

Asteraceae of East Texas (SUNFLOWER, ASTER, and DAISY family)

A nearly-final draft for online release (July 2019)
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Asteraceae is the largest family in East Texas, with 138 genera and 422 species, representing over 12% of the 3426 species estimated to occur in the region. This family will form a substantial portion of Volume 2 of the *Illustrated Flora of East Texas (Acanthaceae–Fabaceae)*, currently in-preparation at BRIT.

Localities are generally derived from the USDA Plants Database maps (USDA NRCS 2016), with additional county records from Turner et al. (2003), Kartesz (2015), online resources, herbarium databases, and other publications, as cited within taxon locality statements.

Pictographs used to indicate rarity, endemism, invasiveness, toxicity, etc., in published volumes of the *Illustrated Floras of Texas* series are herein temporarily approximated with the following placeholders:

☛ = Leaf symbol used to indicate family or generic synopses.

EET = Endemic to East Texas

ET = Endemic to Texas

I = Introduced

! = Of conservation concern

X = Toxic/poisonous plant

NOX = noxious/harmful plant

ASTERACEAE Bercht. & J.Presl (COMPOSITAE)

SUNFLOWER, ASTER, OR DAISY FAMILY

Modified from Barkley et al. (2006), Diggs et al. (1999), Taylor (1997), and Turner (2016),
 and contributed by
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Ours annual, biennial, or perennial herbs, or less frequently subshrubs, shrubs, or vines; leaves basal, alternate, opposite, or whorled, simple or compound, entire, toothed, or lobed, not stipulate (but small basal lobes sometimes resemble stipules); inflorescence a single involucrete capitulum (=head), or several or many involucrete heads in spikes, racemes, corymbs, or panicles, each head simulating a single flower; involucre of one or more rows of separate or united bracts (= phyllaries, so termed to avoid confusion with bracts on peduncles) imitating sepals; flowers grouped inside the involucre on a platform (= receptacle), which may be smooth or pitted, or bristly or hairy, or may have chaffy bracts (= pales) associated with each flower; flowers without typical calyx, but often with a modified calyx of bristles, awns, scales, teeth, or minute crowns (= pappus) on the summit of the inferior ovary; flowers of two basic types (with a few exceptions): ray flowers, which may be perfect or styliferous and fertile, or sterile, or neuter, with corollas of a small basal tube and a broad, often showy, strap-shaped main portion (= ligule); and disk flowers, which may be perfect and fertile or functionally staminate and sterile, with corollas mainly tubular (varying from thread-like to tubular-funnelform or campanulate, with a cylindrical basal tube), with typically 4–5 equal or unequal lobes; stamens none or (4–)5, attached inside the corolla tube, anthers separate or united into a ring; pistil 1 and style 1, commonly with 2 branches (in perfect or styliferous flowers); ovary inferior; fruit a single-seeded achene, often dispersed with aid from the pappus.

☛ Asteraceae is one of the two largest families of flowering plants (Orchidaceae is the other), containing ca. 25,000 species in 1620 genera (Stephens 2001 onward). It is a cosmopolitan family of mainly herbs to shrubs and is of significant economic importance as a source of food plants (e.g., *Lactuca*—LETTUCE, *Cynara*—ARTICHOKE), oil (e.g., *Helianthus*—SUNFLOWER, *Carthamus*—SAFFLOWER), spices and flavorings (e.g., *Artemisia*—TARRAGON and ABSINTH), herbal teas and medicines (e.g., *Matricaria* or *Chamaemelum*—CHAMOMILE, *Echinacea*—PURPLE CONEFLOWER), and ornamentals (e.g., *Aster*,

Chrysanthemum, *Cosmos*, *Dahlia*, *Gerbera*, *Helianthus*, *Tagetes*, and *Zinnia*). Many are weeds including *Taraxacum* (DANDELIONS) and *Cirsium* (THISTLES); *X* In some parts of the world poisonous species of *Senecio* are a major cause of livestock poisoning; wind-pollinated genera such as *Ambrosia* (RAGWEED), *Iva* (SUMPWEED), and *Artemisia* (SAGEBRUSH), which produce large quantities of allergenic pollen, are important causes of hay fever (Lewis et al. 1983). Cronquist (1981) suggested that the evolutionary success of the family may be in part due to a diversified chemical defense system, including polyacetylenes and sesquiterpene lactones. Asteraceae is the largest family in the flora of North America north of Mexico, with 418 genera and 2413 species (Barkley et al. 2006). The 351 species of Asteraceae found in OK make it the largest family in that state (Taylor & Taylor 1994) and the 620 species (almost 13% of the TX flora) in TX likewise make it the largest TX family (Hatch et al. 1990). Asteraceae is also the largest family in the nc TX flora; the 263 species represent nearly 12% of the 2223 species known in nc TX (Diggs et al. 1999). Asteraceae is the largest family in East TX, with 138 genera and 422 species recorded—12.3% of the 3426 species estimated to occur in East TX; we note an additional 26 species and two genera (*Arctium* and *Stokesia*) potentially occurring in East TX, for a total of 140 genera and 448 species treated herein. The tribes and generic circumscriptions (and for the most part, species circumscriptions) in this treatment follow Barkley et al. (2006). (subclass Asteridae—Cronquist; Asterales—APG III)

FAMILY RECOGNITION IN THE FIELD: usually herbs or rarely shrubs or vines with a characteristic inflorescence: flowers in a compact *head* subtended by bracts (= *phyllaries*)—the inflorescence resembling a single flower (heads are often grouped together to form compound inflorescences); corollas sympetalous, 5-merous; stamens united by their anthers; fruit a 1-seeded achene often topped by a *pappus* of bristles, awns, or scales.

REFERENCES: Solbrig 1963; Carlquist 1976; Cronquist 1977, 1980, 1985; Gandhi & Thomas 1989; Jansen et al. 1991, 1992; Michaels et al. 1993; Bremer 1994, 1996; Nesom 1994a; Jansen & Kim 1996; Taylor 1997; Diggs et al. 1999; Panero & Funk 2002; Anderberg et al. 2006; Barkley et al. 2006; Funk et al. 2009; Turner 2016.

KEYS TO GENERA OF ASTERACEAE

ARTIFICIAL KEY TO GENERA OF ASTERACEAE

(For Technical Key to Tribes of Asteraceae see page 12)

1. Heads with flowers all similar and perfect; only ray flowers present (with strap-shaped ligules) OR all corollas neither ray-like nor disk-like, all 2-lipped.
 2. Plant sap usually milky; heads with only ray flowers (with strap-shaped ligules)..... **Key to Cichorieae Tribe** (page 15)
 2. Plant sap usually watery; heads with all corollas neither ray-like nor disk-like, all 2-lipped..... **Key to Mutisieae Tribe** (page 20)
1. Heads with flowers all similar and perfect or not so; heads with disk flowers present (with 4–5-lobed, tubular, eligulate corollas); ray flowers absent OR present at the periphery of the heads and pistillate or neuter.
 3. Heads with ray flowers, the ligules usually evident.
 4. Ray ligules yellow to orange or red to reddish brown, sometimes with reddish brown or maroon marks.
 5. Receptacle chaffy, a bract (pale) subtending each flower. **Key A**
 5. Receptacle without chaffy bracts or pales associated with each flower (but sometimes bearing bristles)..... **Key B**
 4. Ray ligules white, yellowish cream, tawny, pink, lavender, bluish, or purple.
 6. Disk flower pappus (at least the innermost series) of capillary bristles or hairs **Key C**
 6. Disk flower pappus of awns, scales, or a minute crown, or pappus absent..... **Key D**
 3. Heads with only disk flowers or apparently so (ray flowers sometimes present but their corollas inconspicuous or reduced, < 0.7 mm long).
 7. Plants sometimes spiny; phyllaries with hooked or straight spines, or tubercles (at least on pistillate heads when heads unisexual), sometimes united at maturity to form a bur-like fruit OR phyllaries with margins variously lobed, toothed, or bristle-fringed (COCKLEBURS, RAGWEEDS, THISTLES, KNAPWEEDS, and BASKET-FLOWERS)..... **Key E**
 7. Plants not spiny; phyllaries without hooked or straight spines or tubercles or large teeth or bristles, not united into a bur.
 8. Disk corollas white, yellowish cream, greenish, tawny, pink, lavender, bluish, or purple (or infrequently obscured by pubescence, enclosed by receptacle pales, or corollas vestigial or absent) **Key F**
 8. Disk corollas yellow to orange or red to reddish brown or maroon, sometimes with reddish brown or maroon marks..... **Key G**

KEY A

Ray and disk flowers both present; ray flowers yellow to orange or red to reddish brown, sometimes with reddish brown or maroon marks; receptacle chaffy

1. Only ray flowers fertile (= maturing achenes), their achenes much larger than those of the sterile disk flowers.
 2. Leaf blades usually \pm palmately 3–5-lobed; ray achenes thick, rounded, without wings..... **Smallanthus**
 2. Leaf blades unlobed or pinnately lobed; ray achenes \pm strongly flattened, with or without wings.
 3. Achenes broadly winged.
 4. Taprooted annuals; phyllaries 8–10, in 2 series; ray flowers usually 5, in 1 series; involucre 5–12 mm wide **Lindheimera**
 4. Coarse perennials; phyllaries 11–45, in 2–4 series; ray flowers 8–38, in 2–3 series; involucre 10–30 mm wide..... **Silphium**
 3. Achenes not winged.
 5. Leaves crenate, serrate, dentate, or lyrate-pinnatifid; involucre 12–30+ mm wide; ray ligules with green, red, or maroon veins on the lower surface; achenes 4.5–6 mm long **Berlandiera**
 5. Leaves deeply pinnatifid; involucre 6–10 mm wide; ray ligules entirely yellow on the lower surface, without colored veins; achenes 3–4 mm long..... **Engelmannia**
1. Disk flowers perfect and fertile; ray flowers present and fertile OR sterile.
 6. Ray flowers neuter OR pistillate and sterile; only disk flowers fertile (= maturing achenes), their achenes much larger than those of the sterile ray flowers.
 7. Leaves mostly opposite (NOT both alternate and auriculate-clasping); phyllaries apparently in \pm 3 series, dimorphic, the outer (secondary) series herbaceous (and sometimes foliaceous), the inner 2 (primary) series often very unlike the outer, usually scarious-margined; achenes flattened parallel to the phyllaries or 3–4-angled and linear to spindle-shaped.
 8. Primary (inner) phyllaries united for 1/5 to 1/2 or more of their lengths; disk corolla lobes often lance-linear (sometimes triangular) **Thelesperma**
 8. Phyllaries all separate to their bases or nearly so; disk corolla lobes triangular to ovate.
 9. Achenes (at least central ones) \pm 4-angled, \pm linear to spindle-shaped, often with tips narrowed or beaked (no achenes winged).
 10. Disk flowers 10–20 per head; stamen filaments hairy near anthers (use lens); achenes usually with 1 groove on each face **Cosmos**
 10. Disk flowers (5–)12–150+ per head; stamen filaments not hairy; achenes with 0 or 2 grooves on each face.. **Bidens** (in part)
 9. Achenes all \pm obcompressed or flattened (sometimes winged).
 11. Achenes sometimes thickened or winged; pappus usually of barbellate (rarely smooth) awns or sometimes absent..... **Bidens** (in part)
 11. Achenes (some or all) usually thin-margined or \pm winged; pappus usually absent or of 2 bristly scales (or achene wing shoulders may be bristly) **Coreopsis**
 7. Leaves alternate or opposite; phyllaries in 1–several series, usually not strongly dimorphic (IF strongly dimorphic THEN leaves alternate and blades auriculate and clasping); achenes various but usually not flattened parallel to the phyllaries.
 12. Receptacles spheric to high-conic or columnar (mostly 8–20+ mm high); achenes not winged.
 13. Leaves lyrate-pinnate to 1–2-pinnatifid; phyllaries unequal (outer noticeably longer than inner); achenes linear-lanceolate to oblong, strongly compressed, with one margin usually toothed, fringed, or ciliate **Ratibida**
 13. Leaves simple to deeply lobed; phyllaries subequal; achenes obpyramidal and \pm 4-angled, not strongly compressed, margins not toothed, fringed, or ciliate..... **Rudbeckia**
 12. Receptacles mostly flat to convex or conic (mostly 0–5 mm high); achenes winged or unwinged.
 14. Receptacle pales completely enclosing each achene, forming a hardened, warty, fruit-like structure **Sclerocarpus**
 14. Receptacle pales sometimes enfolding an achene, sometimes shed with it, but not completely enclosing each achene in a fruit-like structure.
 15. Stems sometimes winged with decurrent leaf bases; achenes strongly flattened and papery-winged; pappus usually of 2 persistent subulate scales or awns to 2 mm long (or sometimes pappus absent)..... **Verbesina** (in part)
 15. Stems not winged, leaf bases not decurrent; achenes various but not strongly flattened and papery-winged (achenes may be somewhat flattened, with thin margins); pappus of 1–2+ scales, these often fragile and deciduous (plus sometimes shorter scales or squamellae) or pappus sometimes absent.
 16. Petiole bases dilated, fused to form disks at nodes; ray flowers styliferous (= styles present); achenes somewhat flattened and thin-margined..... **Simsia**
 16. Petiole bases not dilated, not forming nodal disks; ray flowers neuter, styles and stigmas absent; achenes \pm compressed, often obpyramidal.
 17. Involucre 4–40+ mm wide; stamen filaments not hairy; pappus fragile, readily falling..... **Helianthus**
 17. Involucre 7–10 mm wide; stamen filaments hairy; pappus persistent or tardily falling..... **Viguiera**
 6. Ray flowers present and fertile (rays sometimes inconspicuous); disk flowers perfect and fertile; both kinds of flowers producing mature achenes (though these may differ in shape).
 18. Stems sometimes winged with decurrent leaf bases; achenes strongly flattened and papery-winged **Verbesina** (in part)
 18. Stems not winged, leaf bases not decurrent; achenes various but not strongly flattened and papery-winged (achenes may be somewhat flattened, with thin margins).
 19. Plants usually strongly aromatic; leaves usually alternate; receptacle chaff (= pales) readily falling; pappus of 20–40 bristles, 3–5.5 mm long..... **Chrysactinia**
 19. Plants sometimes aromatic; leaves opposite; receptacle chaff persistent or falling; pappus of a few awns or bristles OR of scales OR a minute crown OR pappus lacking.
 20. Outer 4 phyllaries broadly lanceolate, foliaceous, forming square “buds” prior to anthesis, overlapping at

- anthesis, notably larger than inner, scarious phyllaries.....**Tetragonotheca**
20. Outer phyllaries larger than inner or not, sometimes herbaceous, but not notably different in texture, not forming 4-sided "buds."
21. Ray ligules sessile, not borne on corolla tubes, 10–40 mm long, usually persistent and becoming papery in age.
22. Plants perennial; leaves petiolate and usually toothed; ray ligules yellow to orange; achenes 4–5 mm long; native species**Heliopsis**
22. Plants annual; leaves sessile and entire; ray ligules usually red (or yellow in cultivars); achenes 6–10 mm long; horticultural exotics escaping cultivation..... **Zinnia**
21. Ray ligules usually borne on corolla tubes, not sessile, 2–15 mm long, not persistent, not becoming papery in age.
23. Plants often decumbent to prostrate; ray ligules to 5 mm long.
24. Receptacles conic; phyllaries 8–15+; disk flowers 25–100(–200+); pappus of 1–3 bristle-like awns, or pappus absent**Acmella**
24. Receptacles convex; phyllaries 5; disk flowers 10–20; pappus of 2(–5+) stout awns **Calyptocarpus**
23. Plants erect or decumbent to prostrate; ray ligules 6–15 mm long.
25. Leaves usually villous to sericeous; phyllaries 20–40+; phyllaries and pales spine-tipped.....**Borrchia**
25. Leaves usually hispid to scabrous; phyllaries 8–16+; phyllaries and pales not spine-tipped.
26. Prostrate herbaceous perennials, often rooting at nodes; achenes strongly biconvex to plumply 3–4-angled; pappus a small fringed crown or absent..... **Sphagneticola**
26. Small erect shrubs; achenes mostly strongly compressed and 3–4-angled, usually ± winged; pappus a small cup-like crown plus sometimes 1–3 bristles or awns to 6 mm long..... **Wedelia**

KEY B

Ray and disk flowers both present; ray flowers yellow to orange or red to reddish brown, sometimes with reddish brown or maroon marks; receptacle without chaffy bracts or pales (but sometimes bearing bristles)

1. Disk flower pappus of scales OR a few (< 10) stout bristles or awns OR a minute crown OR pappus lacking.
2. Plants usually strongly aromatic (sometimes unpleasantly so); phyllaries (and usually also leaves) noticeably dotted or streaked with pellucid glands containing strong-scented oils.
3. Leaves linear, margins entire and glandular-punctate, basally ciliate; phyllaries distinct to bases or nearly so; disk flowers 7–20 per head, corollas sometimes weakly 2-lipped **Pectis**
3. Leaves linear and entire to coarsely toothed OR wider and pinnately lobed to pinnatisect, not basally ciliate; phyllaries fused 1/3+ of their lengths (at least the inner series); disk flowers (10–)20–150+ per head, corollas 5-lobed.
4. Leaves pinnately lobed or pinnatisect, the lobes or segments usually lanceolate to ovate; secondary (subtending) phyllary-like bracts absent; disk corollas 7–12+ mm long; pappus of 2–6 elements; horticultural exotics escaping cultivation **Tagetes**
4. Leaves simple and entire to toothed or pinnately lobed, the leaves or lobes usually filiform to linear; secondary phyllary-like bracts often present; disk corollas 2–4.5 mm long; pappus of 10–12 elements; native species.
5. Plants 40–90 cm tall; leaf bases and secondary phyllary-like bracts often with a few stiff bristles; phyllaries 10–12; ray flowers 7–12, ligules 10–15 mm long **Dysodiopsis**
5. Plants 15–30 cm tall; leaf bases and secondary phyllary-like bracts (if any) lacking stiff bristles; phyllaries 12–22; ray flowers 10–21, ligules 2–10 mm long **Thymophylla**
2. Plants sometimes aromatic; leaves sometimes with sessile or stalked glands, but these generally minute and not noticeably pellucid; phyllaries eglandular or glandular, or sometimes notably resinous.
6. Plants taprooted; stems, leaves, and/or phyllaries resinous or gummy; leaves often gland-dotted, sometimes releasing a turpentine scent when crushed.
7. Leaves usually crenate to dentate or serrate; involucre (6–)8–25 mm wide; disk flowers usually 100+ per head; achenes glabrous **Grindelia** (in part)
7. Leaves entire; involucre 1–5 mm wide; disk flowers 1–50 per head; achenes pubescent or bristly.
8. Ray and disk flowers with strongly dissimilar pappus types, the ray pappus a small crown, the disk pappus of 5–8 white, narrowly spatulate, basally-fused scales **Amphichyris**
8. Pappus not dimorphic, or only weakly so (ray pappus may differ in size from disk pappus but will not differ in pappus type) OR pappus lacking.
9. Plants subshrubs, perennials, or annuals, to 140 cm tall; receptacles hairy; ray flowers 1–23 per head, ligules 1.5–6 mm long; disk pappus a short scaly crown 0.1–1 mm high, or rarely absent **Gutierrezia**
9. Plants shrubs, to 150(–200) cm tall; receptacles naked; ray flowers 4–9 per head, ligules 2–3 mm long; pappus absent, or a minute toothed crown < 0.1 mm high..... **Gymnosperma**
6. Plant root types various; herbage not resinous or gummy; leaves gland-dotted or eglandular, aromatic or not when crushed (lacking a turpentine scent).
10. Leaves opposite, ± succulent; phyllaries usually 2; ray flowers usually 1 per head; pappus absent **Flaveria**
10. Leaves either basal or mostly alternate (at least on upper stems), seldom succulent; phyllaries 5+; ray flowers 2+

- per head; pappus present or absent.
11. Ray flowers 2–5 per head.
12. Stems and leaves green, glabrous or sparsely hairy; disk flowers 16–22 per head, 4-lobed; pappus usually of 1–2 bristles to 1.8 mm long plus minute vestigial scales or a callous crown, or rarely pappus absent **Perityle**
12. Stems and leaves gray-green, cobwebby-villous; disk flowers 5–8(–12) per head, 5-lobed; pappus of 4–6 scales, 2.5–3+ mm long **Psilostrophe**
11. Ray flowers 6+ per head.
13. Ray and disk flowers with strongly dissimilar achenes, the ray achenes prismatic or club-shaped, 4–5 mm long, the disk achenes compressed and often winged, 6–8 mm long; pappus absent; horticultural exotics escaping cultivation **Dimorphotheca**
13. Ray and disk achenes not dimorphic as described above (they may be dimorphic in other ways) OR either ray or disk flowers sterile and not producing achenes; pappus of awns or scales; native species.
14. Stems usually winged by decurrent leaf bases; achenes 0.6–1.5 mm long (IF stems unwinged THEN achenes to only 1.3 mm long) **Helenium**
14. Stems not winged; leaf bases not decurrent; achenes 1.5+ mm long.
15. Leaves usually sharply crenate to dentate or serrate (rarely entire); phyllaries in 5–6(–9) series, usually strongly recurved; achenes glabrous **Grindelia** (in part)
15. Leaves entire to toothed or lobed to pinnatifid; phyllaries in 2–5 series, erect to reflexed at maturity; achenes pubescent or rarely glabrous.
16. Disk flowers functionally staminate and sterile, only ray flowers producing achenes; ray flower pappus of several series of barbellate bristles 1–3 mm long; disk pappus of 1–3 awn-like bristles **Bradburia** (in part)
16. Disk flowers perfect and fertile, ray flowers fertile or sterile; ray and disk pappus similar, of scales.
17. Herbage noticeably sweet-scented, like newly-mown sweet-clover; achenes narrowly obconic, prominently 10-ribbed; pappus scales not awn-tipped **Amblyolepis**
17. Herbage not noticeably sweet-scented (may be otherwise aromatic); achenes usually obpyramidal and 4-sided; pappus scales awn-tipped.
18. Phyllaries usually strongly reflexed in fruit; receptacles often bristly; ray ligules (when present) frequently in colors other than solid yellow; disk corollas usually brown-purple to red-brown, or tipped with these colors; pappus of 7–12 awn-tipped scales, 5–9 mm long **Gaillardia**
18. Phyllaries mostly spreading to erect in fruit; receptacles naked; ray ligules usually uniformly some shade of yellow (rarely tipped or striped with white); disk corollas usually solid yellow (or sometimes purple-tipped); pappus of 4–7 awn-tipped scales, 1.2–4 mm long.
19. Phyllaries in 2 series of identical number, glabrous or inconspicuously short-pubescent, margins not noticeably scarious; ray flowers either 6–8 and ligules minute (to 3 mm long) in two rare species OR ray flowers 8–13 and ligules 8.5–11 mm long in one common species, withering and twisting in age **Hymenoxys**
19. Phyllaries in 3 series, usually ± hairy, margins usually scarious (at least inner series); ray flowers 9–26, ligules 8.2–22 mm long, often not withering, remaining attached and strongly recurved in age **Tetraeneuris**
1. Disk flower pappus of 20+ capillary bristles or hairs, with or without an additional outer series of scales or awns or bristles.
20. Perennials or subshrubs, evergreen, strongly aromatic; leaves and phyllaries noticeably dotted or streaked with pellucid glands containing strong-scented oils **Chrysactinia**
20. Perennials, biennials, or annuals, evergreen or deciduous, sometimes aromatic; leaves and/or phyllaries sometimes with sessile or stalked glands, but these generally minute and not noticeably pellucid.
21. Primary phyllaries in 1–2 series, equal or subequal, usually subtended by 1–20 secondary phyllary-like bracts.
22. Plants vining, to 500 cm tall; ray ligules orange to brick-red; disk corollas orange; horticultural escape in subtropical parts of TX **Pseudogynoxys**
22. Plants herbaceous, to 80 cm tall; ray ligules yellow; disk corollas yellow; native or weedy plants widespread in TX.
23. Plants annual or perennial; stem leaves deeply toothed to pinnately lobed or compound, bases sometimes auriculate and clasping **Packera**
23. Plants annual; stem leaves nearly entire or shallowly toothed, bases usually auriculate and clasping **Senecio**
21. Primary phyllaries in 3–6+ series, usually unequal, not subtended by secondary phyllary-like bracts.
24. Outer pappus series of scales or flat-based awns, 0.25–1.4 mm long (use hand lens), surrounding inner series of longer bristles.
25. Basal leaves persistent, linear to lanceolate or oblanceolate, grass-like in appearance, 3–11-parallel veined, pubescence silky-sericeous **Pityopsis**
25. Basal leaves (if present) spatulate to obovate or ovate to elliptic (not grass-like), usually 1-nerved, with pinnate or reticulate veins, pubescence scabrous to hispid-strigose or pilose to sericeous-cobwebby.
26. Plants fibrous-rooted, sometimes with short lateral rhizomes; herbage pilose to sericeous-cobwebby;

- basal leaves sessile; ray ligules 2–3 mm wide **Chrysopsis**
26. Plants taprooted, sometimes rhizomatous; herbage scabrous to hispid-strigose or pilose; basal leaves (if present) petiolate or subsessile; ray ligules 1–2 mm wide.
27. Plants annual or perennial (IF annual, THEN achenes dimorphic and ray achenes lacking pappus); leaves scabrous to hispid or strigose, often with sparse to dense stalked glands (IF eglandular THEN leaves silvery gray-green) **Heterotheca**
27. Plants annual; leaves pilose, eglandular; ray and disk achenes similar; pappus always present **Bradburia** (in part)
24. Pappus solely of thin-based, capillary bristles in 1–4 series (outer series may be shorter than inner).
28. Achenes dimorphic, the ray achenes \pm 3-sided, the disk achenes \pm compressed.
29. Herbage eglandular; basal and lowermost stem leaves pinnately lobed or pinnatifid; receptacle with a persistent network of subulate, chaff-like scales; inner phyllaries basally narrowed and stalk-like, expanded above **Xanthisma**
29. Herbage with prominent sessile or stalked glands; basal and lowermost stem leaves coarsely serrate to entire; receptacle naked; inner phyllaries not basally narrowed **Rayjacksonia**
28. Ray and disk achenes similar in shape.
30. Involucres 10–15 mm high and 15–25 mm wide; ray flowers 25–45 per head **Grindelia** (in part)
30. Involucres 3–10 mm high and 1.7–10 mm wide; ray flowers 2–30 per head.
31. Taprooted annuals or biennials; heads borne singly or in loose, widely-branched paniculate arrays **Croptilon**
31. Rhizomatous perennials; heads usually borne in clusters in corymbose, paniculate, or racemose arrays.
32. Leaves entire, with glandular-punctate dots; heads in a \pm flat-topped corymbose arrangement; achenes 2–4-nerved **Euthamia**
32. Leaves usually serrate, without glandular-punctate dots; heads in pyramidal paniculate or club-shaped racemose arrangements (or sometimes in axillary clusters); achenes 8–10-nerved **Solidago**

KEY C

Ray and disk flowers both present; ray flowers white, yellowish cream, tawny, pink, lavender, bluish, or purple; disk pappus (at least the innermost series) of capillary bristles or hairs

1. Ray flowers inconspicuous, ligules < 1 mm long, barely exceeding the phyllaries **Conyza**
1. Ray flowers conspicuous, ligules 1.3+ mm long, exceeding the phyllaries.
2. Corollas of disk flowers bilaterally symmetrical, creamy white to purple, sometimes maturing to crimson **Chaptalia**
2. Corollas of disk flowers radially symmetrical, most often true yellow, infrequently yellowish cream or yellow-orange, sometimes becoming pink to brown with age.
3. Plants subshrubs or rush-like perennials, colonial; stems green and glaucous, green thorns often present; few leaves present at flowering; phyllaries (1–)3(–5)-nerved **Chloracantha**
3. Plants herbaceous annuals or perennials, solitary or colonial; stems not becoming thorny; at least upper leaves persistent through flowering; phyllaries usually 1-nerved (sometimes 3-nerved in *Erigeron* and *Symphotrichum*).
4. Plants 1–3 cm tall; heads solitary and nearly sessile, nestled in basal rosettes; involucre (10–)12–25+ mm wide **Townsendia**
4. Plants usually 10+ cm tall; heads solitary or borne in various arrays, usually well above any basal leaves; involucre often < 12 mm wide.
5. Heads usually borne in flat-topped corymbose arrays; ray ligules white, 2–7 per head; disk flowers usually < 20 per head; disk flower pappus innermost bristles with strongly flattened tips (= clavate) **Doellingeria**
5. Heads solitary or borne in various arrays; ray ligules white or various shades of pink, blue, violet, or purple, 7–100+ per head; disk flowers usually > 20 per head; disk flower pappus innermost bristles with rounded tips (or perhaps obscurely flattened).
6. Leaves narrow, stiff, evenly distributed; phyllaries strongly keeled; ray and disk achenes slightly dimorphic; achene pubescence silky strigose-sericeous **Ionactis**
6. Leaves variously shaped and distributed; phyllaries flat or only swollen at bases, not strongly keeled; ray and disk achenes either monomorphic OR strongly dimorphic; achenes glabrous to strigose but usually not silky-sericeous.
7. Plants taprooted annuals; achenes strongly dimorphic, ray achenes 1.3–1.5 mm long and sparsely hairy, disk achenes 2–3 mm long and glabrous or nearly so; pappus lacking on ray achenes **Psilactis**
7. Plants annual or perennial, taprooted or fibrous rooted or rhizomatous; achenes of various sizes, glabrous to variously pubescent, but generally monomorphic within a head; ray achenes with some pappus present, similar to disk achenes or differing.
8. Leaves glabrous to minutely scabrous, margins usually entire and often revolute; phyllaries glabrous and tips often squarrose or strongly recurved; ray flowers 15–30 per head, ligules usually violet-purple, rarely white; achenes 9–16-nerved **Eurybia**
8. Leaves glabrous or variously pubescent, margins various; phyllaries glabrous or variously pubescent, tips appressed or erect to variously recurved; ray flowers 8–350+ per head; ligules often white, but also sometimes pinkish to bluish or purplish; achenes 2–5(–10)-nerved.
9. Heads borne singly or in loose corymbose or paniculate arrays; peduncles of buds often nodding;

- phyllaries with orange-resinous veins, tips usually lacking a well-differentiated green zone; ray flowers usually 44–350+ per head, ligules usually < 1 mm wide; plants flowering Mar–Jun (sporadically into Oct).....**Erigeron**
9. Heads usually borne in paniculate or corymbose arrays; peduncles of buds often erect; phyllaries lacking orange-resinous veins, tips usually with a well-differentiated green zone, or sometimes foliaceous; ray flowers usually 8–50 per head, ligules usually > 1 mm wide; plants flowering Aug–Nov (rarely Mar–Apr).....**Symphotrichum**

KEY D

Ray and disk flowers both present; ray flowers white, yellowish cream, tawny, pink, lavender, bluish, or purple; disk pappus of awns, scales, or a minute crown, or pappus absent

1. Receptacles chaffy, a bract (pale) subtending each flower.
 2. Only ray flowers fertile (= maturing achenes), their achenes much larger than those of the sterile disk flowers.
 3. Inner phyllaries each subtending and clasping a ray achene; mature achenes enclosed by and shed within the subtending phyllary, forming a fruit-like or bur-like structure.
 4. Heads borne in sessile clusters; ray flowers 5–8 per head, ligules inconspicuous, minute; achenes shed in a bur-like structure, 7–9+ mm long, with hooked or straight spines or tubercles**Acanthospermum**
 4. Heads borne singly on peduncles; ray flowers 7–13 per head, ligules obvious, showy; achenes shed in a ± conical or boot-shaped, fruit-like structure, 1.3–2.6 mm long.....**Melampodium**
 3. Inner phyllaries sometimes subtending and clasping a ray achene; mature achenes sometimes shed with the subtending phyllary or other parts, but not completely enclosed within the phyllary and not forming a fruit-like or bur-like structure.
 5. Ray flowers 5(–8) per head, ligules to 2 mm long; achenes compressed but not winged, 1.5–4+ mm long (each shed with the subtending phyllary, two adjacent disk flowers, and their pales)**Parthenium**
 5. Ray flowers 14–30 per head, ligules 10+ mm long; achenes flattened and winged, 12–26 mm long (shed without accessory structures).....**Silphium**
 2. Disk flowers perfect and fertile; ray flowers fertile OR sterile.
 6. Ray flowers neuter OR pistillate and sterile; only disk flowers fertile (= maturing achenes), their achenes much larger than those of the sterile ray flowers.
 7. Leaves all opposite; phyllaries apparently in ± 3 series, dimorphic, the outer (secondary) series herbaceous (and sometimes foliaceous), the inner 2 (primary) series often very unlike the outer, usually scarious-margined.
 8. Ray ligules 15–50 mm long; disk corollas 5–7 mm long; stamen filaments hairy near anthers (use lens); achenes usually with 1 groove on each face **Cosmos**
 8. Ray ligules 1–15+ mm long; disk corollas 2–5 mm; stamen filaments not hairy; achenes with 0 or 2 grooves on each face**Bidens**
 7. Leaves mostly alternate; phyllaries in 1–several series, usually not strongly dimorphic, herbaceous or scarious-margined.
 9. Stems winged by decurrent leaf bases; achenes strongly flattened and papery-winged; pappus usually of 2 persistent subulate scales or awns to 2 mm long (or sometimes pappus absent).....**Verbesina** (in part)
 9. Stems unwinged, leaf bases not decurrent; achenes rounded or 4-angled in cross-section, not strongly flattened or papery-winged; pappus absent or a small crown, sometimes with a few teeth.
 10. Ill-scented annuals; leaves 1–2-pinnately lobed; involucre 5–9 mm wide; ray ligules white.....**Anthemis**
 10. Non-aromatic perennials; leaves entire to dentate or serrate; involucre 12–40 mm wide; ray ligules pink to purple or rarely white**Echinacea**
 6. Ray flowers fertile; disk flowers perfect and fertile; both kinds of flowers producing mature achenes (though these may differ in shape).
 11. Leaves all opposite; achenes 3–4-angled or compressed.
 12. Leaves serrate to subentire; involucre 3–5 mm wide; ray ligules ca. 2 mm long.....**Eclipta**
 12. Leaves entire; involucre 15–25 mm wide; ray ligules 10–35 mm long.....**Zinnia**
 11. Leaves mostly alternate; achenes strongly flattened and winged.
 13. Plants usually > 50 cm tall; stems winged by decurrent leaf bases; ray ligules 3–7+ mm long**Verbesina** (in part)
 13. Plants often < 50 cm tall; stems unwinged, leaf bases not decurrent; ray ligules 1.5–3 mm long**Achillea**
1. Receptacles naked, not bearing chaff or pales (but sometimes bearing bristles).
 14. Disk flower pappus either absent OR a minute crown < 1 mm high (crown may be of thickened rings, scales, awns, or hairs).
 15. Leaves opposite, ± succulent; phyllaries usually 2; disk flowers 0–1(–2) per head.....**Flaveria**
 15. Leaves alternate, not succulent; phyllaries 10+; disk flowers 5+ per head.
 16. Heads borne in loose, leafy corymbose or paniculate arrays; achenes dimorphic, ray achenes ± 3-sided and sometimes winged, disk achenes ± compressed.....**Boltonia** (in part)
 16. Heads borne singly; achenes not dimorphic, or only weakly so and not as described above (pappus may be dimorphic).
 17. Involucre 12–20+ mm wide; ray ligules often > 15 mm long.....**Leucanthemum**

17. Involucres < 12 mm wide; ray ligules usually < 15 mm long.
18. Plants aromatic (smelling of sweet hay when bruised); leaves finely and narrowly divided, usually 2–3-pinnately lobed; achenes 0.75–0.9 mm long **Matricaria**
18. Plants not especially aromatic; leaves entire to pinnatifid; achenes usually 1+ mm long.
19. Plants often small and delicate; receptacles flat to convex, smooth; ray flowers 5–19 per head; disk flowers 4–22; achenes 1.5–2.2 mm long **Chaetopappa** (in part)
19. Plants delicate or not; receptacles conic, pitted; ray flowers (7–)13–75 per head; disk flowers 25–400; achenes 1–1.6 mm long.
20. Leaves varying from entire to deeply pinnatifid, achenes columnar, 4-angled to somewhat rounded, 4–12-ribbed **Aphanostephus**
20. Leaves usually entire or sometimes toothed; achenes obovoid to oblanceoloid, compressed, 2-nerved (nerves marginal) **Astranthium**
14. Disk flower pappus (at least on the central achenes) with at least some elements usually > 1 mm long, of scales, awns, hairs, a cup-like crown, or bristles, OR any combination of these.
21. Plants dainty taprooted annuals, 3.5–30 cm tall; pappus of 5 scales alternating with 5 slender awns **Chaetopappa**
21. Plants annual or perennial, of various heights; pappus various but not of 5 scales and 5 awns alternating.
22. Achenes dimorphic, ray achenes \pm 3-sided and sometimes winged, disk achenes \pm compressed; pappus of 2–3 awns (sometimes with 1–12 shorter bristles or scales) **Boltonia** (in part)
22. Achenes not dimorphic, or only weakly so and not as described above; pappus various (may be dimorphic), usually not of 2–3 awns.
23. Ray flowers usually 44–350+ per head; disk achene pappus with an inner series of (5–)8–36 bristles, often with an outer series of scales, or shorter bristles, or a crown; achenes \pm compressed or flattened **Erigeron**
23. Ray flowers < 40 per head; disk achene pappus of scales (may be awn-tipped), not of bristles; achenes \pm 4-angled or club-shaped, not compressed.
24. Small plants, < 20 cm tall; ligules inconspicuous, 2–3 mm long, whitish to pale yellow; pappus of 5–6 awn-tipped scales, 1.4–2.5 mm long **Hymenoxys**
24. More robust plants, usually > 20 cm tall; ligules usually obvious and showy, 5–30+ mm long, pink to purple or white to pale yellow; pappus of 4–12 rounded or awn-tipped scales, 3–9 mm long (sometimes shorter or absent on peripheral achenes).
25. Leaves entire to toothed or pinnately lobed; heads borne singly; phyllaries 14–40; receptacles often bristly; achenes 1.5–4+ mm long **Gaillardia**
25. Leaves entire; heads borne in \pm corymbose arrays; phyllaries 8–14; receptacles without bristles; achenes 5–9 mm long **Palafoxia**

KEY E

Disk flowers only or apparently so; phyllaries with hooked or straight spines, or tubercles (at least on pistillate heads when heads unisexual), sometimes united at maturity to form a bur-like fruit OR phyllaries with margins variously lobed, toothed, or bristle-fringed; plants sometimes spiny

1. Some or all flowers imperfect, corollas small (< 5 mm long), rudimentary, or absent; pappus absent.
2. Stems procumbent; pistillate and functionally staminate flowers in the same head **Acanthospermum**
2. Stems generally erect; pistillate and staminate flowers in different heads (plants monoecious) (RAGWEEDS and COCKLEBURS).
3. Staminate heads usually in racemes or spikes, their phyllaries united and cup-shaped; pistillate heads forming a 1-seeded bur < 6 mm long, with phyllary tips projecting as 1–12 spines or tubercles (or rarely, membranous wings) **Ambrosia**
3. Staminate heads in terminal clusters, their phyllaries not fused; pistillate heads forming a 2-seeded bur (cocklebur) 10–30+ mm long, with phyllary tips projecting as 20+ hooked, spine-like structures **Xanthium**
1. Flowers usually perfect, corollas relatively large, showy, variously colored; pappus of awns, bristles, or scales usually present (THISTLES, KNAPWEEDS, and BASKET-FLOWERS).
4. Corollas bright yellow to yellow-orange or orange-red.
5. Leaf margins never spiny; leaf bases long-decurrent, creating winged stems; all phyllaries spine-tipped; pappus of stiff bristles **Centaurea** (in part)
5. Leaf margins sometimes spiny; leaf bases not decurrent; stems unwinged; outer phyllaries sometimes leafy, at least the inner phyllaries spine-tipped; pappus absent or of scales **Carthamus**
4. Corollas usually pink to rosy-red or lavender to bluish purple, less often white, or rarely pale yellow.
6. Pappus of 4–5 scales, 8–12 mm long, shed early from mature achenes **Stokesia**
6. Pappus of many awn-like scales or bristles.
7. Leaf margins spiny.
8. Pappus of plumose bristles (feather-like, with long side branches, at least on the upper portion) **Cirsium**
8. Pappus of awn-like scales, smooth bristles, or barbellate bristles (with short side branches).
9. Leaves variegated (mottled white and green above); leaf bases not decurrent; stems lacking spiny wings **Silybum**
9. Leaves uniformly colored above; leaf bases long-decurrent, creating spiny-winged stems.
10. Receptacles unpitted, bearing flattened bristles or scales; pappus bristles 11–25 mm long **Carduus**

10. Receptacles deeply pitted, lacking bristles or scales; pappus bristles 7–9 mm long.....**Onopordum**
7. Leaf margins not spiny.
11. Phyllary margins entire, tips with a single, prominent, hooked spine; corollas of all flowers similar; the entire head shed as a spiny bur at maturity**Arcium**
11. Phyllary margins variously lobed, toothed, or bristle-fringed, not prominently spine-tipped; corollas of peripheral flowers often enlarged, simulating ray flowers; achenes generally shed individually at maturity.
12. Involucres 10–16 mm high; peripheral (sterile) flower corollas 15–25 mm long..... **Centaurea** (in part)
12. Involucres 30–50 mm high; peripheral (sterile) flower corollas 35–50 mm long.....**Plectocephalus**

KEY F

Disk flowers only or apparently so; phyllaries mostly entire; corollas white, yellowish cream, greenish, tawny, pink, lavender, bluish, or purple (or infrequently obscured by pubescence, enclosed by receptacle pales, or corollas vestigial or absent); plants not spiny

1. Plants dioecious (or essentially so), all flowers imperfect.
2. Shrubs or subshrubs, variable in size from 25–600 cm tall (male and female plants may differ in appearance); leaves mostly on stems; pappus of 25–50 bristles, 7–14 mm long**Baccharis**
2. Herbs, usually less than 45 cm tall; leaves mostly basal; pappus of 10–20+ bristles, 2.5–8 mm long..... **Antennaria**
1. Plants monoecious, at least some flowers in each head usually perfect.
3. Leaves alternate, usually entire (NOT deeply divided or pinnately lobed), white or gray woolly-tomentose beneath (sometimes bicolor and green above, or with dense silvery-gray pubescence on both sides); phyllaries usually pale and notably scarious-margined; heads often with copious cottony or woolly pubescence; flowers typically small, not very showy, sometimes embedded in or obscured by pubescence.
4. Plants rhizomatous perennials, often > 50 cm tall.
5. Stems winged by long-decurrent leaf bases; heads in interrupted, ± cylindric, spicate arrays (not leafy); pappus of numerous bristles**Pterocaulon**
5. Stems unwinged, leaf bases not decurrent; heads in paniculate or racemose arrays (often leafy); pappus absent.....**Artemisia** (in part)
4. Plants taprooted annuals or short-lived fibrous-rooted perennials, usually 3–50 cm tall.
6. Heads embedded in and ± obscured by cottony pubescence, clustered in compact, terminal arrays, subtended by leafy bracts; phyllaries 0–6; receptacles chaffy; pappus essentially absent.
7. Pales of perfect flowers saccate, each enclosing a flower; achenes (at least the peripheral ones) strigose; known only from Gulf coastal prairie in Victoria Co.....**Micropsis**
7. Pales of perfect or staminate flowers flat to concave, not enclosing flowers; achenes glabrous; widespread in East TX**Diaperia**
6. Heads often with woolly hairs but not embedded in or obscured by these, clustered in terminal, corymbose, spicate, or paniculate arrays; phyllaries more numerous, in 3–7 series; receptacles naked; pappus of bristles.
8. Pappus of plumose bristles (use lens to see side branches)**Facelis**
8. Pappus of minutely-barbed or barbellate bristles.
9. Heads in spicate or narrow paniculate arrays (reduced to terminal clusters in depauperate individuals); receptacles concave in fruit; pappus of 12–28 minutely barbed bristles, deciduous as a ring; usually blooming Mar–Jun.....**Gamochoaeta**
9. Heads in corymbose or paniculate arrays or terminal clusters, often somewhat flat-topped; receptacles flat in fruit; pappus of 10–12 barbed bristles, these readily separating individually, in clusters, or as an easily-fragmented ring; most species blooming Aug–Dec (Apr–Jun in *P. luteoalbum*)**Pseudognaphalium**
3. Leaves variously arranged, margins various (IF white or gray woolly-tomentose beneath or with dense silvery-gray pubescence on both sides THEN deeply divided or pinnately lobed); phyllaries green or colorful or pale, sometimes scarious-margined; heads glabrous or pubescent but generally not with copious cottony or woolly pubescence; flower size various, showy or not so, usually not embedded in or obscured by pubescence.
10. Receptacles chaffy, a bract (pale) subtending each flower.
11. Leaves opposite; primary phyllaries subtended by 3–21+ secondary phyllary-like bracts (these may be ± herbaceous); pappus usually of 2–4 retorsely-barbed awns 2–4 mm long**Bidens**
11. Leaves opposite or alternate; primary phyllaries not subtended by secondary phyllary-like bracts; pappus of unbarbed scales or awns, barbellate bristles, or pappus absent.
12. Plants wind-pollinated, the heads small and not at all showy nor attractive to pollinators; disk corollas minute or insignificant.....**Iva**
12. Plants generally adapted for pollination by insects, heads colorful or otherwise attractive; disk flowers with obvious corollas.
13. Pappus of ca. 40 barbellate bristles**Chromolaena** (in part)
13. Pappus of 2–6 scales or awns or pappus absent.
14. Leaves entire; heads solitary or in open corymbose arrays; corollas lavender-pink to purple to white, lobes long and often contorted; pappus of 5–6 scales**Marshallia**
14. Leaves dentate to deeply pinnately lobed; heads in relatively compact corymbose or paniculate arrays; corollas white to pale dingy yellow, lobes short; pappus of 2 subulate scales or awns or pappus

- absent.
15. Plants 100+ cm tall; stems winged with decurrent leaf bases; leaves minutely pubescent; achenes strongly flattened and papery-winged **Verbesina**
15. Plants often < 100 cm tall; stems unwinged, leaf bases not decurrent; leaves usually hairy, sometimes silvery-gray; achenes compressed but not strongly flattened, unwinged **Parthenium**
10. Receptacles not bearing chaff or pales (but sometimes bearing bristles).
16. Pappus of scales OR a few stout-based bristles or awns OR a minute crown OR pappus lacking.
17. Pappus (at least of the central achenes) of scales OR a few stout-based bristles or awns.
18. Heads sessile; flowers 1–5+ per head.
19. Leaves mostly basal, wider than linear-filiform; several heads clustered and subtended by whorls of 2–3 leaf-like ovate-deltate bracts ca. 10 mm long; flowers (1–)4(–5+) per head, corollas pink or purple to white; pappus of 5(–6) bristle-tipped scales **Elephantopus**
19. Leaves mostly on the stems, linear-filiform; heads not clustered, not subtended by ovate leaf-like bracts; flowers 3 per head, corollas white to pale yellowish; pappus of 10 scales in 2 series **Thurovia**
18. Heads pedunculate; flowers 5–100+ per head.
20. All leaves usually 1–2-pinnately lobed, often tomentose and gland-dotted; phyllaries petaloid at tips; pappus of 14–20 awn-tipped scales **Hymenopappus**
20. Leaves entire to toothed or pinnatifid; glabrous to sparsely villous; phyllaries not petaloid (may be colorful); pappus (at least of the central achenes) of 4–10 subulate or awn-tipped scales.
21. Leaves mostly basal, margins entire to toothed or pinnatifid; phyllaries 22–32, usually green; achenes 2 mm long **Gaillardia**
21. Leaves mostly on the stems, margins entire; phyllaries 8–14, often tipped purple or white; achenes 3–8 mm long **Palafoxia**
17. Pappus a minute crown OR pappus lacking.
22. Rhizomatous perennials, 20–120+ cm tall; leaves linear to lanceolate or oblong-elliptic, margins entire to toothed or pinnately lobed; heads borne in panicate arrays; achenes 0.5–0.8 mm long **Artemisia** (in part)
22. Taprooted annuals, usually 2–40 cm tall; leaves obovate to spatulate, (1–)2–3-pinnately lobed or finely dissected; heads usually borne singly; achenes 1–3+ mm long.
23. Heads sessile in leaf axils; achenes tipped by a persistent spine-like stylar sheath (painful in a manner similar to sandburs) **Soliva**
23. Heads pedunculate; achenes without a persistent spine-like stylar sheath.
24. Receptacles flat to convex; peripheral flowers pistillate, central flowers functionally staminate; achenes compressed or ± flattened, obovoid to oblong, the peripheral ones larger and ± winged; pappus absent **Cotula**
24. Receptacles conic to oblong-ovoid; all flowers perfect and fertile; achenes ± cylindrical-obconic, ribbed; pappus a small crown **Matricaria**
16. Pappus of bristles or hairs, with or without an additional, shorter, outer series of scales or bristles.
25. Leaves all or mostly opposite or whorled.
26. Perennial twining or scrambling vines; phyllaries 4; flowers usually 4 per head **Mikania**
26. Non-vining annuals, perennials, or shrubs; phyllaries 8+; flowers 3–60+ per head.
27. Involucres 5–12 mm wide; achenes 10-ribbed **Brickellia** (in part)
27. Involucres 1–7 mm wide; achenes (3–)4–5(–8) ribbed.
28. Pappus of 2–6+ hair-like scales or bristles to 0.5 mm long **Trichocoronis**
28. Pappus of (5–)10–50 barbellate bristles or hair-like scales, much longer than 0.5 mm.
29. Phyllaries ± equal in length.
30. Receptacles conic **Conoclinium**
30. Receptacles flat or convex.
31. Involucres 1–3(–5+) mm wide; flowers (4–)5(–15) per head; style bases usually puberulent **Eupatorium** (in part)
31. Involucres 3–6 mm wide; flowers 10–60 per head; style bases glabrous **Ageratina**
29. Phyllaries unequal (outer ones shorter).
32. Leaves whorled, with 3–7 petiolate leaves per node **Eutrochium**
32. Leaves opposite, rarely whorled (IF whorled THEN sessile).
33. Flowers (4–)5(–15) per head; style bases usually puberulent and enlarged **Eupatorium** (in part)
33. Flowers (6–)15–40(–75) per head; style bases glabrous, not enlarged.
34. Involucres 5–10 mm high; phyllaries in 4–6+ series; achenes (3–)5-ribbed, usually gland-dotted **Chromolaena** (in part)
34. Involucres 4–5 mm high; phyllaries in 2–4 series; achenes 5(–8)-ribbed, not gland-dotted **Fleischmannia**
25. Leaves all or mostly alternate. (
35. Pappus of two distinctly different series, the inner row of long bristles, the outer of shorter scales or bristles **Vernonia**
35. Pappus of 1–several series of bristles, usually of similar lengths.

36. Leaves deeply divided to pinnately or palmately pinnatifid, ultimate lobes linear **Eupatorium** (in part)
36. Leaves entire to variously toothed or lobed but not deeply divided or pinnatifid.
37. Phyllaries usually 5, 8, 13, or 21 in 1–2 series, \pm equal; pappus bristles 60–200+.
38. Plants perennial; leaves entire or rarely toothed, palmately veined (with several prominent, \pm parallel longitudinal nerves converging at the base and tip); phyllaries mostly pale green to white; 5 flowers per head..... **Arnoglossum**
38. Plants annual; leaves entire to sharply double-serrate and sometimes irregularly lobed, pinnately veined (with a single prominent midnerve and lacking additional prominent, parallel, longitudinal nerves); phyllaries mostly leaf-green; 10+ flowers per head.
39. Leaves entire to toothed or weakly lobed; corollas pink to purple or reddish purple, surpassing the phyllaries by 2–4 mm; achenes with 5 ribs or nerves..... **Emilia**
39. Leaves sharply double-serrate and lobed; corollas whitish to greenish or yellowish cream to pale pinkish, only slightly surpassing the phyllaries; achenes with 10–12 ribs or nerves **Erechtites**
37. Phyllaries 18–40+ in 2–7 series, unequal; pappus bristles usually < 40.
40. Achenes 8–11-ribbed, 2.7–9 mm long; pappus bristles barbellate to plumose.
41. Shrubs or woody-based perennials, usually much-branched; heads in paniculate or corymbose arrays; corollas cream to pale yellow or pale green to pinkish or purplish **Brickellia** (in part)
41. Herbaceous perennials from a woody corm or rhizome, stems unbranched or infrequently branched; heads usually in spicate or racemose arrays, or rarely in cymose arrays; corollas pink to lavender-purple or rarely white..... **Liatrix**
40. Achenes 2–8-ribbed, < 2 mm long; pappus bristles only minutely barbed.
42. Plants usually aromatic (sometimes unpleasantly so); leaves lance-ovate or ovate to elliptic or oblong; achenes cylindric, 4–8-ribbed **Pluchea**
42. Plants not aromatic; leaves lanceolate or oblanceolate to linear; achenes compressed, 1-nerved on each edge **Conyza**

KEY G

Disk flowers only or apparently so; phyllaries mostly entire; corollas yellow to orange or red to reddish brown or maroon, sometimes with reddish brown or maroon marks; plants not spiny

1. Receptacles naked; pappus of 15+ bristles or hairs.
2. Primary phyllaries in 1–2 series, equal or subequal, subtended by 2–4(–6+) secondary phyllary-like bracts **Senecio**
2. Primary phyllaries in 2–6 series, unequal, not subtended by secondary phyllary-like bracts.
3. Weedy annuals; heads borne singly or in elongated paniculate or corymbose arrays; peripheral flowers pistillate, ligules absent or minute; central disk flowers perfect, corollas yellowish **Conyza**
3. Perennials; heads borne in compact, terminal, corymbose arrays; all flowers perfect and fertile, corollas bright yellow.
4. Leaves mostly basal in persistent rosettes; phyllaries disposed in vertical ranks, usually yellowish; flowers 2–6 per head; achenes sparsely strigose..... **Bigelowia**
4. Leaves mostly on the stems; phyllaries disposed spirally, green to yellowish with scarious margins; flowers 12–34 per head; achenes sericeous **Isocoma**
1. Receptacles naked or bristly or paleate; pappus of 2–10 bristles, hairs or awn-tipped scales OR a few stout awns OR pappus absent.
5. Receptacles not bearing chaff or pales (but sometimes bearing bristles); primary phyllaries not subtended by secondary phyllary-like bracts.
6. Leaves opposite; phyllaries usually 2; pappus absent. **Flaveria**
6. Leaves alternate; phyllaries 9+; pappus present.
7. Leaves (at least 1 side) white to gray tomentose; heads small, not very showy; phyllaries white to silvery gray or yellowish. **Pseudognaphalium**
7. Leaves glabrous to hairy but not white-gray tomentose; heads relatively large, showy; phyllaries green.
8. Plants resinous; leaves usually crenate to serrate (rarely entire); phyllaries in 5–6(–9) series, usually strongly recurved; achenes glabrous **Grindelia**
8. Plants not resinous; leaves entire to toothed or lobed; phyllaries in 2–3 series, erect to reflexed at maturity; achenes pubescent.
9. Plants perennial; stem winged by decurrent leaf bases; heads borne in paniculate arrays; achenes 1–1.2 mm long; pappus of 5–6 bristle-like scales..... **Helenium**
9. Plants usually annual; stems unwinged, leaf bases not decurrent; heads borne singly; achenes 2–2.5 mm long; pappus of 7–10 bristle-like scales **Gaillardia**
5. Receptacles chaffy, a bract (pale) subtending each flower; primary phyllaries subtended by secondary phyllary-like bracts (these may be \pm herbaceous).
10. Primary (inner) phyllaries united for 1/5 to 1/2 or more of their lengths; corollas reddish brown or yellow with reddish brown veins **Thelesperma**

10. Phyllaries all separate to their bases or nearly so; corollas solid yellow or yellow-orange to orange.....**Bidens**

TECHNICAL KEY TO TRIBES OF ASTERACEAE

(For Artificial Key to Tribes of Asteraceae see page 2)

1. Plant sap usually milky; all flowers perfect, rayed or ligulate, the ligules strap-shaped (disk flowers absent)..... **Cichorieae**
1. Plant sap usually watery, rarely milky; disk flowers with tubular, eligulate, or bilabiate corollas present; ray flowers with strap-shaped ligules present or absent, if present, these pistillate or neuter.
2. Anther bases usually rounded or obtuse to acute (sometimes saggitate, but not tailed).
3. Leaves usually opposite, sometimes whorled or alternate; heads of disk flowers only; corollas white to pinkish, bluish, or purple, or greenish to pale yellowish cream; style-branch appendages usually terete to club-shaped (lengths usually 2–5+ times lengths of stigmatic lines) **Eupatorieae**
3. Leaf arrangement various; ray flowers present or absent; corolla color various; style-branch appendages essentially absent, or resembling small tufts of hair, or deltate to lance-linear or filiform (lengths mostly 0–3+ times lengths of stigmatic areas or lines).
4. Leaf margins usually 1–3 pinnately or palmately lobed or divided, or sometimes merely toothed; phyllaries usually scarious to hyaline at margins and tips; rays (if present) white to grayish white or creamy white; if only disk flowers present their corollas mostly white to yellowish cream or yellowish green; disk flower achenes with pappus usually absent or sometimes a small crown **Anthemideae**
4. Leaf margins various; phyllary margins and tips various; pappus various or sometimes absent.
5. Ray flowers absent, heads of disk flowers only (though peripheral flowers may have enlarged or zygomorphic corollas simulating rays); corollas pink to lavender or blue to purple, or sometimes white (never yellow); style-branch appendages essentially absent..... **Vernonieae**
5. Ray flowers absent or present (peripheral disk flowers may have enlarged or zygomorphic corollas simulating rays); style-branch appendages usually resembling small tufts of hair, or deltate to lanceolate, or sometimes essentially absent.
6. Leaves alternate; primary phyllaries equal to subequal, in 1–2 series, sometimes subtended by secondary phyllary-like bracts; receptacles naked; style-branch appendages usually resembling small tufts of hair or essentially absent; achenes usually columnar to prismatic, seldom compressed or flattened; pappus of many smooth to finely-barbed (not plumose) bristles..... **Senecioneae**
6. Leaf arrangement various; primary phyllaries subequal in 1–2 series or unequal in 3–5+ series, sometimes subtended by secondary phyllary-like bracts; receptacles chaffy, bristly, or naked; style-branch appendages usually deltate to lanceolate, seldom resembling small tufts of hair; achenes sometimes compressed or flattened; pappus various or sometimes absent.
7. Leaves alternate (sometimes mostly basal); secondary phyllary-like bracts absent; receptacles naked; pappus usually of bristles, sometimes of scales, rarely of awns or a crown or absent **Astereae**
7. Leaves often wholly or partially opposite (at least on lower stems); secondary phyllary-like bracts present or absent; receptacles chaffy, bristly, or naked; pappus usually of scales, sometimes of awns or bristles, sometimes a crown or absent **Heliantheae**
2. Anther bases \pm tailed.
8. Corollas all \pm 2-lipped **Mutisieae** (in part)
8. Corollas actinomorphic or zygomorphic (not all 2-lipped, usually none 2-lipped).
9. Plants often prickly-spiny or thistle-like; phyllaries with margins often spiny, toothed, or bristle-fringed; ray flowers absent, heads of disk flowers only (peripheral flowers may have enlarged or zygomorphic corollas simulating rays)..... **Cardueae**
9. Plants not spiny, not thistle-like; phyllary margins not spiny, toothed, or bristle-fringed; ray flowers absent or present.
10. Ray and disk achenes with dissimilar shapes, sizes, and textures or ornamentations; pappus absent..... **Calenduleae**
10. All achenes within a head of similar shape, size, and texture or ornamentation; pappus various or sometimes absent.
11. Ray flowers usually present (ligules sometimes reduced or unequally 2-lipped); achenes beaked (= with a narrowed portion above the wider achene body)..... **Mutisieae** (in part)
11. Ray flowers absent, heads of disk flowers only; achenes not beaked..... **Inuleae**

ANTHEMIDEAE TRIBE

1. Heads with disk flowers only, or apparently so (if peripheral florets pistillate, these lacking corollas or ligules).
2. Rhizomatous perennials, 20–120+ cm tall; leaves linear to lanceolate or oblong-elliptic, margins entire to toothed or pinnately lobed; heads borne in paniculate arrays; achenes 0.5–0.8 mm long..... **Artemisia**
2. Taprooted annuals, usually 2–40 cm tall; leaves obovate to spatulate, (1–)2–3-pinnately lobed or finely dissected; heads usually borne singly; achenes 1–3+ mm long.

3. Heads sessile in leaf axils; achenes tipped by a persistent spine-like stylar sheath (painful in a manner similar to sandburs).....**Soliva**
3. Heads pedunculate; achenes without a persistent spine-like stylar sheath.
4. Receptacles flat to convex; peripheral flowers pistillate, central flowers functionally staminate; achenes compressed or ± flattened, obovoid to oblong, the peripheral ones larger and ± winged; pappus absent.....**Cotula**
4. Receptacles conic to oblong-ovoid; all flowers perfect and fertile; achenes ± cylindrical-obconic, ribbed; pappus a small crown.....**Matricaria** (in part)
1. Heads with both ray flowers and disk flowers, the ray flowers with evident ligules.
5. Stem leaves toothed or lobed, but not finely dissected; involucre > 10 mm wide; ray ligules 12–20(–35+) mm long.....**Leucanthemum**
5. Stem leaves 1–2-pinnately lobed or finely dissected; involucre < 10 mm wide; ray ligules 1.5–15+ mm long.
6. Plants perennial; heads borne in congested corymbose arrays; ray flowers (3–)5–8 per head; ligules 1.5–3 mm long.....**Achillea**
6. Plants annual; heads borne singly or in loose, few-flowered corymbose arrays; ray flowers 10+ per head, ligules 5–15+ mm long.
7. Receptacles chaffy; ray flowers 10–15; disk flower corollas 2–2.5 mm long; achenes 1.3–2 mm long.....**Anthemis**
7. Receptacles naked; ray flowers (10–)14–26; disk flower corollas 1.6–1.8 mm long; achenes 0.7–0.9 mm long.....**Matricaria** (in part)

ASTEREA TRIBE

1. Heads with disk flowers only, or apparently so (if peripheral florets pistillate, these lacking ligules, or ligules inconspicuous and < 0.7 mm long).
2. Shrubs or subshrubs, variable in size from 25–600 cm tall; flowers imperfect, the plants dioecious (male and female plants may differ in appearance).....**Baccharis**
2. Subshrubs or herbaceous plants, from 6 to 150 cm tall; at least some flowers perfect, the plants not dioecious.
3. Pappus of 2–10 scales or awns.
4. Delicate plants, 6–45 cm tall; herbage eglandular; involucre 1.5–2 mm wide; flowers 3 per head, corollas white to yellowish cream; restricted to Gulf coastal plain.....**Thurovia**
4. Robust plants, usually 40–100 cm tall; herbage gland-dotted or resinous; involucre 8–20+ mm wide; flowers ca. 100 per head, corollas bright yellow.....**Grindelia** (in part)
3. Pappus of 15–50 bristles.
5. Weedy annuals; heads borne singly or in elongated paniculate or corymbose arrays; peripheral flowers pistillate, ligules absent or minute; central disk flowers perfect, corollas yellowish.....**Conyza** (in part)
5. Perennials; heads borne in compact, terminal, corymbose arrays; all flowers perfect and fertile, corollas bright yellow.
6. Leaves mostly basal in persistent rosettes; phyllaries disposed in vertical ranks, usually yellowish; flowers 2–6 per head; achenes sparsely strigose.....**Bigelovia**
6. Leaves mostly on the stems; phyllaries disposed spirally, green to yellowish with scarious margins; flowers 12–34 per head; achenes sericeous.....**Isocoma**
1. Heads with both ray flowers and disk flowers, the ray ligules usually conspicuous but sometimes concealed by phyllaries.
7. Ray flower corollas yellow to yellow-orange.
8. Disk flower pappus of scales OR a few stout bristles or awns OR a minute crown OR pappus lacking.
9. Involucre (6–)8–25 mm wide; disk flowers usually 100+ per head; achenes glabrous.....**Grindelia** (in part)
9. Involucre 1–9 mm wide; disk flowers 1–60 per head; achenes pubescent or bristly.
10. Ray and disk flowers with strongly dissimilar pappus types, but neither lacking pappus.
11. Ray flower pappus a small crown; disk pappus of 5–8 white, narrowly spatulate, basally fused scales.....**Amphiachyris**
11. Ray flower pappus of several series of barbellate bristles 1–3 mm long; disk pappus of 1–3 awn-like bristles.....**Bradburia** (in part)
10. Pappus not dimorphic, or only weakly so (ray pappus may differ in size from disk pappus but will not differ in pappus type) OR pappus lacking.
12. Plants subshrubs, perennials, or annuals, to 140 cm tall; receptacles hairy; ray flowers 1–23 per head, ligules 1.5–6 mm long; disk pappus a short scaly crown 0.1–1 mm high, or rarely absent.....**Gutierrezia**
12. Plants shrubs, to 150(–200) cm tall; receptacles naked; ray flowers 4–9 per head, ligules 2–3 mm long; pappus absent, or a minute toothed crown < 0.1 mm high.....**Gymnosperma**
8. Disk flower pappus of 20+ capillary bristles or hairs, with or without an additional outer series of scales or awns or bristles.
13. Outer pappus series of scales or flat-based awns, 0.25–1.4 mm long (use hand lens), surrounding inner series of longer bristles.
14. Basal leaves persistent, linear to lanceolate or oblanceolate, grass-like in appearance, 3–11-parallel veined, pubescence silky-sericeous.....**Pityopsis**
14. Basal leaves (if present) spatulate to obovate or ovate to elliptic (not grass-like), usually 1-nerved, with pinnate or reticulate veins, pubescence scabrous to hispid-strigose or pilose to sericeous-cobwebby.
15. Plants fibrous-rooted, sometimes with short lateral rhizomes; herbage pilose to sericeous-cobwebby; basal leaves sessile; ray ligules 2–3 mm wide.....**Chrysopsis**
15. Plants taprooted, sometimes rhizomatous; herbage scabrous to hispid-strigose or pilose; basal leaves (if

- present) petiolate or sessile; ray ligules 1–2 mm wide.
16. Plants annual or perennial (IF annual, THEN achenes dimorphic and ray achenes lacking pappus); leaves scabrous to hispid or strigose, often with sparse to dense stalked glands (IF eglandular THEN leaves silvery gray-green).....**Heterotheca**
16. Plants annual; leaves pilose, eglandular; ray and disk achenes similar; pappus always present**Bradburia** (in part)
13. Pappus solely of thin-based, capillary bristles in 1–4 series (outer series may be shorter than inner).
17. Achenes dimorphic, the ray achenes \pm 3-sided, the disk achenes \pm compressed.
18. Herbage eglandular; basal and lowermost stem leaves pinnately lobed or pinnatifid; receptacle with a persistent network of subulate, chaff-like scales; inner phyllaries basally narrowed and stalk-like, expanded above.....**Xanthisma**
18. Herbage with prominent sessile or stalked glands; basal and lowermost stem leaves coarsely serrate to entire; receptacle naked; inner phyllaries not basally narrowed**Rayjacksonia**
17. Ray and disk achenes similar.
19. Involucres 10–15 mm high and 15–25 mm wide; ray flowers 25–45 per head**Grindelia** (in part)
19. Involucres 3–10 mm high and 1.7–10 mm wide; ray flowers 2–30 per head.
20. Taprooted annuals or biennials; heads borne singly or in loose, widely-branched paniculate arrays.....**Croptilon**
20. Rhizomatous perennials; heads usually borne in clusters in corymbose, paniculate, or racemose arrays.
21. Leaves entire, with glandular-punctate dots; heads in a \pm flat-topped corymbose arrangement; achenes 2–4-nerved.....**Euthamia**
21. Leaves usually serrate, without glandular-punctate dots; heads in pyramidal paniculate or club-shaped racemose arrangements (or sometimes in axillary clusters); achenes 8–10-nerved**Solidago**
7. Ray flower corollas white, tawny, pink, rose, lavender, bluish, or purplish.
22. Disk flower pappus of scales OR a few stout bristles or awns OR a minute crown OR pappus lacking.
23. Plants fibrous rooted and rhizomatous, sometimes colonial, 30–200 cm tall; achenes dimorphic (and sometimes winged), ray achenes \pm 3-sided OR 2–(3)-nerved, disk achenes \pm compressed OR 3–5-nerved.
24. Heads borne in loose, leafy corymbose or paniculate arrays; achenes often 2–3-winged; pappus of 2–3 awns, 0.3–1.2 mm long, plus 0–12 shorter bristles or scales**Boltonia**
24. Heads borne singly; ray achenes 2–(3)-nerved, disk achenes 3–5-nerved; pappus of thickened rings or a minute, fringed crown < 0.1 mm high.....**Chaetopappa** (in part)
23. Plants taprooted; ray and disk achenes similar, never winged.
25. Plants often small and delicate; receptacles flat to convex, smooth; ray flowers 5–19 per head; disk flowers 4–22; achenes 1.5–2.2 mm long**Chaetopappa** (in part)
25. Plants delicate or not; receptacles conic, pitted; ray flowers (7–)13–75 per head; disk flowers 25–400; achenes 1–1.6 mm long.
26. Leaves varying from entire to deeply pinnatifid, achenes columnar, 4-angled to somewhat rounded, 4–12-ribbed.....**Aphanostephus**
26. Leaves usually entire or sometimes toothed; achenes obovoid to oblanceoloid, compressed, 2-nerved (nerves marginal).....**Astranthium**
22. Disk flower pappus of (5–)8–90 capillary bristles or hairs, with or without an additional outer series of scales or awns or bristles.
27. Ray flowers inconspicuous, ligules < 1 mm long, barely exceeding the phyllaries**Conyza**
27. Ray flowers conspicuous, ligules 1.3+ mm long, exceeding the phyllaries.
28. Plants subshrubs or rush-like perennials, colonial; stems green and glaucous, green thorns often present; few leaves present at flowering; phyllaries (1–)3(–5)-nerved.....**Chloracantha**
28. Plants herbaceous annuals or perennials, solitary or colonial; stems not becoming thorny; at least upper leaves persistent through flowering; phyllaries usually 1-nerved (sometimes 3-nerved in *Erigeron* and *Symphyotrichum*)
29. Plants 1–3 cm tall; heads solitary and nearly sessile, nestled in basal rosettes; involucre (10–)12–25+ mm wide**Townsendia**
29. Plants usually 10+ cm tall; heads solitary or borne in various arrays, usually well above any basal leaves; involucre often < 12 mm wide.
30. Heads usually borne in flat-topped corymbose arrays; ray ligules white, 2–7 per head; disk flowers usually < 20 per head; disk flower pappus innermost bristles with strongly flattened tips (= clavate).....**Doellingeria**
30. Heads solitary or borne in various arrays; ray ligules white or various shades of pink, blue, violet, or purple, 7–100+ per head; disk flowers usually > 20 per head; disk flower pappus innermost bristles with rounded tips (or perhaps obscurely flattened).
31. Leaves narrow, stiff, evenly distributed; phyllaries strongly keeled; ray and disk achenes slightly dimorphic; achene pubescence silky strigose-sericeous**Ionactis**
31. Leaves variously shaped and distributed; phyllaries flat or only swollen at bases, not strongly keeled; ray and disk achenes either monomorphic OR strongly dimorphic; achenes glabrous to strigose but usually not silky-sericeous.
32. Plants taprooted annuals; achenes strongly dimorphic, ray achenes 1.3–1.5 mm long and

- sparsely hairy, disk achenes 2–3 mm long and glabrous or nearly so; pappus lacking on ray achenes.....**Psilactis**
32. Plants annual or perennial, taprooted or fibrous rooted or rhizomatous; achenes of various sizes, glabrous to variously pubescent, but generally monomorphic within a head; rays achenes with some pappus present, similar to disk achenes or differing.
33. Leaves glabrous to minutely scabrous, margins usually entire and often revolute; phyllaries glabrous and tips often squarrose or strongly recurved; ray flowers 15–30 per head, ligules usually violet-purple, rarely white; achenes 9–16-nerved.....**Eurybia**
33. Leaves glabrous or variously pubescent, margins various; phyllaries glabrous or variously pubescent, tips appressed or erect to variously recurved; ray flowers 8–350+ per head; ligules often white, but sometimes pinkish to bluish or purplish; achenes 2–5(–10)-nerved.
34. Heads borne singly or in loose corymbose or paniculate arrays; peduncles of buds often nodding; phyllaries with orange-resinous veins, tips usually lacking a well-differentiated green zone; ray flowers usually 44–350+ per head, ligules usually < 1 mm wide; plants flowering Mar–Jun (sporadically into Oct)**Erigeron**
34. Heads usually borne in paniculate or corymbose arrays; peduncles of buds often erect; phyllaries lacking orange-resinous veins, tips usually with a well-differentiated green zone, or sometimes foliaceous; ray flowers usually 8–50 per head, ligules usually > 1 mm wide; plants flowering Aug–Nov (rarely Mar–Apr)**Symphotrichum**

CALENDULEAE TRIBE

1. Only one genus**Dimorphotheca**

CARDUEAE (CYNAREAE) TRIBE

1. Corollas bright yellow to yellow-orange or orange-red.
2. Leaf margins never spiny; leaf bases long-decurrent, creating winged stems; all phyllaries spine-tipped; pappus of stiff bristles.....**Centaurea** (in part)
2. Leaf margins sometimes spiny; leaf bases not decurrent; stems unwinged; outer phyllaries sometimes leafy, at least the inner phyllaries spine-tipped; pappus absent or of scales.....**Carthamus**
1. Corollas usually pink to rosy-red or lavender to purple, less often white, or rarely pale yellow.
3. Leaf margins spiny.
4. Pappus of plumose bristles (feather-like, with long side branches, at least on the upper portion).....**Cirsium**
4. Pappus of awn-like scales, smooth bristles, or barbellate bristles (with short side branches).
5. Leaves variegated (mottled white and green above); leaf bases not decurrent; stems lacking spiny wings.....**Silybum**
5. Leaves uniformly colored above; leaf bases long-decurrent, creating spiny-winged stems.
6. Receptacles unpitted, bearing flattened bristles or scales; pappus bristles 11–25 mm long.....**Carduus**
6. Receptacles deeply pitted, lacking bristles or scales; pappus bristles 7–9 mm long.....**Onopordum**
3. Leaf margins not spiny.
7. Phyllary margins entire, tips with a single, prominent, hooked spine; corollas of all flowers similar; the entire head shed as a spiny bur at maturity**Arctium**
7. Phyllary margins variously lobed, toothed, or bristle-fringed, not prominently spine-tipped; corollas of peripheral flowers often enlarged, simulating ray flowers; achenes generally shed individually at maturity.
8. Involucres 10–16 mm high; peripheral (sterile) flower corollas 15–25 mm long**Centaurea** (in part)
8. Involucres 30–50 mm high; peripheral (sterile) flower corollas 35–50 mm long**Plectocephalus**

CICHORIAE (LACTUCEAE) TRIBE

1. Achenes (at least central ones) distinctly beaked (= with a narrowed portion above the wider achene body).
2. Pappus with an outer series of basally flattened, awn-like scales and an inner series of plumose bristles**Leontodon** (in part)
2. Pappus of bristles or hairs (plumose or otherwise), awn-like scales lacking (minute outer crowns may be present in addition to hair-like bristles).
3. Primary (inner) phyllaries in 3–5 series, unequal; secondary (subtending) phyllary-like bracts absent; receptacles chaffy.
4. Leaves in a basal rosette and on lower stems; heads in loose cymose arrays or solitary; corollas 5–15 mm long, yellow to white (sometimes striped reddish or gray-green beneath); eastern 1/3 TX**Hypochaeris**
4. Leaves nearly all in a basal rosette, stem leaves few or absent; heads solitary; corollas 15–18 mm long, rose-lavender to pink to white (often yellow at the base); western 2/3 TX.....**Pinaropappus**
3. Primary phyllaries in 1–2 series, usually equal or subequal; secondary phyllary-like bracts often present (and sometimes intergrading with phyllaries); receptacles naked.

5. Leaves linear, grass-like, margins entire; achenes 25–40 mm long (including beak); pappus 20–30 mm long **Tragopogon**
5. Leaves not linear or grass-like, margins entire or variously toothed or lobed; achenes < 20 mm long; pappus < 15 mm long.
6. Plants frequently > 80 cm tall in flower; corollas yellow, bluish, purplish, or whitish (sometimes reddish-tinged); achenes elliptic to oblong, ± flattened **Lactuca**
6. Plants < 80 cm tall; corollas yellow (sometimes striped or tipped reddish beneath); achenes spindle-shaped, terete or subcylindric.
7. Phyllaries and subtending phyllary-like bracts coarsely setose or hispid; longest pappus bristles ca. 4 mm **Crepis** (in part)
7. Phyllaries and subtending phyllary-like bracts glabrous or minutely pilose; longest pappus bristles 4–12 mm.
8. Plants often with branched, leafy stems, each bearing 1–several heads, or sometimes stemless; lateral leaf margins pinnately lobed (but usually not runcinately or retorsely so); achene bodies 4–6 mm long; pappus bristles 7–12 mm long, subtended by a ring of minute, reflexed hairs (use lens) **Pyrrhopappus**
8. Plants stemless, leaves in a basal rosette; heads all solitary; lateral leaf margins usually sharply and retorsely runcinate; achene bodies 2–4 mm long; pappus bristles 4–7(–8) mm long, not subtended by a ring of minute hairs **Taraxacum**
1. All achenes beakless.
9. Pappus of scales (basally flattened, sometimes awn-like but not hair-like) OR scales and bristles OR a minute crown OR pappus lacking.
10. Secondary (subtending) phyllary-like bracts absent; achenes 1.2–3 mm long.
11. Lower stem leaves usually sessile; heads mostly in sessile, axillary clusters; phyllaries unequal, with gland-tipped hairs; corollas lavender-blue, rarely white or pink; achenes 3–5-angled **Cichorium**
11. Lower stem leaves petiolate; heads borne singly; phyllaries equal, glabrous; corollas yellow or yellow-orange; achenes 10–20-ribbed **Krigia** (in part)
10. Secondary phyllary-like bracts 3–12; achenes 5–12 mm long.
12. Leaves in a basal rosette and on branching stems; heads borne singly or in loose corymbose arrays; phyllaries ± keeled and incurved at maturity, each ± enfolding a subtended peripheral achene; pappus on central achenes of 1–2 series of scales (peripheral achenes may have only a minute, fringed crown) **Hedypnois**
12. Leaves all in a basal rosette; heads borne singly on long unbranched stems; phyllaries unkeeled, reflexed at maturity; pappus with an outer series of basally flattened, awn-like scales and an inner series of plumose bristles **Leontodon** (in part)
9. Pappus solely of bristles or hairs, at least some > 1 mm long.
13. Leaves all (or nearly all) in a basal rosette (1–2 reduced stem leaves may be present).
14. Heads borne singly; primary phyllaries 12–16; secondary (subtending) phyllary-like bracts absent; corollas 15–25 mm long; pappus bristles of the inner series 5–8 mm long, plus an outer series of minute scales (may be obscure) **Krigia** (in part)
14. Heads borne in corymbose to paniculate arrays; primary phyllaries usually 8; secondary phyllary-like bracts 3–5+; corollas mostly 4.5–6.5 mm long; pappus bristles 2.5–3.5 mm long **Youngia**
13. Well-developed stem leaves present, at least on lower stem (leaves may be linear or wider).
15. Corollas bright yellow (ligules sometimes striped or tipped reddish on the lower surface).
16. Stems often hollow; leaf margins usually spiny or prickly; stem leaf bases auriculate; achenes flattened **Sonchus**
16. Stems not hollow; leaf margins not spiny-prickly; leaf bases not auriculate; achenes rounded in cross-section (at least the central ones).
17. Plants annual; leaves short-hispid or with dense stalked glands; leaf margins toothed or lobed; primary phyllary bases strongly keeled and thickened; secondary (subtending) phyllary-like bracts 5–7; pappus bristles 1.5–5 mm long **Crepis** (in part)
17. Plants perennial; leaves pilose-hirsute (hairs 2–8+ mm long); leaf margins entire; primary phyllary bases not strongly keeled or thickened; secondary phyllary-like bracts 8–13+; pappus bristles 5–6.5 mm long **Hieracium**
15. Corollas white, creamy yellow, greenish yellow, pink, or lavender-purple.
18. Lower stem leaves linear, 1–8 mm wide; heads erect, borne singly; corollas pink, purple, or lavender (rarely white), 35–40 mm long; pappus bristles smooth, 10–15 mm long **Lygodesmia**
18. Lower stem leaves broader, 10–160 mm wide; heads often nodding, borne in racemose, thyriform, or paniculate arrays; corollas white to creamy yellow or greenish yellow, 7–17 mm long (phyllaries may be more colorful); pappus bristles minutely barbed, 5–8 mm long **Prenanthes**

EUPATORIEAE TRIBE

1. Perennial twining or scrambling vines; leaves opposite; phyllaries 4; flowers usually 4 per head **Mikania**
1. Non vining annuals, perennials, or shrubs; leaves alternate, opposite, or whorled; phyllaries 8+; flowers 3–60+ per head.
2. Achenes 8–11 ribbed (IF 8-ribbed, THEN the achenes 2.7–9 mm long).
3. Single-stemmed or infrequently-branched herbaceous perennials from a woody corm or rhizome; leaves basal or basal and cauline at flowering; corollas usually lavender to magenta to pinkish purple (sometimes creamy white) **Liatris**
3. Shrubs or branched perennials with woody bases; leaves mostly cauline at flowering; corollas usually white to

- cream (sometimes greenish, purplish, or yellowish) **Brickellia**
2. Achenes (3–)4–5(–8) ribbed (IF 8-ribbed, THEN the achenes 1.8–2.8 mm long).
4. Pappus of 2–6+ hair-like scales or bristles to 0.5 mm long **Trichocoronis**
4. Pappus of (5–)10–50 barbellate bristles or hair-like scales, much longer than 0.5 mm.
5. Phyllaries ± equal in length.
6. Receptacles conic **Conoclinium**
6. Receptacles flat or convex.
7. Involucres 1–3(–5+) mm wide; flowers (4–)5(–15) per head; style bases usually puberulent (glabrous in *E. capillifolium*) **Eupatorium** (in part)
7. Involucres 3–6 mm wide; flowers 10–60 per head; style bases glabrous **Ageratina**
5. Phyllaries unequal (outer ones shorter).
8. Leaves whorled, with 3–7 petiolate leaves per node **Eutrochium**
8. Leaves opposite or alternate, rarely whorled (IF whorled THEN sessile).
9. Flowers (4–)5(–15) per head; style bases usually puberulent and enlarged (glabrous in *E. capillifolium*) . **Eupatorium** (in part)
9. Flowers (6–)15–40(–75) per head; style bases glabrous, not enlarged.
10. Involucres 5–10 mm high; phyllaries in 4–6+ series; achenes (3–)5-ribbed, usually gland-dotted **Chromolaena**
10. Involucres 4–5 mm high; phyllaries in 2–4 series; achenes 5(–8)-ribbed, not gland-dotted **Fleischmannia**

HELIANTHEAE TRIBE (INCLUDING HELENIEAE)

1. Plants generally wind-pollinated or self-pollinated, the heads small and not at all showy nor attractive to pollinators; all flowers imperfect, pistillate and staminate flowers in same or different heads; ray flowers absent; disk corollas minute or insignificant; pappus absent.
2. Pistillate and staminate flowers in the same head; phyllaries without spine-like structures or tubercles, the heads not bur-like **Iva**
2. Pistillate and staminate flowers in separate heads, the staminate usually uppermost; phyllaries of pistillate heads joined and enclosing achenes at maturity and forming a bur or nut-like structure with prickles, spines, or tubercles (or rarely encircled by membranous wings).
3. Staminate heads usually in racemes or spikes, their phyllaries united and cup-shaped; pistillate heads forming a 1-seeded bur < 6 mm long, with phyllary tips projecting as 1–12 spines or tubercles (or rarely as membranous wings) **Ambrosia**
3. Staminate heads in terminal clusters, their phyllaries not fused; pistillate heads forming a 2-seeded bur (cocklebur) 10–30+ mm long, with phyllary tips projecting as 20+ hooked, spine-like structures **Xanthium**
1. Plants generally adapted for pollination by insects (and sometimes hummingbirds), at least some heads colorful or otherwise attractive; usually some or all flowers perfect; ray flowers present or absent; disk flowers with obvious corollas; pappus various.
4. Receptacles not bearing chaff or pales (but sometimes bearing bristles, or with fringed pit borders around flower attachment points), or rarely with pales associated with peripheral disk flowers only.
5. Plants usually strongly aromatic (sometimes unpleasantly so); phyllaries (and usually also leaves) noticeably dotted or streaked with pellucid glands containing strong-scented oils.
6. Phyllaries distinct to bases or nearly so.
7. Evergreen perennials or subshrubs to 50+ cm tall; leaves mostly alternate; heads solitary; ray ligules 6–12 mm long; pappus of 20–40 bristles, 3–5.5 mm long **Chrysactinia** (in part)
7. Small perennials or annuals to 15 cm tall; leaves opposite; heads congested in cymose arrays; ray ligules 3–5(–7) mm long; pappus of 1–7 bristles or awns, or sometimes a minute crown, usually < 1 mm high **Pectis**
6. Phyllaries fused 1/3+ of their lengths (at least the inner series).
8. Leaves pinnately lobed or pinnatisect, the lobes or segments usually lanceolate to ovate; secondary (subtending) phyllary-like bracts absent; disk corollas 7–12+ mm long; pappus of 2–6 elements; horticultural exotics escaping cultivation **Tagetes**
8. Leaves simple and entire to toothed or pinnately lobed, the leaves or lobes usually filiform to linear; secondary phyllary-like bracts often present; disk corollas 2–4.5 mm long; pappus of 10–12 elements; native species.
9. Plants 40–90 cm tall; leaf bases and secondary phyllary-like bracts often with a few stiff bristles; phyllaries 10–12; ray flowers 7–12, ligules 10–15 mm long **Dysodiopsis**
9. Plants 15–30 cm tall; leaf bases and secondary phyllary-like bracts (if any) lacking stiff bristles; phyllaries 12–22; ray flowers 10–21, ligules 2–10 mm long **Thymophylla**
5. Plants sometimes aromatic; leaves sometimes with sessile or stalked glands, but these generally minute and not noticeably pellucid; phyllaries usually eglandular.
10. Phyllaries 5–14; corollas white to cream or pink to lavender to dark purple (but usually not maroon or brownish purple).
11. Leaves usually 1–2-pinnately lobed (but may be simple or merely lobed), often conspicuously white-hairy on lower surface; ray flowers absent; pappus of 14–20 scales **Hymenopappus**
11. Leaves entire, sparsely to moderately pubescent; ray flowers absent or 3–13; pappus of 4–10 scales (sometimes absent on peripheral achenes) **Palafoxia**

10. Phyllaries 2–60+; at least some corollas partially or completely pale yellow, golden yellow, orange, reddish brown, or maroon-purple (rarely white); IF some corollas completely purplish to pinkish THEN phyllaries usually > 14.
12. Leaves opposite, ± succulent; phyllaries usually 2; disk flowers 0–1(–2) per head; pappus absent **Flaveria**
12. Leaves either basal or mostly alternate (at least on upper stems), seldom succulent; phyllaries 5+; disk flowers 5+ per head; some pappus usually present.
13. Ray flowers 2–5 per head
14. Stems and leaves green, glabrous or sparsely hairy; disk flowers 16–22 per head, 4-lobed; pappus usually of 1–2 bristles to 1.8 mm long plus minute vestigial scales or a callous crown, or rarely absent **Perityle**
14. Stems and leaves gray-green, cobwebby-villous; disk flowers 5–8(–12) per head, 5-lobed; pappus of 4–6 scales, 2.5–3+ mm long **Psilostrophe**
13. Ray flowers either 6+ per head or absent.
15. Stems usually winged by decurrent leaf bases; achenes 0.6–1.5 mm long (IF stems unwinged THEN achenes to only 1.3 mm long) **Helenium**
15. Stems not winged; leaf bases not decurrent; achenes 1.5+ mm long.
16. Herbage noticeably sweet-scented, like newly-mown sweet-clover; achenes narrowly obconic, prominently 10-ribbed; pappus scales not awn-tipped **Amblyolepis**
16. Herbage not noticeably sweet-scented (may be otherwise aromatic); achenes usually obpyramidal and 4-sided; pappus scales awn-tipped.
17. Phyllaries usually strongly reflexed in fruit; receptacles often bristly; ray ligules (when present) frequently in colors other than solid yellow; disk corollas usually brown-purple to red-brown, or tipped with these colors; pappus of 7–12 awn-tipped scales, 5–9 mm long **Gaillardia**
17. Phyllaries mostly spreading to erect in fruit; receptacles naked; ray ligules usually uniformly some shade of yellow (rarely tipped or striped with white); disk corollas usually solid yellow (or sometimes purple-tipped); pappus of 4–7 awn-tipped scales, 1.2–4 mm long.
18. Phyllaries in 2 series of identical number, glabrous or inconspicuously short-pubescent, margins not noticeably scarios; ray flowers either 6–8 and ligules minute (to 3 mm long) in two rare species OR ray flowers 8–13 and ligules 8.5–11 mm long in one common species, withering and twisting in age **Hymenoxys**
18. Phyllaries in 3 series, usually ± hairy, margins usually scarios (at least inner series); ray flowers 9–26, ligules 8.2–22 mm long, often not withering, remaining attached and strongly recurved in age **Tetaneuris**
4. Receptacles chaffy, a bract (pale) subtending each flower.
19. Only ray flowers fertile (= maturing achenes), their achenes much larger than those of the sterile disk flowers; ray ligules often showy but sometimes insignificant or corollas absent.
20. Ray achenes thick, rounded, without wings (may be shed enclosed in a fruit-like or bur-like structure).
21. Leaf blades usually ± palmately 3–5-lobed; inner phyllaries subtending but not clasping the achenes; ray ligules yellow; achenes obovoid, shed separately from phyllaries **Smallanthus**
21. Leaf blades entire to toothed or pinnately lobed; inner phyllaries each subtending and clasping a ray achene; ray ligules white to cream or pale yellow (may be minute); achenes enclosed by and shed within the subtending phyllary, forming a fruit-like or bur-like structure.
22. Heads borne in sessile clusters; ray flowers 5–8 per head, ligules inconspicuous, minute; achenes shed in a bur-like structure 7–9+ mm long, with hooked or straight spines or tubercles **Acanthospermum**
22. Heads borne singly on peduncles; ray flowers 7–13 per head, ligules obvious, showy; achenes shed in a ± conical or boot-shaped, fruit-like structure, 1.3–2.6 mm long **Melampodium**
20. Ray achenes ± strongly flattened, with or without wings.
23. Achenes broadly winged.
24. Taprooted annuals; phyllaries 8–10, in 2 series; ray flowers usually 5, in 1 series; involucre 5–12 mm wide **Lindheimera**
24. Coarse perennials; phyllaries 11–45, in 2–4 series; ray flowers 8–38, in 2–3 series; involucre 10–30 mm wide **Silphium**
23. Achenes not winged.
25. Ray ligules white to pale dingy yellow, < 2 mm long **Parthenium**
25. Ray ligules lemon to bright yellow (at least on the upper surface), 10–20 mm long.
26. Leaves crenate, serrate, dentate, or lyrate-pinnatifid; involucre 12–30+ mm wide; ray ligules with green, red, or maroon veins on the lower surface; achenes 4.5–6 mm long **Berlandiera**
26. Leaves deeply pinnatifid; involucre 6–10 mm wide; ray ligules entirely yellow on the lower surface, without colored veins; achenes 3–4 mm long **Engelmannia**
19. Disk flowers perfect and fertile; ray flowers present and fertile OR sterile OR absent.
27. Ray flowers neuter OR pistillate and sterile OR absent; only disk flowers fertile (= maturing achenes), their achenes much larger than those of the sterile ray flowers (if present).
28. Leaves mostly opposite (NOT both alternate and auriculate-clasping); phyllaries apparently in ± 3 series, dimorphic, the outer (secondary) series herbaceous (and sometimes foliaceous), the inner 2 (primary) series often very unlike the outer, usually scarios-margined; achenes flattened parallel to the phyllaries or 3–4-angled and linear to spindle-shaped.

29. Primary (inner) phyllaries united for 1/5 to 1/2 or more of their lengths; disk corolla lobes often lance-linear (sometimes triangular) **Thelesperma**
29. Phyllaries all separate to their bases or nearly so; disk corolla lobes triangular to ovate.
30. Achenes (at least central ones) \pm 4-angled, \pm linear to spindle-shaped, often with tips narrowed or beaked (no achenes winged).
31. Disk flowers 10–20 per head; stamen filaments hairy near anthers (use lens); achenes usually with 1 groove on each face **Cosmos**
31. Disk flowers (5–)12–150+ per head; stamen filaments not hairy; achenes with 0 or 2 grooves on each face **Bidens** (in part)
30. Achenes all \pm obcompressed or flattened (sometimes winged).
32. Achenes sometimes thickened or winged; pappus usually of barbellate (rarely smooth) awns or sometimes absent **Bidens** (in part)
32. Achenes (some or all) usually thin-margined or \pm winged; pappus usually absent or of 2 bristly scales (or achene wing shoulders may be bristly) **Coreopsis**
28. Leaves alternate or opposite; phyllaries in 1–several series, usually not strongly dimorphic (IF strongly dimorphic THEN leaves alternate and blades auriculate and clasping); achenes various but usually not flattened parallel to the phyllaries.
33. Receptacles spheric to high-conic or columnar (mostly 8–20+ mm high); ray flowers present; achenes not winged.
34. Pales longer than disk corollas, the awn-like tips apparent between the flowers at anthesis; ray ligules pink to purple or rarely white **Echinacea**
34. Pales not awn-like, tips not emerging between flowers at anthesis; ray ligules yellow to yellow-orange, maroon, reddish brown, or a bicolor combination of these.
35. Leaves lyrate-pinnate to 1–2-pinnatifid; phyllaries unequal (outer noticeably longer than inner); achenes linear-lanceolate to oblong, strongly compressed, with one margin usually toothed, fringed, or ciliate **Ratibida**
35. Leaves simple to deeply lobed; phyllaries subequal; achenes obpyramidal and \pm 4-angled, not strongly compressed, margins not toothed, fringed, or ciliate **Rudbeckia**
33. Receptacles mostly flat to convex or conic (mostly 0–5 mm high); ray flowers present or absent; achenes winged or unwinged.
36. Receptacle pales completely enclosing each achene, forming a hardened, warty, fruit-like structure **Sclerocarpus**
36. Receptacle pales sometimes enfolding an achene, sometimes shed with it, but not completely enclosing each achene in a fruit-like structure.
37. Stems sometimes winged with decurrent leaf bases; achenes strongly flattened and papery-winged; pappus usually of 2 persistent subulate scales or awns to 2 mm long (or sometimes pappus absent) **Verbesina** (in part)
37. Stems not winged, leaf bases not decurrent; achenes various but not strongly flattened and papery-winged (achenes may be somewhat flattened, with thin margins); pappus of 1–2+ scales, these often fragile and deciduous (plus sometimes shorter scales or squamellae) or of 5+ persistent scales (or sometimes pappus absent).
38. Ray flowers absent; disk corollas pale lavender, purple, pink, or white; achenes usually 5-angled and 10-ribbed; pappus of 5–6 scales **Marshallia**
38. Ray flowers present, ligules yellow to yellow-orange; disk corollas yellow to orange or reddish purple; achenes \pm compressed, often obpyramidal; pappus of 1–2+ scales, these often fragile and deciduous (plus sometimes shorter scales or squamellae).
39. Petiole bases dilated, fused to form disks at nodes; ray flowers styliiferous (= styles present); achenes somewhat flattened and thin-margined **Simsia**
39. Petiole bases not dilated, not forming nodal disks; ray flowers neuter, styles and stigmas absent; achenes \pm compressed, often obpyramidal.
40. Involucres 4–40+ mm wide; stamen filaments not hairy; pappus fragile, readily falling **Helianthus**
40. Involucres 7–10 mm wide; stamen filaments hairy; pappus persistent or tardily falling **Viguiera**
27. Ray flowers present and fertile (rays sometimes inconspicuous); disk flowers perfect and fertile; both kinds of flowers producing mature achenes (though these may differ in shape).
41. Stems sometimes winged with decurrent leaf bases; achenes strongly flattened and papery-winged **Verbesina** (in part)
41. Stems not winged, leaf bases not decurrent; achenes various but not strongly flattened and papery-winged (achenes may be somewhat flattened, with thin margins).
42. Plants usually strongly aromatic; leaves usually alternate; pales readily falling; pappus of 20–40 bristles, 3–5.5 mm long **Chrysactinia** (in part)
42. Plants sometimes aromatic; leaves opposite; pales persistent or falling; phyllaries usually eglandular; pappus of a few awns or bristles OR of scales OR a minute crown OR pappus lacking.
43. Outer 4 phyllaries broadly lanceolate, foliaceous, forming square “buds” prior to anthesis, overlapping at anthesis, notably larger than inner, scarious phyllaries **Tetragonotheca**
43. Outer phyllaries larger than inner or not, sometimes herbaceous, but not notably different in texture,

- not forming 4-sided "buds."
44. Ray ligules sessile, not borne on corolla tubes, 10–40 mm long, usually persistent and becoming papery in age.
45. Plants perennial; leaves petiolate and usually toothed; ray ligules yellow to orange; achenes 4–5 mm long; native species.....**Heliopsis**
45. Plants annual; leaves sessile and entire; ray ligules usually red (or white, yellow, or pink-purple in cultivars); achenes 6–10 mm long; horticultural exotics escaping cultivation.....**Zinnia**
44. Ray ligules usually borne on corolla tubes, not sessile, 2–15 mm long, not persistent, not becoming papery in age.
46. Plants often decumbent to prostrate; ray ligules to 5 mm long.
47. Ray ligules 20–40, white or whitish; pappus a small crown (sometimes plus 2 teeth).....**Eclipta**
47. Ray ligules 3–20, yellow; pappus of a few awns or bristles, or pappus absent.
48. Receptacles conic; phyllaries 8–15+; disk flowers 25–100(–200+); pappus of 1–3 bristle-like awns, or absent.....**Acmella**
48. Receptacles convex; phyllaries 5; disk flowers 10–20; pappus of 2(–5+) stout awns.....**Calyptocarpus**
46. Plants erect or decumbent to prostrate; ray ligules 6–15 mm long.
49. Leaves usually villous to sericeous; phyllaries 20–40+; phyllaries and pales spine-tipped.....**Borrhicia**
49. Leaves usually hispid to scabrous; phyllaries 8–16+; phyllaries and pales not spine-tipped.
50. Prostrate herbaceous perennials, often rooting at nodes; achenes strongly biconvex to plumply 3–4-angled; pappus a small fringed crown or absent.....**Sphagnetocola**
50. Small erect shrubs; achenes mostly strongly compressed and 3–4-angled, usually ± winged; pappus a small cup-like crown plus sometimes 1–3 bristles or awns to 6 mm long.....**Wedelia**

INULEAE TRIBE (INCLUDING PLUCHEAE AND GNAPHALIEAE)

1. Plants without conspicuous white or gray woolly pubescence; middle and upper stem leaves broad, 10–70 mm wide; herbage usually glandular and strongly aromatic (sometimes unpleasantly so).....**Pluchea**
1. Plants with conspicuous white or gray woolly pubescence (most often on leaf undersurfaces); middle and upper stem leaves narrow, 1–20 mm wide; herbage sometimes glandular but not strongly aromatic.
2. Plants often > 50 cm tall; stems winged by long-decurrent leaf bases.....**Pterocaulon**
2. Plants usually 3–50 cm tall; stems unwinged; leaf bases not or only briefly decurrent.
3. Heads embedded in and ± obscured by cottony pubescence, clustered in compact, terminal arrays, subtended by leafy bracts; phyllaries 0–6; receptacles chaffy; pappus essentially absent.
4. Pales of perfect flowers saccate, each enclosing a flower; achenes (at least the peripheral ones) strigose; known only from Gulf coastal prairie in Victoria Co.....**Micropsis**
4. Pales of perfect or staminate flowers flat to concave, not enclosing flowers; achenes glabrous; widespread in East TX.....**Diaperia**
3. Heads often with woolly hairs but not embedded in or obscured by these, clustered in terminal, corymbose, spicate, or paniculate arrays; phyllaries more numerous, in 3–7 series; receptacles naked; pappus of bristles.
5. Pappus of plumose bristles (use lens to see side branches).....**Facelis**
5. Pappus of smooth or barbellate bristles.
6. Leaves mostly basal, these 12–45 mm wide, obovate-spatulate to rhombic-ovate or suborbicular; heads typically few, in tight, terminal, corymbose arrays; staminate and pistillate heads usually on separate plants.....**Antennaria**
6. Well-developed stem leaves present; most leaves < 20 mm wide (usually much less), lance-linear to narrowly spatulate or oblanceolate; heads usually numerous, in elongate spicate or paniculate arrays or terminal clusters; all heads with pistillate peripheral flowers and perfect central flowers.
7. Heads in spicate or narrow paniculate arrays (reduced to terminal clusters in depauperate individuals); receptacles concave in fruit; pappus of 12–28 minutely barbed bristles, deciduous as a ring; usually blooming Mar–Jun.....**Gamochoaeta**
7. Heads in corymbose or paniculate arrays or terminal clusters, often somewhat flat-topped; receptacles flat in fruit; pappus of 10–12 barbed bristles, these readily separating individually, in clusters, or as an easily-fragmented ring; most species blooming Aug–Dec (Apr–Jun in *P. luteoalbum*).....**Pseudognaphalium**

MUTISIEAE TRIBE

1. Basal rosette leaves with scattered straight hairs (and sometimes stalked glands), margins entire to lyrate, undulately shallowly lobed, finely denticulate; peripheral flower corollas usually ray-like, central flower corollas shorter and bilaterally symmetrical; achenes beaked.....**Chaptalia**
1. Basal rosette leaves nearly glabrous above, thinly to densely gray or white tomentose beneath, margins pinnately lobed, dentate-prickly to spinulose; all corollas similar, bilabiate and bilaterally symmetrical; achenes unbeaked.....**Acourtia**

SENECIONEAE TRIBE

1. Corollas yellow or orange to brick-red; heads usually with both ray and disk flowers (ray flowers absent in 1 species).
 2. Plants vining, to 500 cm tall; ray ligules orange to brick-red; disk corollas orange; horticultural escape in subtropical parts of TX..... **Pseudognoxys**
 2. Plants herbaceous, to 80 cm tall; ray ligules yellow or absent; disk corollas yellow; native or weedy plants widespread in TX.
 3. Stem leaves deeply toothed to pinnately lobed or compound; outer (shortest) phyllaries not black-tipped; plants annuals or perennials; ray flowers present **Packera**
 3. Stem leaves nearly entire or shallowly toothed to pinnately lobed (IF pinnately lobed, THEN outer (shortest) phyllaries black-tipped and ray flowers absent); plants annuals; ray flowers absent or present..... **Senecio**
1. Corollas white, yellowish cream, greenish, pinkish, or purple-red; heads with only disk or disk-like flowers.
 4. Plants perennial; leaves entire or rarely toothed, palmately veined (with several prominent, \pm parallel longitudinal nerves converging at the base and tip); phyllaries mostly pale green to white; 5 flowers per head..... **Arnoglossum**
 4. Plants annual; leaves entire to sharply double-serrate and sometimes irregularly lobed, pinnately veined (with a single prominent midnerve and lacking additional prominent, parallel, longitudinal nerves); phyllaries mostly leaf-green; 10+ flowers per head.
 5. Leaves entire to toothed or weakly lobed; corollas pink to purple or reddish purple, surpassing the phyllaries by 2–4 mm; achenes with 5 ribs or nerves **Emilia**
 5. Leaves sharply double-serrate and lobed; corollas whitish to greenish or yellowish cream to pale pinkish, only slightly surpassing the phyllaries; achenes with 10–12 ribs or nerves **Erechtites**

VERNONIEAE TRIBE

1. Involucres 25–45 mm wide; phyllary margins (at least the outer) spinose-toothed; peripheral corollas simulating rays, enlarged and zygomorphic..... **Stokesia**
1. Involucres < 10 mm wide; phyllary margins entire; peripheral and central corollas similar in size.
 2. Heads sessile, in dense clusters subtended by whorls of 2–3 leaf-like ovate-deltate bracts ca. 10 mm long; phyllaries 8; flowers (1–)4(–5+) per head; pappus of 5(–6) bristle-like scales **Elephantopus**
 2. Heads mostly pedunculate, not borne in clusters subtended by a whorl of leaf-like bracts; phyllaries 25–70+; flowers 9–55+ per head; pappus of 20+ outer scales and 20+ inner, longer bristles **Vernonia**

ACANTHOSPERMUM Schrank STARBUR

☛ A mainly South American genus of 6 species, with several becoming widespread and weedy. (Greek: *acantha*, spine, and *sperma*, seed, alluding to spiny “fruits”) (tribe Heliantheae)

REFERENCES: Blake 1921; Stuessy 1970; Strother 2006a.

Acanthospermum australe (Loefl.) Kuntze, (of the south), PARAGUAY STARBUR. Annual herbs; stems procumbent, dichotomously branching, 10–60(–120) cm long, often rooting at the nodes; leaves opposite, deltate to rhombic-ovate, 13–37 mm long, 7–32 mm wide, scabrellous or appressed-pubescent, gland-dotted, margins toothed above the middle; heads 3–5 mm wide, appearing axillary; phyllaries in 2 series, outer 4–6 herbaceous and ovoid, inner 5–8 spiny, enclosing ray achenes at maturity; receptacles chaffy; ray flowers pistillate, fertile, ligules 0.8–1 mm long, white to yellowish cream; disk flowers staminate, corollas white to yellowish cream; mature achenes enclosed within and shed with inner phyllaries as a bur, these “fruits” plumply ellipsoid, 7–9+ mm long, with hooked prickles, reminiscent of cockleburs (*Xanthium* spp.); pappus absent. Disturbed areas, sandy soils; collected only once in TX in San Jacinto Co. in 1933 (Correll & Johnston 1970); recorded from Vernon Par. in w LA (Gandhi & Thomas 1989); e and se U.S. from MA s to FL and w to TX; introduced elsewhere. Mar–Oct. [*A. xanthioides* DC., *Melampodium australe* Loefl.] Native of South America; now a weed in many countries worldwide. *I*

ACHILLEA L. YARROW

☛ A mainly temperate genus of 115 species, usually aromatic; many are used medicinally or cultivated as ornamentals. (So named because its healing powers were said to have been discovered by Achilles of Greek mythology; he supposedly stopped the flow of blood from the wounds of his Myrmidon warriors, perhaps with this plant—Arriagada & Miller 1997) (tribe Anthemideae)

REFERENCES: Mulligan & Bassett 1959; Tyril 1975; Arriagada & Miller 1997; Trock 2006a.

Achillea millefolium L., (thousand-leaved), MILFOIL, WESTERN YARROW, COMMON YARROW. Aromatic, woolly-pubescent,

rhizomatous, perennial herbs 35–100 cm tall, usually unbranched up to the inflorescence; leaves alternate, sessile, lanceolate, 2–3 times pinnately compound, fern-like in appearance, the crowded, narrow leaflets finely lobed or toothed; heads small, in a dense, terminal corymbose arrangement; phyllaries 20–30 in \pm 3 series; receptacles chaffy; ray flowers 5–12, pistillate, fertile, corollas white, rarely pinkish to purplish, the ligules ca. 2 mm long; disk flowers bisexual, fertile, corollas grayish white or creamy white; achenes 1–2 mm long, margins broadly winged; pappus absent. Roadsides, disturbed sites, prairies, and pastures; widespread in TX but most common in c and e TX; throughout most of the U.S. and Canada; Mexico; introduced elsewhere. Apr–May. [*A. lanulosa* Nutt., *A. millefolium* var. *lanulosa* (Nutt.) Piper, *A. millefolium* subsp. *lanulosa* (Nutt.) Piper, *A. millefolium* var. *occidentalis* DC., *A. occidentalis* (DC.) Raf. ex Rydb.] While this species is sometimes split into subspecific taxa (e.g., Kartesz 1994; Jones et al. 1997), Tyril (1975) regarded the species as so variable that infraspecific names in North America were relatively meaningless. Cronquist (1980) indicated that *A. millefolium* is a highly variable polyploid complex with both native and introduced forms, thus, several varieties are likely to be combined in our concept and distribution of this species. We are therefore not recognizing subspecies or varieties. When the foliage is crushed, it releases a spicy odor. MILFOIL was attributed to have extensive curative powers by herbals of the Middle Ages, supposedly being useful in treating such conditions as influenza, gout, and ailments of the kidneys and liver (Wills & Irwin 1961). It was also used medicinally by Native Americans and is still used in folk remedies; however, ingestion has been reported to cause irritation of mucous membranes and gastric and abdominal pain (Burlage 1968). *X*

ACMELLA Rich. ex Pers. SPOTFLOWER

☛A mainly tropical genus of 30 species. Previously included in and closely related to *Spilanthes*. (Greek: *akme*, a point, the highest point, bloom, in reference to the taste of the foliage—Quattrocchi 2000) (tribe Heliantheae)

REFERENCES: Jansen 1981, 1985a, 1985b; Strother 2006b.

Acmeila repens (Walter) Rich., (creeping), CREEPING SPOTFLOWER. Herbaceous rhizomatous perennials, creeping, rooting at nodes; flowering branches ascending; leaves opposite, petiolate; leaf blades ovate, rhombic to deltoid, 20–40 mm long, margins serrate; heads few, solitary, on axillary peduncles 5–15 cm long; phyllaries linear, in \pm 2 series; receptacles elongate, conical, 8–10 mm long in fruit, chaffy, the pales about equaling disk flowers; ray flowers few, pistillate, fertile, the ligules ca. 5 mm long, yellow; disk flowers perfect, fertile, yellow; achenes black, compressed, 1–2.5 mm long; pappus absent or rarely of 1–2(–3) bristles. Low moist areas, ditches, ponds; mainly se and e TX; Blackland Prairie in Dallas, Ellis, and Brazos cos., sw to the e edge of Edwards Plateau in Travis and Bexar cos.; se U.S. from NC s to FL and w to MO and TX; widespread in tropical America. May–Nov. [*A. oppositifolia* (Lam.) R.K. Jansen var. *repens* (Walter) R.K. Jansen, *Spilanthes americana* (Mutis ex. L. f.) Hieron. var. *repens* (Walter) A.H. Moore]

ACOURTIA D. Don DESERT-PEONY

☛A North American genus of ca. 41 species. *Acourtia* was long treated as a section of *Perezia*, but Reveal and King (1973) resurrected the genus, transferring all of the cauline-leaved members of *Perezia* from North America into *Acourtia*; Turner (1978) subsequently transferred the scapiform species. So treated, *Perezia* is confined to South America; *Acourtia* to North America and Mexico. (According to its author, the genus is named for Mrs. A'Court of Heytesbury House, Wiltshire, England, out of respect for her “botanical taste and knowledge.”) (tribe Mutiseae)

REFERENCES: Bacigalupi 1931; Reveal & King 1973; Turner 1978, 1993; Simpson 2006.

Acourtia runcinata (Lag. ex D. Don) B.L. Turner, (for its runcinate or saw-like leaves) SAWTOOTH ACOURTIA, FEATHERLEAF DESERT-PEONY. Scapose perennial herbs 5–30 cm tall with fasciculated tuberous-fusiform roots; leaves in a basal rosette; petioles 0.5–9 cm long; leaf blades 2.5–23 cm long, 3–8 cm wide, deeply pinnately lobed, glandular-pubescent to nearly glabrate, the margins spinulose-dentate; heads 1–3 per scape, scapes about as long as the longer leaves, ultimate peduncles 1–3 cm long; phyllaries in 2–4 series, subulate to lanceolate, 3–15 mm long; receptacles naked; flowers all perfect, fertile, corollas pink or lavender, 12–22 mm long, zygomorphic, 2-lipped, the outer lip ligule-like and 3-toothed, the inner lip smaller, 2-lobed, the lobes often curled; achenes fusiform, ribbed, 4–8 mm long; pappus of many tan or white ciliate bristles to 17 mm long. Dry calcareous hillsides; sw border of East TX along Edwards Plateau from Travis Co. s to Bexar and Goliad cos.; Trans-Pecos to South TX Plains; Mexico. Mar–Aug. [*Clarionia runcinata* Lag. ex D. Don, *Perezia runcinata* (Lag. ex D. Don) Lag. ex A. Gray.] *ET*

AGERATINA Spach SNAKEROOT

Ours shrubs or perennials; leaves opposite, petiolate, simple; heads clustered in compact, corymbose arrays; phyllaries in 2(–

3) series, ± equal, herbaceous; receptacles naked; ray flowers absent; disk flower corollas white or pinkish; achenes spindle-shaped, usually 5-angled; pappus of minutely barbed bristles.

☛A genus of ca. 250 species of the Americas; formerly included in *Eupatorium*; a few species are cultivated. (Named for the resemblance to the related genus *Ageratum*, and Latin: *-ina*, diminutive) (tribe Eupatorieae)

REFERENCES: King & Robinson 1970b, 1987; Clewell & Wooten 1971; Nesom 2006c.

1. Herbaceous perennials; petioles usually 3–10 cm long; corolla lobes short-villous; achenes glabrous.....**A. altissima**
1. Rounded, much-branched, evergreen shrubs; petioles usually 10–30 cm long; corolla lobes glabrous; achenes hispid**A. havanensis**

Ageratina altissima (L.) R.M. King & H. Rob. var. **altissima**, (tallest), WHITE SNAKEROOT, SNAKEROOT, RICHWEED, FALLPOISON. Herbaceous perennials from fibrous crowns, sometimes rhizomatous, 30–120 cm tall; stems erect or sprawling; leaves with petioles (5–)10–30(–50) mm long, blades deltoid-ovate to broadly lance-ovate, sometimes cordate, margins coarsely double-serrate; involucre 4–5 mm high; corollas white, lobes sparsely short-villous; achenes glabrous. Low woods, sandy soils, along streams; e and se TX w to Edwards Plateau; e 1/2 North America. Sep–Nov. [*A. altissima* (L.) R.M. King & H. Rob. var. *angustata* (A. Gray) Clewell & Wooten, *Eupatorium rugosum* Houtt., *E. urticifolium* Reichard] All parts of WHITE SNAKEROOT contain tremetol, a complex alcohol, and glycosides; it is poisonous to livestock. During colonial times cows eating SNAKEROOT passed the poison through their milk causing “milk sickness” in humans (Hardin & Arena 1974). So many deaths resulted that in some areas the human population was reduced to less than 1/2 the original number, and whole villages were abandoned (Kingsbury 1964); in livestock the condition is known as “trembles” (Stephens 1980). Other species are not known to contain the toxin. *X*

Ageratina havanensis (Kunth) R.M. King & H. Rob., (of Havana), HAVANA SNAKEROOT, SHRUBBY BONESET. Rounded, much-branched shrubs, 30–200 cm tall; stems erect, brittle; leaves evergreen-persistent, petioles 3–10(–15) mm long, blades deltoid to broadly ovate or hastate, margins dentate; involucre 4–6 mm high; corollas pinkish white to white, lobes glabrous; achenes hispid. Rocky limestone outcrops, oak-juniper woodlands, along streams; sw border of East TX from Bell Co. s to Comal Co.; Edwards Plateau and s part of Lampasas Cut Plain; Mexico and West Indies. (Sep–)Oct–Nov. [*Eupatorium havanense* Kunth, *E. texense* (Torr. & A. Gray) Rydb.] As the epithet implies, this species was first described from Cuba, but it is also native to TX. *ET*

AMBLIOLEPIS DC. HUISACHE DAISY

☛A monotypic genus endemic to the sw U.S. and Mexico; closely related to *Helenium* and *Gaillardia* but distinguished by a number of characters, including the strong smell of coumarins, present even in dried specimens after years of storage. (Greek: *ambly*, blunt, and *lepis*, scale, in reference to the pappus scales—Turner 2016) (tribe Heliantheae)

REFERENCES: Bierner 1990, 2006a.

Amblyolepis setigera DC., (bristle-bearing, presumably for the bristle-like hairs on the phyllaries), HUISACHE DAISY. Small annuals, 10–60 cm tall, with sweet odor reminiscent of freshly-mown sweet-clover (*Melilotus*); stems erect or decumbent with few branches distally; stems and leaf margins with long, wide-spreading, cottony hairs; leaves alternate, sessile, entire, the lowest oblanceolate, the upper ovate, subclasping; heads long-peduncled and large, the involucre 7–11 mm long; phyllaries in 2 series, lanceolate, the outer series green and pilose, the inner series scarious; receptacles hemispherical-ovoid, usually with short bristles, rarely with peripheral flowers subtended by pales; ray flowers 8–13(–20), pistillate, fertile, ligules yellow (sometimes striped or tipped with white), 10–22 mm long; disk flowers perfect, fertile, yellow; achenes 3–4.5 mm long, with a cage-like exterior of 8–10 stout, separate ribs; pappus of 5–6 ovate to obovate scales, 2–3(–4.1) mm long. Sandy or rocky open ground; w 1/2 of TX; along the sw border of East TX from Travis, Comal, and Bexar cos. s to Goliad and Victoria cos.; mainly High Plains, Edwards Plateau, and South TX Plains; n Mexico. Mar–Jul. [*Helenium setigerum* (DC.) Britton & Rusby] *ET*

AMBROSIA L. RAGWEED

Ours annual or perennial herbs (or rarely shrubs), 30–400+ cm tall; leaves alternate, alternate above and opposite below, or opposite, sessile or petiolate, palmately lobed or pinnatifid, sometimes aromatic; receptacles chaffy; flowers unisexual, in separate heads, these on the same plant; staminate heads in spicate or racemose arrays, their phyllaries united and cup-shaped, corollas insignificant, whitish or purplish; pistillate heads 1–few-flowered, axillary (usually below the staminate heads, rarely intermixed), their phyllaries often toothed, ± united, enclosing the achenes at maturity, forming a hard, indehiscent “bur” or “fruit,” the bur usually with the tips of the phyllaries projecting as spines, tubercles, or wings; pistillate

corollas and pappus absent.

• A cosmopolitan, but especially American genus of ca. 40 species. Most of the widespread species are exceedingly variable, both in vegetative and fruiting characters. Several of the species are known to form natural hybrids, which has probably confounded specific delimitation (Strother 2006c; Turner 2016). The flowers of *Ambrosia* are small and wind-pollinated; the abundant air-borne pollen is a problematic cause of allergic reactions during the fall and is considered the leading cause of hay fever in the U.S. (Lewis & Elvin-Lewis 1977). The allergic response is initiated when pollen grain proteins (antigens) attach to receptors on antibodies (immunoglobulin E—IgE) linked to immune system cells. This results in the immune cells releasing histamines, the molecules directly responsible for the symptoms known as hay fever (Kuby 1997). (Early Greek name for aromatic plants; the mythic food of the gods) (tribe Heliantheae)

REFERENCES: Rydberg 1922; Payne 1964; Lee & Dickinson 1980; Lee 1981; Strother 2006c.

1. Shrubs; fruits with membranous wings; rare in TX **A. monogyra**
 1. Annual or perennial herbs; fruits with spines or tubercles; common in TX.
 2. Leaves 3–5-lobed or sometimes unlobed.
 3. Plants < 1 m tall; sap not red; stem leaves sessile or nearly so; side lobes of leaves basically a large tooth on each side, these much smaller than the middle lobe; lobes or whole leaf (if unlobed) 12 mm wide or less; staminate heads sessile..... **A. bidentata**
 3. Plants 1–3(–5) m tall; sap often red; stem leaves petiolate; side lobes of leaves not much smaller than the middle lobe; lobes or whole leaf > 12 mm wide (often much more); staminate heads on short peduncles..... **A. trifida**
 2. Leaves pinnatifid, divided into numerous narrow segments.
 4. Leaves 1–4 times pinnatifid, parsley-like in appearance, with petioles to 4 cm long (longest on lower leaves); spines of the bur (1–)5–12+, with tips hooked, in several series on the upper 2/3 of the body of the bur; rare in East TX **A. confertiflora**
 4. Leaves 1–3 times pinnatifid, but not parsley-like, subsessile or with petioles to only 3 cm long; spines or tubercles of the bur 3–7, with tips straight or blunt, in a single series near the apex (= beak) of the bur; widespread throughout East TX.
 5. Taprooted annuals; stem leaves petiolate..... **A. artemisiifolia**
 5. Perennials from creeping rootstocks; stem leaves essentially sessile..... **A. psilostachya**

Ambrosia artemisiifolia L., (with leaves like *Artemisia*—sagebrush, wormwood), COMMON RAGWEED, ROMAN WORMWOOD, SHORT RAGWEED, ALTAMISA, HOGBRAKE. Tap-rooted annuals; stems 30–100 cm tall; leaves opposite or uppermost sometimes alternate, pinnatifid to bipinnatifid, with petioles usually 10–30 mm long; staminate heads short-stalked; “fruits” ca. 3 mm long, obovoid in outline, the spines 3–7. Disturbed areas; se and e TX, w to nc TX and Edwards Plateau; throughout most of Canada and the U.S.; occasionally introduced elsewhere. Aug–Nov. [*A. elatior* L., *A. glandulosa* Scheele, *A. monophylla* (Walter) Rydb.]

Ambrosia bidentata Michx., (two-toothed), SOUTHERN RAGWEED, LANCE-LEAF RAGWEED. Annuals; stems 30–100 cm tall; leaves alternate above, opposite below, sessile or nearly so, narrowly ovate to lanceolate, 3–5 cm long, usually with a broad tooth or small lobe on each side at the blade base; staminate heads sessile with oblique involucre; “fruits” ca. 5 mm long, 4-angled, the spines 4. Prairies; extreme n and e TX; from Grayson and Lamar cos. to Bowie Co. in Red River Area, also Sabine Co. in Pineywoods; ec U.S. from NY s to GA and w to MN and TX. Aug–Sep.

Ambrosia confertiflora DC., (with flowers crowded together), FIELD RAGWEED, BUR-SAGE. Perennials, forming colonies; stems 30–60(–150) cm tall; leaves mostly alternate, petiolate, 1–4-pinnatifid, often with 1–several pair of small lobes on the petiolar bases below the main blade; staminate heads short-stalked; “fruits” 2–4 mm long, the spines usually (1–)5–12+, ca. 0.5–1 mm long, with hooked tips. Disturbed areas; mainly w 1/2 of TX; along the sw border of East TX in Travis, Comal, and Bexar cos., disjunct e to Dallas Co.; sw U.S. from CA to OK; Mexico; occasionally introduced elsewhere. Aug–Nov. [*A. simulans* Shinnery, *Franseria caudata* Rydb., *Franseria confertiflora* (DC.) Rydb.]

Ambrosia monogyra (Torr. & A. Gray) Strother & B.G. Baldw., (one-whorled), BURROBUSH, SINGLE-WHORL BURROBUSH. Woody shrubs, to 150(–400) cm tall; leaves mostly alternate, sessile, filiform, unlobed or sometimes with 3(–5+) filiform lobes, finely scabrous on upper surface, staminate heads sessile or short-stalked; “fruits” 4–5 mm long, spindle- or pear-shaped, membranously-winged in a single whorl around the middle, wing segments 7–12+. Disturbed areas, alluvial washes, ravines; in East TX recorded only from Travis Co. in collections from the early 20th century (H.H. York s.n. and B.C. Tharp 44189 (TEX-LL)), at least the latter from xeric sandpiles along the Colorado River; Edwards Plateau and Trans-Pecos; sw U.S. from TX to CA. Oct–Dec. [*Hymenoclea monogyra* Torr. & A. Gray] Perhaps not a persistent member of the East TX flora.

Ambrosia psilostachya DC., (naked spike), WESTERN RAGWEED, PERENNIAL RAGWEED. Perennials, forming colonies; stems

30–60(–100+) cm tall; leaves alternate above, opposite below, sessile, pinnatifid; staminate heads short-stalked; “fruits” ca. 2.5 mm long, obovoid in outline, spines or tubercles 1–6, acute or blunt. Disturbed areas; nearly throughout TX; w 1/2 U.S.; Mexico. Aug–Nov. [*A. lindheimeriana* Scheele, *A. rugelii* Rydb.] Used as a medicinal tea by Native Americans; also apparently inhibits the growth of some other organisms through allelopathy (Cheatham & Johnston 1995).

Ambrosia trifida L., (three-parted), GIANT RAGWEED, BLOOD RAGWEED, BUFFALOWEED. Annuals; sap blood-red; stems often very tall, 1–3 (–5) m; leaves usually opposite, petiolate, palmately 3(–5)-lobed or uppermost rarely unlobed, scabrous on both sides, extremely so on upper surface; staminate heads stalked; “fruits” ca. 4 mm long, obovoid in outline, the tubercles 4–8, small or obsolete. Disturbed areas, ditches, often extremely abundant; nearly throughout TX; widespread in the U.S. and Canada. Aug–Nov. [*A. aptera* DC., *A. trifida* var. *texana* Scheele] The sap from broken stems stains the hands red.

AMPHIACHYRIS (A. DC.) Nutt. BROOMWEED

Taprooted glabrous annuals, with strong turpentine scent when crushed; stems usually much-branched in the upper portion; leaves alternate, sessile, linear to lanceolate, gland-dotted, margins entire; heads borne in paniculate or corymbose arrays; phyllaries in 1–3 series, unequal, whitish-resinous, bases hardened, margins hyaline; receptacles not chaffy (may be hairy); ray flowers pistillate, fertile, corollas yellow; disk flowers functionally staminate, corollas yellow; achenes obovate, 4–9-ribbed, hairy; pappus of ray achenes a low crown of scales.

♣A genus of 2 species of the c U.S. The species treated here have also been treated in *Gutierrezia* and *Xanthocephalum*. The molecular analysis by Suh and Simpson (1990) indicated *Amphiachyris* and *Thurovia* (a monotypic genus) form a sister group to *Gutierrezia*, and supported these as separate genera. As in *Gutierrezia*, plant populations tend to increase under overgrazing. (Greek: *amphi*, around, and *achyron*, chaff or husks, alluding to the pappus) (tribe Astereae)

REFERENCES: Shinnery 1951c; Solbrig 1960, 1961; Ruffin 1974; Lane 1979, 1982; Suh & Simpson 1990; Nesom 2006d.

1. Plants to 40(–60) cm tall; leaves 0.2–1(–2) mm wide; heads scattered in open panicles; receptacles with hooked, swollen-based hairs; achenes 4–6-ribbed, with long, bristly pubescence **A. amoena**
 1. Plants to 100(–200) cm tall; leaves 0.5–6 mm wide; heads many to very numerous in crowded corymbs; receptacles glabrous; achenes 7–9-ribbed, with short, bristly pubescence **A. dracunculoides**

Amphiachyris amoena (Shinnery) Solbrig, (charming), ANNUAL BROOMWEED, TEXAS BROOMWEED. Plants to 40(–60) cm tall; primary stems usually (2–)5 mm in diameter; leaves linear, rarely linear-lanceolate, 0.2–1(–2) mm wide; heads scattered in open paniculate arrays; receptacles with hooked, swollen-based hairs; phyllaries 3–4 mm long; achenes 2–3 mm long, 4–6-ribbed, with long, bristly pubescence. Calcareous soils on or near limestone outcrops; endemic to TX; w border of East TX in Denton Co., Bell Co., and Travis to Comal cos.; c to nc TX and Edwards Plateau. Sep–Oct. [*Gutierrezia amoena* (Shinnery) Diggs, Lipscomb, & O’Kennon, *Xanthocephalum amoenum* Shinnery, *X. amoenum* var. *intermedium* Shinnery] *ET*

Amphiachyris dracunculoides (DC.) Nutt., (resembling *Artemisia dracunculus* L.—taragon), COMMON BROOMWEED, PRAIRIE BROOMWEED. Plants to 100(–200) cm tall; primary stems 0.3–1(–2) mm in diameter; leaves narrowly to broadly lanceolate, 5–6 mm wide; heads many to very numerous in crowded corymbose arrays; receptacles glabrous; phyllaries 2–3 mm long; achenes 1.2–2.2 mm long, 7–9-ribbed, with short, bristly pubescence. Disturbed habitats, pastures, often in large populations in overgrazed areas; nearly throughout TX but less common in East TX; sc U.S. from TN and AL w to KS and NM; adventive in states further e and n (Kartesz 2015); Mexico. Aug–Nov. [*Gutierrezia dracunculoides* (DC.) S.F. Blake, *Xanthocephalum dracunculoides* (DC.) Shinnery] This species can cause contact dermatitis in humans, eye inflammation in humans and livestock, and gastrointestinal upsets in cattle (Gates 1945; Ajilvsgi 1984). The plants were tied to sticks by early settlers and used as brooms (Ajilvsgi 1984). *X*

ANTENNARIA Gaertn. PUSSY-TOES, EVERLASTING, LADIES’-TOBACCO

Ours low herbaceous perennials to 35 cm tall, stoloniferous; leaves alternate, entire, tomentose beneath; basal leaves petiolate, elliptic to broadly obovate, 2–6 cm wide; stem leaves reduced and ± sessile; heads in congested corymbose arrays, unisexual, the heads containing all female or all male flowers (these usually on separate plants); phyllaries imbricate in 3–5 series, narrow, membranous or scarious; receptacles naked; ray flowers absent; disk flowers either functionally staminate or pistillate and fertile; corollas creamy white to pinkish; achenes minute, elliptical; pappus of white, hair-like bristles.

♣A genus of 45 species of small dioecious herbs of temperate and alpine-arctic regions of the Americas and Eurasia; some are cultivated as rock garden subjects. (Latin: *antenna*, the pappus of the male flowers have swollen tips resembling a

butterfly's antennae) (tribe Inuleae)

REFERENCES: Bayer & Stebbins 1982; Bayer 1984, 1985, 2006; Anderberg 1991.

1. Basal leaves tomentose or glabrous on upper surface; pistillate involucre (7–)8–13 mm high; staminate corollas 3.5–5 mm long; pistillate corollas 4–7 mm long; pistillate flower pappus 5–8 mm long..... **A. parlinii**
 1. Basal leaves tomentose on upper surface; pistillate involucre 5–7 mm high; staminate corollas 2–3.5 mm long; pistillate corollas 3–4 mm long; pistillate flower pappus 3.5–5.5 mm long..... **A. plantaginifolia**

Antennaria parlinii Fernald, (for its discoverer, John Crawford Parlin, 1863–1948, of Maine), LARGE-LEAF PUSSY-TOES, PLAIN-LEAF PUSSY-TOES, PARLIN'S PUSSY-TOES. Plants to 35(–45) cm tall; leaves obovate-spatulate, prominently 3- to 5-nerved, lower surface gray-pubescent with matted, woolly hairs; involucre of pistillate heads (7–)8–13 mm high; phyllaries with scarious or white tips; staminate flowers with prominent black-brown anthers; pistillate corollas 4–7 mm long; achenes 1–2 mm long; pistillate flower pappus 5–8 mm long. Sandy woods; East TX w to West Cross Timbers; e 1/2 of North America. Mar–Apr. Thought to be a polyploid of hybrid origin (Bayer & Stebbins 1982; Bayer 1985).

1. Stems usually eglandular; upper surface of basal leaves tomentose subsp. **fallax**
 1. Stems usually with purple glandular hairs (at least near summits of young flowering stems); upper surface of basal leaves glabrous..... subsp. **parlinii**

subsp. **fallax** (Greene) Bayer & Stebbins, (deceptive), DECEITFUL PUSSY-TOES. Basal leaves usually gray-tomentose on both sides. Widespread from East TX w to West Cross Timbers. [*A. fallax* Greene]

subsp. **parlinii**, PARLIN'S PUSSY-TOES. Basal leaves gray-tomentose beneath, the upper surface green and glabrous. Rare in TX; recorded only in Montgomery Co. (Brown 2014). [*A. arnoglossa* Greene]

Antennaria plantaginifolia (L.) Richardson, (with leaves resembling *Plantago*—plantain), PLANTAIN-LEAVED PUSSY-TOES. Plants to 20(–25) cm tall; leaves obovate-orbicular, 3–5(–7)-nerved, lower surface tomentose, upper surface green and glabrescent to gray-pubescent; involucre of pistillate heads 5–7 mm high; phyllaries with white tips; pistillate corollas 3–4 mm long; achenes 0.5–1.6 mm long; pistillate flower pappus 3.5–5.5 mm long. Sandy woods; rare in TX; recorded from Lamar (TEX) and Morris cos.; e 1/2 of North America. Mar–Apr. [*A. caroliniana* Rydb., *Gnaphalium plantaginifolium* L.]

ANTHEMIS L. MAYWEED, DOG-FENNEL, CHAMOMILE

☛ An Old World genus of ca. 175 species ranging from Europe through the Mediterranean region to Iran and e Africa; some species are medicinal or are cultivated as ornamentals. (Greek name for the related *Chamaemelum nobile* (L.) All., camomile; probably derived from *antheon*, flower) (tribe Anthemideae)

REFERENCES: Arriagada & Miller 1997; Watson 2006a.

Anthemis cotula L., (resembling species belonging to the genus *Cotula*), MAYWEED, CHAMOMILE, DOG-FENNEL, STINKING CAMOMILE, STINKWEED. Rankly aromatic annuals to 60 cm tall; slightly and inconspicuously pubescent; leaves alternate, finely and deeply cut, twice compound or pinnately lobed; heads borne singly or in loose corymbose arrays; phyllaries appressed, scarious-margined; receptacles ovoid-conical, chaffy; ray flowers 10–15 per head, sterile, ligules white, ca. 7–12 mm long, persistent and reflexed in age; disk corollas greenish yellow; achenes ribbed, 1.3–2 mm long; pappus absent. Sandy roadsides, pastures, disturbed areas; cultivated and escaped; se and e TX w to nc TX and Edwards Plateau; throughout most of the U.S. and Canada. Apr–May. Native of Europe; now a widespread weed in temperate regions. Reverchon (1880) stated that its introduction in Dallas Co. dates from 1875. Source of an insecticide and reported to taint cow's milk (Mabberley 1987). According to Stubbendieck et al. (1994) it is poisonous to both cattle and poultry, the sap containing caustic substances which irritate membranes. Related to *Chamaemelum nobile*, which is the source of the stomach remedy camomile. *I*

APHANOSTEPHUS DC. LAZY DAISY, DOZE DAISY

Annual or perennial herbs; leaves alternate, with narrowed, petiolar bases; blades linear to oblong-oblancoate, entire to pinnately lobed; heads solitary; phyllaries ovate-lanceolate with broad, scarious margins; receptacles naked; ray flowers pistillate, fertile, with ligules white to pink, often rose-red or rose-purple beneath, spreading from mid-morning to late afternoon, erect at night; disk flowers perfect, fertile, corollas yellow; achenes terete or 4-angled and multi-ribbed; pappus absent or minute, of scales, awns, or cilia 1 mm or less long.

☛ A genus of 4 species endemic to the U.S. and Mexico. The common names refer to the flowers remaining closed until mid-

morning or later (Ajilvsgi 1984); the often rose-red or rose-purple undersides of the erect ray flowers are conspicuous (Kirkpatrick 1992). (Greek: *aphanes*, obscure or hidden, and *stephanos*, crown, presumably from the inconspicuous crown-like pappus of some species) (tribe Astereae)

REFERENCES: Shinnars 1946c; Turner 1984; Elisens et al. 1992; Nesom 2006e.

1. Plants soft-pubescent to hispid-pubescent with spreading to reflexed hairs (usually < 1 mm long); heads not crowded, on long peduncles naked for 15–100 mm below the heads (to 150 mm in age); ray flowers 16–85 per head.
 2. Ray flowers with ligules 5–10 mm long; bases of disk corollas only slightly enlarged at maturity; taprooted annuals or clump-forming perennials; sw border of East TX.
 3. Ray flowers usually 16–32 per head; plants annual from slender taproot **A. ramosissimus**
 3. Ray flowers 40–85 (as few as 25 in second flowering of summer and fall) per head; plants perennial from branched, woody base **A. riddellii**
 2. Ray flowers with ligules 8–15 mm long; bases of disk corollas becoming swollen (to 2 times or more their original diam.) and hardened at maturity; taprooted annuals; widespread in East TX **A. skirrhobasis**
1. Plants conspicuously hispid with long (0.7–2.2 mm long), coarse, jointed, translucent hairs spreading at right angles; heads ± crowded, on short peduncles naked for 3–12 mm below the heads (to 25 mm in age); ray flowers 12–18 per head **A. pilosus**

Aphanostephus pilosus Buckley, (pilose, with long soft hairs), HAIRY LAZY DAISY. Small annuals; stems 6–33 cm tall; stem hairs spreading at right angles; involucre 4.5–5.5 mm high, 4–6 mm wide; ray flower ligules 5–7 mm long, white to rosy-lavender, especially upon withering; pappus to 0.7 mm long. Sandy or silty soils; low prairies, draws, and ditches; Rollings Plains and West Cross Timbers with a disjunct record from Red River Co. (Kartesz 2015), rare in East TX; endemic to n TX and OK. Mar–May(–Jun).

Aphanostephus ramosissimus DC. var. **ramosissimus** (much-branched), PLAINS LAZY DAISY, ARIZONA LAZY DAISY. More or less soft-pubescent annuals, often widely branched and partly decumbent; stems 20–45 cm tall; involucre 3.3–5 mm high, 5–9 mm wide; ray flower ligules 5.5–7.5 mm long, white or becoming rose to purple, especially on lower surface; pappus to 0.6 mm long. Sandy open woods, fields, prairies, and roadsides; along the sw border of East TX from Bastrop (TEX), Bexar, and Travis (TEX) cos. s to DeWitt and Goliad cos.; High Plains s to South TX Plains; OK; n Mexico. Apr–Jun(–Aug).

Aphanostephus riddellii Torr. & A. Gray, (for John Leonard Riddell, 1807–1865, botanist), RIDDELL'S LAZY DAISY. Hispid-pubescent perennials; stems woody at the base, 10–50 cm tall; stem hairs spreading or bent downward; heads usually numerous, rather large and long-peduncled; involucre 4.5–6.2 mm high, 9–14 mm wide; ray flower ligules 7–10 mm long, white; pappus to 0.3 mm long. Rocky or sandy ground, chiefly on limestone; along the sw border of East TX from Bexar, Comal, and Travis cos. s to Hays and Goliad cos.; High Plains s to South TX Plains; NM; n Mexico. Apr–Jun(–Jul–Oct).

Aphanostephus skirrhobasis (DC.) Trel. var. **skirrhobasis**, (Greek: *skirros*, hard, and *basis*, base, referring to the bases of disk flowers becoming hardened at maturity—Holloway 2005), ARKANSAS LAZY DAISY. Soft, gray-pubescent, taprooted annuals; stems to 50 cm tall; heads rather large; involucre 6–8 mm high, 7–13 mm wide; ray flowers 20–44 with ligules 8–15 mm long, white or reddish to rosy on the lower surface, the color often streaked; pappus to 0.3 mm long. Sandy open woods, fields, prairies, and roadsides; widespread in TX; LA, AR, KS, OK, NM; n Mexico. Apr–Jun, sporadically later. Sometimes cultivated as an ornamental.

A similar variety, *A. skirrhobasis* (DC.) Trel. var. *thalassius* Shinnars, is restricted to Gulf Coast sand dunes but enters our area in Jefferson Co. It differs in having leaves that are thickened and densely felted with gray hairs.

ARCTIUM L. BURDOCK

♣ A genus 10 species native to Eurasia and n Africa; widely introduced and weedy worldwide. (Greek: *arktios*, from *arktos*, bear, perhaps alluding to the bur-like involucre) (tribe Cardueae)

REFERENCES: Duistermaat 1996; Keil 2006a.

Arctium minus Bernh., (small), LESSER BURDOCK, COMMON BURDOCK, BARDANE, BEGGAR'S BUTTON. Herbaceous biennials, 50–300 cm tall; stems erect, openly branched; basal leaves with long, hollow petioles, blades 30–60 cm long, green above, thinly gray-tomentose beneath, margins coarsely dentate to subentire (rarely deeply dissected), not spiny; heads in racemose or paniculate clusters; involucre 15–40 mm wide; phyllaries in many series, linear to lanceolate, margins often minutely serrate; tips hooked-spiny; receptacles bristly; ray flowers absent; disk flowers 30+, corollas pink to purple or white; achenes obovoid, ± compressed, 5–8 mm long, enclosed within mature involucre that are shed as spiny burs; pappus falling early, of many bristles, 1–3.5 mm long. Waste places, roadsides, fields; not yet reported in TX but included here based on records from adjacent Bryan and McCurtain cos., OK (OKL); widespread in U.S. but less frequent in s states; Canada; Eurasia;

introduced elsewhere. Jul–Sep. [*Lappa minor* Hill] Native to Eurasia; an invader of pastures and hayfields, now a noxious weed on several continents. *I* *NOX*

ARNOGLOSSUM Raf. INDIAN-PLANTAIN

Ours perennial herbs, mostly glabrous, with fleshy fibrous roots; stems usually 1, erect, 3–30 cm tall; leaves mostly conspicuously large and basal, fewer and reduced upwards, alternate, petiolate or sessile; leaf blades cordate to lanceolate, with prominent ± parallel, longitudinal nerves eventually converging toward the tip (reminiscent of larger-leaved *Plantago* spp.); heads numerous in a broad corymbose arrangement at apex of plant; involucre mostly cylindrical; phyllaries 5, in 1–2 series, flattened or keeled dorsally; receptacles naked; ray flowers absent; disk flowers 5, perfect, fertile, corollas cream or greenish white; achenes cylindric, ribbed, glabrous; pappus of 100+ white capillary bristles.

☛A genus of 8 species native to e North America; previously recognized in *Cacalia*. (From Greek: *arnos*, lamb, and *glossa*, tongue; an ancient name for some species of *Plantago*) (tribe Senecioneae)

REFERENCES: Shinnery 1950c; Robinson 1974; Phippen 1978; Anderson 2006.

- | | |
|---|------------------------|
| 1. Stems rounded; leaves membranous; phyllaries not keeled or winged on their dorsal midvein; plants flowering late summer–fall..... | A. ovatum |
| 1. Stems striate-angled; leaves firm and fleshy; phyllaries keeled or winged on their dorsal midvein; plants usually spring-flowering | A. plantagineum |

Arnoglossum ovatum (Walter) H. Rob., (for the ovate leaf blades), LANCE-LEAF INDIAN-PLANTAIN. Plants 50–100(–300) cm tall, weakly rhizomatous; stems rounded; basal leaves to 30+ cm long, long-petioled, the blades ovate to narrowly lanceolate or lance-linear, usually entire, membranous; upper stem leaves smaller and subsessile; phyllaries lance-ovate, pale green to white, sometimes purple-tinged at tips, flattened, the midvein not keeled or winged dorsally; achenes 4–5 mm long; pappus bristles to 7.5 mm long. Sandy soils, prairies, fields, and moist open woods; se TX in Pineywoods and Gulf Prairies; se U.S. from NC w to TX. Jul–Nov. [*A. ovatum* var. *lanceolatum* (Nutt.) D.B. Ward, *Cacalia elliotii* (Harper) Shinnery, *Cacalia lanceolata* Nutt., *Cacalia ovata* Walt.]

Arnoglossum plantagineum Raf., (resembling *Plantago*—plantain), PRAIRIE-PLANTAIN, GROOVE-STEM INDIAN-PLANTAIN, TUBEROUS INDIAN-PLANTAIN. Plants 50–100 cm tall, weakly rhizomatous; stems striate-angled, often dark purple; basal leaves 5–17 cm long, long-petioled, the blades elliptic or ovate, entire or rarely toothed, thick and fleshy; stem leaves relatively few, alternate, much smaller, the upper subsessile; phyllaries ovate, pale green to white, with a narrow, sharp, prominent keel or wing on the midvein dorsally; achenes 4–5 mm long; pappus bristles to 8(–9) mm long. Prairies, fields, and moist open woods; se and e TX w to nc TX and sw to Travis and Comal cos.; adjacent cos. on the e border of Edwards Plateau; e 1/2 North America. Apr–Jun, rarely late Sep–Nov. [*Cacalia plantaginea* (Raf.) Shinnery] The striking leaves and erect flowering stalks make this species a conspicuous spring component of many East TX prairies and fields.

ARTEMISIA L. SAGEBRUSH, WORMWOOD, SAGEWORT, SAGE, MUGWORT

Ours perennial herbs or slightly subshrubby; white-pubescent or nearly glabrous, often aromatic; leaves alternate, entire or deeply lobed, the segments linear to oblong, elliptical, or ovate; heads small, in paniculate arrays; involucre white-woolly or nearly glabrous; phyllaries in 4–7 series, unequal; receptacles naked; ray flowers absent; peripheral disk flowers pistillate, with minute filiform corollas; central disk flowers perfect and fertile or functionally staminate, corollas minute, pale yellowish cream; achenes ca. 1 mm or less long; pappus absent.

☛A genus of ca. 350 species of the n temperate zone, w South America, and s Africa; usually in dry areas. *Artemisia* species are wind-pollinated and cause allergies. The genus contains many aromatic shrubs and herbs that have been employed for culinary, medicinal, and spiritual purposes. *Artemisia tridentata* Nutt. is the famous SAGEBRUSH widespread in the arid intermountain w U.S.; the culinary herb TARRAGON is the Eurasian *A. dracunculus* L.; the WORMWOOD of the Bible is thought to be *A. herba-alba* Asso; the green liqueur absinthe is made from the European *A. absinthium* L.; the Asian *A. annua* L. has been long used in traditional Chinese medicine and is now being used to treat malaria. The common name MUGWORT is from Old English *mucgwyrt*, *mucg* meaning midge, and referring to the use of several Old World species in repelling flies and midges (Shultz 2006). (Ancient name of *Artemisia vulgaris* L., from Greek goddess of the hunt, Artemis, or possibly from Artemisia, wife of Mausolus, king of Caria) (tribe Anthemideae)

REFERENCES: Hall & Clements 1923; McArthur & Welch 1984; Arriagada & Miller 1997; Shultz 2006.

- | | |
|--|-----------------------|
| 1. Leaf blades nearly glabrous, usually entire; phyllaries glabrous..... | A. dracunculus |
|--|-----------------------|

1. Leaf blades conspicuously grayish or white-woolly, at least on lower surfaces, entire to lobed or dissected; phyllaries gray-tomentose.....**A. ludoviciana**

Artemisia dracunculus L., (little dragon, for its ancient reputation to cure snakebite) WILD TARRAGON. Rhizomatous perennial or subshrub, 50–120(–150) cm tall, often strongly aromatic; leaves variable, linear to oblong, mostly entire, sometimes irregularly lobed, bright green to olive or gray-green, glabrous to sparsely pubescent; heads in loose corymbose panicles; phyllaries green to tan, glabrous, with hyaline margins; achenes 0.5–0.8 mm long. Desert scrub, fields, roadsides; in East TX recorded only from Comal Co., apparently based on early 19th-century collections by Ferdinand Lindheimer, possibly from cultivated plants; Trans-Pecos and Panhandle; w 1/2 North America; Mexico; Eurasia. Aug–Sep. [*A. aromatica* A. Nelson, *A. dracunculoides* Pursh, *A. dracunculoides* Pursh var. *dracunculina* (S. Watson) S.F. Blake, *A. glauca* Pall. ex Willd.] Widely cultivated as a culinary herb; likely introduced in parts of its range.

Artemisia ludoviciana Nutt., (of Louisiana) WHITE SAGEBRUSH. Perennial rhizomatous herb, rarely slightly subshrubby, 20–80(–120) cm tall, aromatic; leaves variable in shape, usually some lobed or dissected but varying to entire, also variable in terms of pubescence, the young leaves white-woolly above and beneath, older leaves glabrate and dark green above and white-woolly beneath; heads in compact to diffuse panicles; phyllaries densely gray-tomentose; achenes ca. 0.5 mm long. Prairies, roadsides, disturbed habitats; widespread in TX but more frequent in c and w TX; throughout North America; Mexico. Aug–Dec. [*A. albula* Wooton, *A. gnaphalodes* Nutt., *A. ludoviciana* Nutt. var. *mexicana* Willd. ex Spreng., *A. mexicana* Willd., *A. neomexicana* Greene ex Rydb., *A. redolens* A. Gray] We are following Turner (2016) in recognizing *A. ludoviciana* as a single, widespread, highly variable species without meaningful subspecific units.

ASTRANTHIUM Nutt. WESTERN DAISY

♣A genus of 12 species endemic to the s U.S. and Mexico. (Greek, *astron*, star, and *anthos*, flower) (tribe Astereae)
REFERENCES: Larsen 1933; DeJong 1965; Nesom 2005b, 2006f.

Astranthium ciliatum (Raf.) G.L. Nesom, (ciliate, fringed), WESTERN DAISY, COMANCHE WESTERN DAISY, BLUE DAISY. Low pubescent annuals from a taproot; stems usually 1, 10–40 cm tall; leaves alternate, the lowest with narrow, petiolar bases, the upper sessile, blades oblanceolate, entire; heads solitary at the ends of long peduncles, usually several per main stem; phyllaries subequal in 2–3 series; receptacle rounded-conical, naked; ray flowers (7–)13–24, perfect, fertile, the ligules white to bluish white or pinkish white, not curling, (4–)6–10(–12) mm long; disk flowers perfect, fertile, yellow; achenes 1–1.6 mm long; pappus absent or a minute ring or crown of scales. Open woods, prairies, and roadsides, in sandy or silty clay soils; se and e TX w to Rolling Plains and Edwards Plateau; AR, MO, KS, OK; n Mexico. Mar–May. [*A. integrifolium* var. *ciliatum* (Raf.) Larsen, *A. integrifolium* (Michx.) Nutt. subsp. *ciliatum* (Raf.) DeJong, *A. integrifolium* var. *triflorum* (Raf.) Shinnery, *Bellis ciliata* Raf.]

BACCHARIS L. GROUNSELTREE

Shrubs or subshrubs, dioecious, pistillate and staminate plants with a somewhat differing appearance; leaves alternate, subulate to obovate, entire, serrate, or dentate, 1- or 3-nerved, glandular or punctate glandular; heads in paniculate or corymbose arrays; involucre hemispheric to narrowly cylindrical; phyllaries strongly graduated in several series; receptacles naked; ray flowers absent; staminate heads with corollas funnellform, white to yellowish brown; pistillate heads with corollas filiform, yellowish white to brown; achenes 5–10-ribbed, yellow to reddish; pappus of numerous white to brownish bristles, those of pistillate heads generally elongating and exceeding phyllaries at maturity.

♣An American genus of ca. 400 species of dioecious shrubs; some are used medicinally, while others are cultivated as ornamentals. Pistillate plants are necessary for definitive identification. *X* The leaves and flowers of a number of species contain cardioactive glycosides and are considered dangerous, even fatal, to livestock (Hardin & Brownie 1993) (Name derived from Bacchus, Roman god of wine, allusion obscure and likely used originally for a different plant) (tribe Astereae)
REFERENCES: Mahler 1955; Mahler & Waterfall 1964; Nesom 1990d; Sundberg & Bogler 2006.

1. Leaf blades linear to narrowly lanceolate, ca. 1–2 mm wide; achenes 6–8-ribbed, 3–5 mm long, slightly to prominently glandular-scabrous; pistillate pappus of many series, light reddish brown; plants less than 1 m tall **B. texana**
1. Leaf blades linear to oblanceolate, elliptic, rhomboid or obovate, usually > 2 mm wide (often much more); achenes 8–10-ribbed, 1–2 mm long, glabrous; pistillate pappus in 1–2 series, whitish; plants usually 1–3(–6) m tall (but can flower at 0.5 m tall).
2. Leaf blades elliptic to rhomboid or obovate, the larger ones 22–37 mm wide, the upper leaves gradually reduced, narrower; pistillate involucre 3–5 mm long **B. halimifolia**

2. Leaf blades very narrowly elliptic to linear or oblanceolate, 2–8(–15) mm wide; pistillate involucre 4–8 mm long.

3. Pistillate involucre to 5 mm long; leaves linear to very narrowly elliptic, usually 2–4(–5) mm wide; widespread in

East TX **B. neglecta**

3. Pistillate involucre 6–8 mm long; leaves oblanceolate, usually 4–8(–15) mm wide; uncommon in East TX..... **B. salicina**

Baccharis halimifolia L., (with leaves like *Halimium* of the Cistaceae), EASTERN BACCHARIS, SEA-MYRTLE, CONSUMPTION-WEED, TREE-GROUNSEL, GROUNSELTREE, MANGLIER, SALT BUSH, SILVERLING, Shrubs 1–6 m tall; leaves petiolate; leaf blades rhombic to oblong, gland-dotted and resinous, with 1 prominent nerve and 2 lateral nerves, bases cuneate, margins entire in lower half, the upper half entire or with few to several teeth; achenes 1–1.7 mm long; pistillate pappus 8–12 mm long. Wet fields, edges of swamps and marshes, along creeks in woods; widespread in e 1/3 of TX; e and se U.S. from MA to FL, w to OK and TX; n Mexico and West Indies; introduced elsewhere. Jul–Nov. Salt tolerant. In the w part of its distribution it appears to hybridize with *B. neglecta*, making distinction between these species difficult (Turner 2016). This species is a serious invasive pest in Tridens Prairie and similar areas in Lamar Co. Potentially toxic to livestock (Duncan et al. 1957; Burlage 1968). *X*

Baccharis neglecta Britton, (neglected, overlooked), ROOSEVELT-WEED, NEW DEAL WEED, JARA DULCE, Shrubs 1–4 m tall; leaves sessile or short petiolate; leaf blades linear to narrowly elliptic, gland-dotted, 1-nerved with lateral nerves obscure, margins entire or finely serrate with few teeth; achenes ca. 1.2 mm long; pistillate pappus 7–12 mm long. Calcareous soils and disturbed areas; Blackland Prairie and Poast Oak Savannah, widely distributed from nc to s TX; OK; n Mexico. Aug–Nov. Several common names for this species are in reference to its abundance in fallow fields during the Great Depression of the 1930s (Turner 2016).

Baccharis salicina Torr. & A. Gray, (resembling *Salix*—willow), SEEP-WILLOW, WATER-WILLOW, WATER-WALLY, JARA, WILLOW BACCHARIS. Shrubs 1–3 m tall; leaves nearly sessile; leaf blades oblong to oblanceolate, gland-dotted, the wider ones 3-nerved, margins usually coarsely serrate, sometimes entire; achenes 1.2–2 mm long; pistillate pappus to 12 mm long. Alluvial, often sandy or saline soils; uncommon in East TX, Bell, Rusk, and Walker cos. (TAMU), Brazos Co. (TAES); mainly Trans-Pecos and Plains Country, sw U.S. from CA e to KS and TX; n Mexico. Aug–Nov.

Baccharis texana (Torr. & A. Gray) A. Gray, (of Texas), PRAIRIE BACCHARIS. Rhizomatous subshrubs or shrubs 0.25–0.6 m tall; leaves sessile, leaf blades linear to narrowly lanceolate, gland-dotted, 1-nerved, margins minutely undulate; achenes 3–5 mm long; pistillate pappus 11–13 mm long. Calcareous soils, prairies; Bell, Bexar, Goliad, Grimes, and McLennan cos., also Dallas Co., but not collected there since 1900 (Mahler 1988); widely distributed from nc to s TX; OK and NM; n Mexico. Aug–Oct. [*Linosyris texana* Torr. & A. Gray]

BERLANDIERA DC. GREENEYES

Pubescent, herbaceous to suffrutescent perennials; leaves alternate, the margins toothed to lyrate-pinnatifid; heads 1–several in corymbose clusters; phyllaries in 2–3 series, broadly ovate, herbaceous; receptacles chaffy, pales each folded around a disk flower and apically widened and green; ray flowers pistillate, fertile, with ligules yellow to orange-yellow with conspicuous green or red to maroon veins on lower surface; disk flowers staminate, in ours reddish to maroon; achenes broadly obovate, thin-edged, each adhering to and shed with subtending phyllary; pappus absent or inconspicuous.

☛ A genus of 4 species native to the s U.S. and Mexico. The disk flowers are subtended by pales, their tips giving the receptacle a green appearance, hence the common name GREENEYES. (Named for Jean Louis Berlandier, 1805–1851, French botanist who explored TX, NM, and Mexico, and one of the first botanists to make extensive collections in TX). (tribe Heliantheae)

REFERENCES: Turner & Johnston 1956; Pinkava 1967, 2006; Nesom & Turner 1998.

1. Ligules of ray flowers with veins on lower (= abaxial) surface red to maroon; at least some leaves lyrate-pinnatifid; peduncles scabrous to subscabrous; stems arising from a persistent basal rosette; rare in East TX **B. lyrata**

1. Ligules of ray flowers with veins on lower surface green; leaves variously toothed, not lyrate-pinnatifid; peduncles with spreading or matted hairs; stems not arising from a persistent basal rosette; scattered or common in East TX.

2. Middle stem leaves usually with evident petioles; peduncles with matted hairs; stems not densely leafy, the internodes often 3 cm or more long **B. pumila**

2. Middle stem leaves sessile or with inconspicuous short petioles, peduncles with ± spreading hairs; stems very densely leafy, with most internodes 3 cm or less long **B. betonicifolia**

Berlandiera betonicifolia (Hook.) Small, (with leaves like *Betonica*—betony, now = *Stachys* in Lamiaceae), TEXAS GREENEYES. Plants weakly suffrutescent; stems to 100 cm tall, producing a new crop of flowering branches from summit after spring blooming period; leaves evenly distributed or crowded near summit; central stem leaves sessile or short-petioled; leaf

blades ovate, stiffly hirsute to subscabrous or loosely hairy but not velvety, margins toothed; ray flowers with ligules 10.5–17 mm long, veins on lower surface green; achenes 4.5–5.5 mm long, 3–4 mm wide. Sandy soils, open post oak woods; patchy distribution across TX; Blackland Prairie in Dallas, Fannin, Grayson, and Lamar cos.; Pineywoods in Shelby and San Augustine cos., and w border of Edwards Plateau from Travis and Bexar to Goliad and Victoria cos.; sc U.S. from NM to MO to LA. Jun–Sep. [*B. texana* DC.] We are following Nesom and Turner (1998) for nomenclature of this species. The name *B. betonicifolia* must be used since the type collection of *B. betonicifolia* (named in 1835) is of the same species as *B. texana* (named in 1836) (Nesom & Turner 1998). Plants from se TX which had previously gone under the name *B. xbetonicifolia* (Hook.) Small are now being recognized as *B. pumila*.

Berlandiera lyrata Benth., (lyre-shaped), LYRE-LEAF GREENEYES; BERLANDIER'S DAISY, CHOCOLATE DAISY, GREEN-EYED LYRE-LEAF. Plants herbaceous; stems to 120 cm tall; leaves crowded toward base of plant in a persistent basal rosette; leaf blades velvety, lyrate to pinnatifid; ray flowers with ligules 10–14 mm long, sometimes the entire lower surface red to maroon; achenes 4.5–6 mm long, 2.7–3.7 mm wide. Dry rocky limestone areas, roadsides; rare in East TX; Denton Co. and Grayson Co. (Kartesz 2015), mostly High Plains and Trans-Pecos; sw U.S. from CO and AZ e to KS, OK, and TX; n Mexico. Nearly throughout the growing season. [*B. incisa* Torr. & A. Gray] The flowers have a chocolate-like aroma (Kirkpatrick 1992).

Berlandiera pumila (Michx.) Nutt., (dwarf), SOFT GREENEYES. Plants herbaceous to suffrutescent; stems to 70 cm tall; central stem leaves often with long petioles; leaf blades velvety, oblong to ovate; ray flowers with ligules 12–20 mm long, veins on lower surface green; achenes 4.5–6 mm long, 3–4 mm wide. Roadsides, open wooded areas, often in sandy soils; throughout e and sc TX; se U.S. from SC, GA, and FL w to LA and TX. Apr–Oct. [*B. dealbata* (Torr. & A. Gray) Small, *B. tomentosa* (Pursh) Nutt.]

BIDENS L. BEGGAR-TICKS, BUR-MARIGOLD, TICKSEED-SUNFLOWER

Annual or perennial herbs; leaves opposite, simple, divided, or compound; heads borne singly or in corymbose arrays; primary (inner) phyllaries in 2–3 series, hyaline- or yellow-margined, subtended by a series of secondary, phyllary-like bracts, these narrower, herbaceous; receptacles chaffy; ray flowers neuter, or pistillate and infertile, or rarely absent, corollas in ours usually yellow or whitish (rarely pinkish); disk flowers perfect, fertile, yellow or orange-yellow; disk achenes 3–4 angled, sometimes compressed or flattened; pappus of (1–)2–4 usually barbed awns or sometimes reduced or absent.

☛A genus of ca. 200 species, cosmopolitan, but especially speciose in Mexico; a few are cultivated ornamentals while some are considered weeds. Achenes with retrorsely-barbed pappus awns are dispersed by attaching to hair or clothing. (Latin: *bis*, twice, and *dens*, a tooth, in allusion to the two awns on the achenes of some species) (tribe Heliantheae)

REFERENCES: Sherff 1937; Sherff & Alexander 1955; Hall 1967; Lipscomb & Smith 1977; Ballard 1986; Tadesse et al. 1995, 2001; Strother & Weedon 2006.

1. Midstem leaves sessile, simple, the margins dentate-serrate to nearly entire **B. laevis**
1. Midstem leaves petiolate, variously dissected or compound, not simple, variously margined.
 2. Central achenes equally 4-angled, linear-fusiform, widest in the middle.
 3. Midstem leaves usually 2–3 times pinnately dissected or compound with numerous segments or leaflets; ray flowers when present with ligules yellowish to whitish, 1–3 mm long **B. bipinnata**
 3. Midstem leaves once-pinnately lobed with 3–7 segments or leaflets; ray flowers when present with ligules white (rarely pinkish or yellowish), 2–15+ mm long **B. pilosa**
 2. Central achenes flattened or unequally 4-angled, wedge-shaped, widest in the upper 1/3 portion.
 4. Ray flowers absent, or if present, with ligules < 4 mm long.
 5. Ray flowers present or absent; secondary phyllary-like bracts with margins usually ciliate; achenes 7–10 mm long; pappus awns 2–5 mm long **B. frondosa**
 5. Ray flowers absent; secondary phyllary-like bracts with margins seldom ciliate; achenes 4–6+ mm long; pappus awns usually 1–2.4 mm long **B. discoidea**
 4. Ray flowers with conspicuous ligules 10+ mm long.
 6. Central achenes 3.5–5 mm long, the margins not barbed or ciliate and usually not winged **B. mitis**
 6. Central achenes 5–8 mm long, the margins usually barbed or ciliate and often ± corky-winged.
 7. Secondary phyllary-like bracts usually 8–12, shorter than the primary phyllaries; central achenes 5–7 mm long; pappus awns when present usually 2–4 mm long **B. aristosa**
 7. Secondary phyllary-like bracts 12–21+, usually longer than the primary phyllaries; central achenes 7–8 mm long; pappus awns or scales when present usually 0.1–0.5 mm long **B. polylepis**

Bidens aristosa (Michx.) Britton, (bearded), BEARDED BEGGAR-TICKS, TICKSEED-SUNFLOWER. Annuals, 30–60(–150) cm tall; petioles 10–30 mm long; leaves 1–2 times pinnately lobed, the segments linear to lanceolate or narrowly ovate, the margins

lacinate to serrate; secondary phyllary-like bracts 8–12+, linear, (4–)5–7(–12) mm long, margins entire, ciliate; primary phyllaries 7–8(–13), lance-ovate to lance-linear, 6–8(–12) mm long; ray flowers usually 8–10, ligules 10–25 mm long, golden yellow; central achenes flattened or unequally 3–4-angled, wedge-shaped, 5–7 mm long, the margins barbed and sometimes corky-winged; pappus awns absent or 2(–4), 2–4 mm long, antrorsely or retrorsely barbed. Low moist areas; e 1/4 TX; also Travis Co.; e 1/2 North America. Sep–Nov.

Bidens bipinnata L., (twice-pinnate), SPANISH-NEEDLES. Annuals, 30–100(–150+) cm tall; petioles 20–50 mm long; leaves 2–3 times pinnately dissected or compound with numerous segments, the segments obovate or lanceolate, the ultimate margins entire; secondary phyllary-like bracts 7–10, linear, 3–5 mm long, margins ciliate; primary phyllaries 8–12, lanceolate to linear, 4–6 mm long; ray flowers absent or 3–5+, ligules 1–3 mm long, yellowish or whitish; central achenes equally 4-angled, linear-fusiform, 12–18 mm long; pappus of (2–)3–4 awns, 2–4 mm long, retrorsely barbed. In moist soils, disturbed sites; se and e TX w to nc TX and Edwards Plateau; rare in rest of TX; throughout the U.S. except northerly, mountainous states; introduced elsewhere. Aug–Oct. [*B. bipinnata* var. *biternatoides* Sherff] Possibly native to e Asia; a weed in many warm parts of the world.

Bidens discoidea (Torr. & A. Gray) Britton, (discoid, for its rayless heads), SMALL BEGGAR-TICKS, RAYLESS BEGGAR-TICKS. Annuals, 20–60(–180) cm tall; petioles 10–40(–60) mm long; leaves 3-foliolate, the leaflets lance-ovate to lanceolate, the margins serrate; secondary phyllary-like bracts usually 3–5, spatulate to linear, (3–)12–25 mm long, margins seldom ciliate; primary phyllaries 5–7, oblong to lanceolate, 4–6+ mm long; ray flowers absent; central achenes flattened, narrowly wedge-shaped, 4–6+ mm long; pappus of 2 erect awns, usually 1–2.4 mm long, antrorsely barbed or smooth. In permanently moist soils; e and se TX, infrequent; e 1/2 North America. Aug–Oct.

Bidens frondosa L., (leafy), BEGGAR-TICKS, STICKTIGHTS, DEVIL'S BEGGAR-TICKS. Annuals, 20–60(–180) cm tall; petioles 10–40(–60) mm long; leaves once-pinnately or ternately compound, the 3–5 leaflets lanceolate to lance-ovate, the margins dentate to serrate; secondary phyllary-like bracts 5–10, linear-spatulate, sometimes leaf-like, often very long (to 60 mm), margins ciliate; primary phyllaries 6–12, oblong to lance-ovate, shorter than the outer phyllaries, 5–9 mm long; ray flowers absent or 1–3+, ligules 2–3.5 mm long, golden yellow; central achenes flattened, wedge-shaped, 7–10 mm long, the margins barbed; pappus of 2 awns, 2–5 mm long, antrorsely or retrorsely barbed. Moist areas; se and e TX w to Rolling Plains and Edwards Plateau; also Panhandle and Trans-Pecos; throughout North America; Mexico; introduced elsewhere. Aug–Nov. A weed in many parts of the world.

Bidens laevis (L.) Britton, Sterns & Poggenb., (smooth), SMOOTH BEGGAR-TICKS, WILD GOLDENGLOW. Annuals or perennials, 20–60(–120+) cm tall; leaves sessile, simple, linear to lanceolate to obovate, the margins usually coarsely dentate to serrate; heads erect at flowering, sometimes nodding in fruit; secondary phyllary-like bracts 5–9+, linear-lanceolate to oblanceolate, often leaf-like, (6–)10–12(–20+) mm long, margins usually ciliate; primary phyllaries 8–12, obovate to lance-oblong, (4–)6–8(–10+) mm long, tips often orange to purplish; ray flowers 7–8 (rarely absent), ligules (10–)15–25(–30) mm long, orange-yellow; central achenes flattened or unequally 3–4-angled, wedge-shaped, 6–10 mm long, the margins ciliate or barbed; pappus of 2–4 awns, 3–5 mm long, retrorsely barbed. In wet areas, margins of ponds and streams; scattered across TX but most frequent in East TX w to nc TX and Edwards Plateau; New England and s 1/2 of U.S. from ME w to CA; Mexico to South America; introduced elsewhere. Jul–Oct. [*B. elegans* Greene, *B. nashii* Small, *Helianthus laevis* L.] A weed in many parts of the world.

Bidens mitis (Michx.) Sherff, (mild or gentle), SMALLFRUIT BEGGAR-TICKS. Annuals or perennials, 30–100+ cm tall; petioles 5–20(–30+) mm long; leaves once-pinnately lobed or dissected, the segments lance-ovate to linear, the margins serrate or entire; secondary phyllary-like bracts 7–10, linear to spatulate, 5–10 mm long, margins usually ciliate; primary phyllaries 6–8+, lance-ovate, 4–5 mm long; ray flowers 8–13, ligules 12–25+ mm long, golden yellow; central achenes flattened or unequally 3–4-angled, wedge-shaped, 3.5–5 mm long; pappus absent or of 2 awns or scales, 0.5–1 mm long. In wet areas, marshes; rare in TX; recorded only from Newton (LSU) and Trinity (Kartesz 2015) cos.; se U.S. from NJ s to FL and w to MO and TX. Sep–Nov. [*Coreopsis mitis* Michx.]

Bidens pilosa L. (hairy), HAIRY BEGGAR-TICKS, BLACK-JACK, SPANISH-NEEDLES. Annuals or perennials, 30–60(–180+) cm tall; petioles 10–30(–70) mm long; leaves ovate to lanceolate or 3-foliolate or once-pinnately lobed, the segments or leaflets ovate to lanceolate; the ultimate margins serrate or nearly entire; secondary phyllary-like bracts 6–9(–13+), linear to spatulate, 3–5 mm long, margins ciliate; primary phyllaries 7–13, lanceolate to oblanceolate, 4–6 mm long; ray flowers absent or 3–8+, ligules 2–15+ mm long, white (rarely pinkish or yellowish); central achenes equally 4-angled, linear-fusiform, 7–16 mm long; pappus absent or of 2–3(–5) awns, (0.5–)2–4 mm long, retrorsely barbed. Moist areas, disturbed sites; Montgomery

(Brown & Elsik 2002 (as *B. alba*)) and Harris cos. in se TX; also s TX and Trans-Pecos; scattered across North America in mostly coastal states; Mexico and Central America; introduced elsewhere. All seasons, but mostly summer–fall. [*B. alba* (L.) DC., *B. odorata* Cav.] We are following Strother and Weedon's (2006) broader circumscription of this species to include Ballard's (1986) rayless or short-rayed *B. pilosa*, and the white or pinkish-rayed *B. alba* and *B. odorata*. Native of Mexico; now a widespread weed.*I*

Bidens polylepis S.F. Blake, (many scales), AWNLESS BEGGAR-TICKS, TICKSEED-SUNFLOWER. Annuals or biennials, 30–100+ cm tall; petioles 5–30 mm long; leaves pinnately lobed, the segments linear to lanceolate, the margins incised to dentate to serrate; secondary phyllary-like bracts 12–21+, linear, (6–)8–12(–20) mm long, margins ciliate; primary phyllaries 6–8+, lance-ovate to lanceolate, 4–7 mm long; ray flowers ca. 8, ligules 10–25+ mm long, golden yellow; central achenes flattened, wedge-shaped, 7–8 mm long, the margins barbed or ciliate and ± corky-winged; pappus absent or of 2 retrorsely-barbed awns or scales, 0.1–0.5(–1.5) mm long. Low moist areas; e 1/4 TX; e 1/2 North America. May–Jul. Similar to and sometimes included in *B. aristosa* (Michx.) Britton.

Bidens cernua L., (nodding), NODDING BEGGAR-TICKS, which would key to *B. laevis* here, can be distinguished by the sessile, simple leaves (rarely 3-foliolate), heads sometimes nodding in flower, usually nodding in fruit, 6–8 orange-yellow ray ligules 2–15(–18) mm long (rays sometimes absent), and achenes with thickened or winged margins. While widespread in wet habitats across North America, this species is only known in TX from a single county in the Panhandle; it has been recorded near East TX in Caddo Par., LA, and several counties in sw AR, and might be expected in ne TX.

BIGELOWIA DC. RAYLESS-GOLDENROD

☛ A genus of 2 species native to the se U.S. (Named for Dr. Jacob Bigelow, 1787–1879, Boston physician who assisted George Engelmann on the U.S.–Mexican boundary mission and collected plant specimens regularly while visiting his patients in the Boston area on horseback) (tribe Astereae)

REFERENCES: Anderson 1970, 1977; Nesom 2006g.

Bigelovia nuttallii L.C. Anderson, (for Sir Thomas Nuttall, 1786–1859, English-American botanist), SLENDER BIGELOWIA, NUTTALL'S RAYLESS-GOLDENROD. Perennials with rhizome-like caudex branches, growing in colonies or clumps; stems rigidly erect, 30–70 cm tall, unbranched except in head-bearing region; leaves basal in persistent rosettes, 1–2 mm wide, alternate, sessile, linear, entire, often resinous, bases persistent and sheathing lowest branches; heads crowded in a corymbose arrangement; involucre 4.5–9 mm long; phyllaries in 3–4 series, unequal, narrowly lanceolate to linear; receptacles naked; ray flowers absent; disk flowers 4–6 per head; corollas ca. 4.5 mm long, yellow; achenes with stiff antrorse hairs; pappus of numerous bristles, ca. 3.8 mm long. Sandy soils, sandstone outcrops; se TX; se U.S. from GA and FL w to TX. Aug–Nov. Despite previous erroneous reports, the other species in the genus, *B. nudata* (Michx.) DC., is not found in TX (G.L. Nesom, pers. comm. 2016).

BOLTONIA L'Hér. DOLL'S DAISY

Perennial fibrous-rooted herbs, stoloniferous, stiffly erect, ± glabrous; leaves alternate, sessile; blades 1-nerved, linear, subulate to lanceolate or oblanceolate; heads small, borne in diffusely-branched paniculate or corymbose arrays; phyllaries 30–55 in several series, linear to spatulate, unequal to subequal; receptacles naked; ray flowers 20–60, pistillate, fertile, corollas white (sometimes pink upon drying) to lilac; disk flowers perfect, fertile, corollas yellow; ray achenes 3-sided, 3-ribbed, the margins narrowly winged; disk achenes obovoid to wedge-shaped, laterally flattened, the margins winged or not; pappus usually of 2–3 awns plus sometimes a ring of shorter bristles or scales.

☛ A genus of 5 species of c and e North America and e Asia; some are cultivated as ornamentals. Turner (2016) states the distinctions between the two species treated here are nebulous at best, there being a large series of intergradations between the characters that supposedly distinguish them. (Named for James Bolton, 1758–99, English botanist) (tribe Astereae)

REFERENCES: Fernald 1940; Morgan 1966; Karaman-Castro & Urbatsch 2006.

1. Heads usually in corymbose arrays (creating a somewhat flat-topped appearance, with many heads in the same horizontal plane); upper stem leaves leaf-like, usually > 20 mm long, not reduced to bracts; ray ligules 5–13 mm long **B. asteroides**

1. Heads usually in paniculate arrays (creating a more pyramidal appearance, without many heads in the same horizontal plane); upper stem leaves reduced to bracts, not leaf-like, usually < 20 mm long; ray ligules 3–6.3 mm long **B. diffusa**

Boltonia asteroides (L.) L'Hér. var. **asteroides**, (*Aster*-like), WHITE BOLTONIA, LARGE-FLOWER DOLL'S DAISY. Plants 30–100(–

200) cm tall; leaves entire; upper stem leaves leaf-like, only reduced to bracts on peduncles; heads in corymbose arrays; involucre 2.4–3.8 mm high, 3.7–8.7 mm wide; phyllaries in 3–5 series, subulate to linear, 0.3–1 mm wide; ray flowers 20–60, ligules 5–13 mm long; achenes 1–3 mm long, obovoid, wings 0.1–0.5 mm wide; pappus awns 0.4–1.2 mm long. Wet prairies, pond margins, woodland borders; rare in TX, known only from Lamar Co. (TEX), Brazos and Madison cos. (TAMU), and Newton Co. (Kartesz 2015); e and s coastal states from NY s to FL and w to TX. Jul–Oct. [*B. asteroides* (L.) L'Hér. var. *glastifolia* (Hill) Fernald]

Boltonia diffusa Elliott var. **diffusa**, (diffuse, spreading), SMALL-HEAD BOLTONIA, DOLL'S DAISY. Plants 30–100(–200) cm tall; leaves entire, upper stem leaves reduced to bracts, not leaf-like; heads in paniculate arrays; involucre 2.5–3 mm high, 2.5–6 mm wide; phyllaries in 4–6 series, subulate, 0.2–0.7 mm wide; ray flowers 20–40, ligules 3–6.3 mm long; achenes 1.2–2.5 mm long, obovoid, wings 0.2–0.4 mm wide; pappus awns 0.3–0.7 mm long. Disturbed areas, pond margins, roadside ditches, moist sand; e and se TX; se and sc U.S. from VA and IL s to FL and TX. Jul–Oct.

BORRICHIA Adans. SEA OX-EYE DAISY

☛A genus of 2 mostly coastal species of the se U.S., Mexico, and West Indies. (Named for Ole Borch (Olaus Borrichius), 1626–1690, Danish botanist) (tribe Heliantheae)

REFERENCES: Semple 1978, 2006a.

Borrichia frutescens (L.) DC., (shrubby), SEA OX-EYE DAISY, BUSHY SEASIDE TANSY. Perennial bushy herbs or subshrubs to 150 cm tall; sap sticky; leaves opposite, often leathery or subsucculent; petioles or blade bases usually with 1–2+ spine-tipped teeth; leaf blades elliptic to obovate or oblanceolate, usually ± pubescent, margins dentate to serrate in the upper 1/2; heads borne singly; phyllaries 20–40 in 3–4 series, spine-tipped, reflexed and swollen at maturity; receptacles chaffy, pales spine-tipped; ray flowers 15–30, pistillate, fertile, corollas yellow, ligules 6–8 mm long; disk flowers perfect, fertile, corollas yellow; achenes 2.5–4(–5) mm long, 3–4-angled; pappus a short crown of scales. Saline flats and marshes, brackish backwaters, rocky limestone; DeWitt, Goliad, Gonzales, and Harris cos.; coastal TX and lower Rio Grande Valley; se coastal U.S. from MD s to FL and w to TX; Mexico and West Indies. Nearly throughout the growing season.

BRADBURIA Torr. & A. Gray GOLDEN-ASTER

Taprooted annual or perennial herbs, 15–80 cm tall, sparsely pilose; basal leaves petiolate, stem leaves sessile, leaves alternate, hispid to pilose; heads borne singly or in loose paniculate arrays; peduncles with stalked glands; phyllaries in 3–5 series, strongly unequal; receptacles naked; ray flowers pistillate, fertile, corollas yellow; disk flowers perfect and fertile or functionally staminate, corollas yellow; achenes smooth or slightly ribbed, short-strigose; pappus in 2–3 series, the inner series of bristles, the outer series of bristles or small scales.

☛A genus of 2 species native to the se U.S. *Bradburia* species have sometimes been treated in *Chrysopsis* or *Heterotheca*; generic boundaries for the GOLDEN-ASTERS have long been problematic. (Named for John Bradbury (1768–1823), English naturalist and collector in Missouri Territory) (tribe Astereae)

REFERENCES: Shinnars 1951a; Harms 1968, 1974; Semple 1977, 1981, 1996, 2006b; Semple et al. 1980; Semple & Chinnappa 1984; Nesom 1991b, 1991c, 1997c.

1. Midstem leaves 3–8 mm wide; ray flowers with a pappus of barbellate bristles 1–3 mm long, the outer series shorter than and grading into the inner series; disk flowers 11–25, functionally staminate (not developing fertile achenes).....**B. hirtella**

1. Midstem leaves 10–25 mm wide; ray flowers with a pappus in 2 distinct series, the outer series of flat scales 0.5–1.1 mm long, and the inner series of barbellate bristles 5–6 mm long; disk flowers 25–60, perfect and fertile (developing achenes).....**B. pilosa**

Bradburia hirtella Torr. & A. Gray, (hirtellous, somewhat hairy), TEXAS GOLDEN-ASTER, MAUCHIA. Annuals, rarely perennials; basal leaves usually withered before flowering; midstem leaves linear to linear-oblanceolate, 3–8 mm wide, hispid-pilose with stalked glands, entire or obscurely dentate; ray flowers (7–)10(–14); disk flowers 11–25, functionally staminate and infertile; ray pappus of 2–3 series of bristles, the outer slightly shorter. Open, disturbed areas, usually on sand or gravel, roadsides; e and se TX; most common in the Post Oak Savannah of sc TX; LA. Apr–Oct. [*Chrysopsis texana* G.L. Nesom]

Bradburia pilosa (Nutt.) Semple, (pilose, with long soft hairs), SOFT GOLDEN-ASTER. Annuals; basal leaves oblanceolate; midstem leaves linear-elliptic, 10–25 mm wide, short-pilose, sparsely glandular, entire or dentate; ray flowers (11–)16(–24); disk flowers 25–60, perfect and fertile; ray and disk pappus similar, the outer series of minute, flat scales, and the inner series of long, barbellate bristles. Sandy woods, old fields, and roadsides; se and e TX; East Cross Timbers and s TX Plains; se

U.S. from VA s to FL and w to KS and TX. May–Jul. [*Chrysopsis pilosa* Nutt., *C. nuttallii* Britton, *Heterothea pilosa* (Nutt.) Shinners]

BRICKELLIA Elliott BRICKELLBUSH, FALSE BONESET

Ours perennial herbs or small shrubs; stems solitary to several, erect; leaves simple; leaf blades resin-dotted, 1- or 3-nerved from the base, reticulate-veined beneath; involucre cylindrical; phyllaries in several series, the outer much shorter than the inner, linear or lanceolate to oblong, ± chartaceous; receptacles naked; ray flowers absent; achenes 10-ribbed, cylindrical; pappus of bristles.

•A New World genus of 100 species native from w U.S., Mexico, and Central America to Argentina; some are cultivated as ornamentals. Several taxa were previously treated in *Kuhnia*. (Named for Dr. John Brickell, 1749–1809, of Savannah, GA, amateur botanist and helpful correspondent of Muhlenberg, Fraser, and others) (tribe Eupatorieae)

REFERENCES: Robinson 1917; Shinners 1946d, 1971; King & Robinson 1987; Turner 1989; Scott 2006.

1. Pappus bristles plumose, with conspicuous side branches many times longer than the width of the central bristle axis (use lens); heads in ± hemispherical or flat-topped corymbose arrays; widespread in TX on many soil types **B. eupatorioides**
1. Pappus bristles scabrous or barbellate, not feathery, the side branches ca. as long as the width of the central bristle axis (use lens); heads usually in ± elongated racemose or paniculate arrays; generally restricted to c TX and Edwards Plateau on limestone and gravel.
 2. Woody subshrubs with sharply-ascending branches, the stems becoming white and corky with age; leaves along upper portions of primary stems mostly alternate; achenes glabrous or nearly so **B. dentata**
 2. Sprawling or shrubby herbs, woody only at the base, the stems not corky-white; leaves along upper portions of primary stems mostly opposite; achenes pubescent..... **B. cylindracea**

Brickellia cylindracea A. Gray & Engelm., (for the cylindrical heads), GRAVEL-BAR BRICKELLBUSH. Herbaceous perennials from a woody base, to 120 cm tall; leaves mostly opposite, sessile or with petioles to 3 mm long, blades lanceolate to obovate, densely tomentose and gland-dotted beneath, margins crenate to serrate; heads with peduncles 2–15 mm long, in elongated paniculate arrays; phyllaries often purplish-tinged; disk corollas cream to pale yellow; achenes 3.5–5 mm long, pubescent; pappus of 30–35 white to tawny bristles, usually barbellate. Various habitats, but often on rocky limestone soils; sw border of East TX from McLennan and Bell cos. s to Comal and Bexar cos.; c TX to Edwards Plateau. Sep–Nov. [*B. cylindracea* var. *laxa* A. Gray] This species exhibits notable variability in leaf size, shape, texture, and arrangement of heads (Correll & Johnston 1970; Scott 2006). *ET*

Brickellia dentata (DC.) Sch.Bip., (toothed), LEAFY BRICKELLBUSH. Small shrubs to 120 cm tall; stems branched from the base and strictly erect, corky-white and peeling in age; leaves alternate, petioles 1–2 mm long, blades lanceolate to lance-ovate, gland-dotted beneath, margins usually coarsely dentate, sometimes entire; heads nearly sessile with peduncles 1–2 mm long, in elongated paniculate arrays; phyllaries greenish or straw-colored; disk corollas pale green or creamy yellow; achenes 3.5–4 mm long, usually glabrous; pappus of 30–35 tawny bristles, usually barbellate, sometimes subplumose. Calcareous soils, gravel of limestone streambeds; sw border of East TX in Williamson, Travis, Hays, and Comal cos.; Edwards Plateau. Oct–Nov. Records from Trinity and Angelina cos. in se TX likely represent labeling errors (Mahler 1981; Carr 2009; Turner 2016). *ET*

Brickellia eupatorioides (L.) Shinners, (resembling *Eupatorium*—BONESET), FALSE BONESET, PLAINS KUHNIA, PRAIRIE KUHNIA. Herbaceous perennials from a woody base, 30–150+ cm tall; leaves opposite or alternate, sessile or with petioles to 1 cm long, blades linear to lanceolate to broadly rhombic-lanceolate, glandular-pubescent, margins entire to dentate; heads with peduncles 5–100 mm long, in rounded or flat-topped corymbose arrays; disk flowers cream to yellow-green or pinkish to purplish; achenes 2.7–5.5 mm long; pappus of 20–28 white to tawny bristles, usually ± plumose. [*Kuhnia eupatorioides* L.] Most of the varieties in TX appear to intergrade along their overlapping ranges (Turner 2016).

1. Midstem leaves narrowly linear, < 1.5 mm long; restricted to Edwards Plateau stream beds.....var. **gracillima**
1. Midstem leaves linear-lanceolate to narrowly ovate, 2–40 mm long; not restricted to Edwards Plateau.
 2. Midstem leaves alternate; middle and outer phyllaries long-acuminate, usually with conspicuous sickle-shaped or twisted, filiform tips; middle and outer phyllaries usually more than 1/2 as long as inner ones..... var. **texana**
 2. Midstem leaves opposite; middle and outer phyllaries acute or acuminate, tips not sickle-shaped or contorted; middle and outer phyllaries usually less than 1/2 as long as inner ones.
 3. Involucres 8–15 mm high; heads with 15–35 flowers; mostly c and nc TX and Panhandle var. **corymbulosa**
 3. Involucres 7–11 mm high; heads with 6–15 flowers; mostly East TX..... var. **eupatorioides**

var. **corymbulosa** (Torr. & A. Gray) Shinnars, (with flowers in small corymbs), PLAINS KUHNIA. Silty-clay soils, grasslands, open post oak woodland; nw border of East TX in Fannin, Dallas, and Kaufman cos.; nc TX s to Edwards Plateau and w to Plains and Panhandle; c U.S. from MI and OH w to MT and s to NM, TX, and AR; Canada. Jul–Nov. [*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray]

var. **eupatorioides**. FALSE BONESET. Sandy and silty soils, open pine-oak woods; e 1/3 of TX from Lamar and Red River cos. s to Harris Co. and w to Milam, Bastrop, and Gonzales cos.; e and se U.S. from NJ and PA s to FL and w to IL, MO, and TX. Aug–Nov. [*Kuhnia glutinosa* Elliott]

var. **gracillima** (A. Gray) B.L. Turner, (slenderest, for the narrow leaves). Dry stream beds; sw border of East TX in Travis and Comal cos.; Edwards Plateau. Sep–Nov. [*B. leptophylla* (Scheele) Shinnars, *Kuhnia eupatorioides* var. *gracillima* A. Gray, *Kuhnia leptophylla* Scheele] *ET*

var. **texana** (Shinnars) Shinnars, (of Texas), PRAIRIE KUHNIA. Calcareous soils, prairies; w border of East TX from Red River Area (Grayson to Lamar cos.) s to Bexar and Fayette cos.; nc and c TX to Edwards Plateau; sc U.S. prairies from IL s to AR and w to KS and TX. Sep–Nov. [*B. eupatorioides* var. *ozarkana* (Shinnars) Shinnars, *Kuhnia eupatorioides* var. *ozarkana* Shinnars, *Kuhnia eupatorioides* var. *texana* Shinnars]

CALYPTOCARPUS Less. HORSE HERB

☛A genus of 3 or 4 species native from TX to Guatemala. (Greek: *kalypto*, covered or wrapped around, and *karpos*, fruit, for the achenes' location in the involucre cup) (tribe Heliantheae)

REFERENCES: McVaugh & Smith 1967; Strother 2006d.

Calyptocarpus vialis Less., (of the path or roadside), PROSTRATE LAWNFLOWER, HIERBA DEL CABALLO, HORSE HERB, STRAGGLER DAISY. Small, trailing, pubescent, perennial herbs 5–30 cm tall; leaves opposite, petiolate; leaf blades ovate to ovate-lanceolate or deltoid, 1–3(–4) cm long, margins toothed; heads small, short-peduncled, solitary in leaf axils; phyllaries 4–5, subequal in length, obtuse, overlapping laterally; receptacles chaffy; ray flowers 3–8, pistillate, fertile, corollas yellow, ligules 2–5 mm long; disk flowers perfect, fertile; corollas yellow or yellow-orange; achenes obpyramidal, 2–4 mm long; pappus of 2 persistent awns and sometimes also 1–3 rudimentary awns. Lawn weed; common throughout most of TX except for the Plains country; s U.S. from SC and FL w to AZ, also IL; Mexico and Central America; spreading elsewhere pantropically. Nearly throughout the growing season. This sometimes troublesome lawn weed tolerates dry shade well and is occasionally purposely planted as a groundcover. *I*

CARDUUS L. THISTLE, PLUMELESS-THISTLE

Ours spiny annual or biennial herbs; leaves alternate, lobed or pinnatifid, with prickly margins, the basal leaves tapering to winged petioles, the stem leaves sessile, shorter, less divided, decurrent as spiny wings along stem; phyllaries many in 7–10+ series, imbricated, the tips spiny; receptacles bristly; ray flowers absent; disk corollas pink to lavender or purple; achenes ovoid, slightly compressed; pappus of numerous hair-like bristles, these not plumose, sometimes barbellate with short projections to ± as long as width of bristle axis, the bristles joined basally and deciduous as a ring.

☛A genus of 90 species native to Eurasia, the Mediterranean, and n Africa. At least seven species have been introduced to North America and some have become persistent and noxious weeds of pastures and rangelands; populations increase under grazing pressure as more palatable plants are consumed (Desrochers et al. 1988). (The ancient Latin name) (tribe Cardueae)
REFERENCES: McCarty 1978; Desrochers et al. 1988; McGregor 1985; Keil 2006b.

1. Peduncles 2–30 cm long, unwinged nearest the heads or throughout; heads 20–70 mm wide, nodding, often ± solitary **C. nutans**
1. Peduncles 0–4(–10) cm long, usually winged throughout or only unwinged nearest the heads; heads 7–25 mm wide, erect, often in clusters of 2–5.
 2. Heads sessile or short-pedunculate; peduncles 0–2 cm long, spiny-winged throughout or unwinged nearest the heads; involucre cylindrical to ellipsoid, 7–15 mm wide; pappus bristles 15–20 mm long **C. pycnocephalus**
 2. Heads pedunculate; peduncles to 4(–10) cm long, spiny-winged throughout; involucre hemispheric, 10–25 mm wide; pappus bristles 11–13 mm long **C. acanthoides**

Carduus acanthoides L., (spiny), SPINY PLUMELESS THISTLE. Prickly annuals or biennials, 30–200+ cm tall; basal leaves 10–30 cm long, 1–2-pinnately lobed, lobes spine-tipped; heads borne singly or 2–5 in corymbose arrays; peduncles to 4(–10) cm long, spiny-winged throughout; involucre hemispheric, 10–25 mm wide; corollas pink to lavender-purple; achenes 2.5–3

mm long; pappus 11–13 mm long. Waste ground, roadsides, pastures; in East TX recorded only from Collin Co. (J.G. Saunders 3418 (TEX)); also Schliecher Co. in Edwards Plateau; across much of North America; Eurasia; introduced elsewhere. May–Jun. Native of s Europe; unknown in TX until 1992. This species is listed as a noxious weed in several states. If subspecies are recognized, ours would be subsp. *acanthoides*. *I* *NOX*

Carduus nutans L., (nodding), MUSK-THISTLE, NODDING THISTLE. Extremely prickly, stout annuals or biennials, 40–200+ cm tall; basal leaves 10–40 cm long, 1–2-pinnately lobed, lobes spine-tipped; heads borne singly or in corymbose arrays, at least terminal head conspicuously long-pedunculate, often nodding; peduncles 2–30 cm long, unwinged nearest the heads or throughout; involucre hemispheric, 20–70 mm wide; corollas pink to purple; achenes 4–5 mm long; pappus 13–25 mm long. Waste ground, roadsides, pastures; Anderson Co., Travis Co., and w edge of East TX in nc TX in Collin, Dallas, and Grayson cos.; scattered across TX but mostly in nc TX and Edwards Plateau; across most of North America; Eurasia; introduced elsewhere. May–Jul. [*C. macrocephalus* Desf., *C. macrolepis* Peterm., *C. nutans* L. subsp. *macrocephalus* (Desf.) Nyman] Native of Eurasia. This species was apparently first collected in TX in Sutton Co. on the Edwards Plateau in 1939 (along with the following species); it was supposedly introduced through a shipment of hay from California (Cory 1940). This species is listed as a noxious weed in many states; it is unpalatable to wildlife and livestock and forms dense, impenetrable stands in pastures and rangelands (Keil 2006b). *I* *NOX*

Carduus pycnocephalus L., (thick-headed), ITALIAN THISTLE, ITALIAN PLUMELESS THISTLE. Prickly annuals, 20–200 cm tall; basal leaves 10–25 cm long, 2–5-lobed, lobes spine-tipped; heads borne singly or clustered in groups of 2–5; peduncles 0–2 cm long, spiny-winged throughout or unwinged nearest the heads; involucre cylindric to ellipsoid, 7–15 mm wide; corollas pink to lavender-purple; achenes 4–6 mm long; pappus 15–20 mm long. Waste ground, roadsides, pastures; w border of East TX in Bell, Williamson, and Travis cos. and Hays Co (TEX); nc TX to Edwards Plateau; scattered across U.S. but most common in CA; Europe; introduced elsewhere. Apr–Jul. Native of Mediterranean Europe. This species was apparently first collected in TX in Sutton Co. on the Edwards Plateau in 1939 (along with the previous species); it was supposedly introduced through a shipment of hay from California (Cory 1940). This species is listed as a noxious weed in five states and has the potential of becoming a problematic pernicious weed much like *C. nutans*. If subspecies are recognized, ours would be subsp. *pycnocephalus*. *I* *NOX*

CARTHAMUS L. SAFFLOWER, DISTAFF-THISTLE

Mostly annual herbs; leaves usually alternate, spiny, upper stem leaves sessile and sometimes clasping; heads terminal, solitary or in corymbose arrays; at least inner phyllaries spiny or spine-tipped, outer phyllaries spreading, conspicuously leafy; receptacles scaly; ray flowers absent; disk corollas tubular, in ours yellow to orange; achenes oblong, ± 4-angled, with an attachment scar at base; pappus of scales or absent.

♣A genus of about 14 species native from the Mediterranean area to c Asia. (From Arabic or Hebrew: *quarhami*, to paint, alluding to the dye obtained from the flowers of *C. tinctorius*) (tribe Cardueae)
REFERENCES: Kessler 1987; Keil 2006c.

1. Leaves ± pinnatifid, usually woolly-pubescent, coarsely and conspicuously spine-toothed; corollas yellow; filaments bearded; achenes (at least peripheral ones) rugose, tan to brown; pappus present (at least on central achenes) **C. lanatus**
1. Leaves usually simple (rarely pinnatifid), glabrous, entire or inconspicuously spine-toothed; corollas bright orange or yellow-orange; filaments glabrous; achenes ± smooth, white; pappus usually absent..... **C. tinctorius**

Carthamus lanatus L., (woolly), DISTAFF-THISTLE, SAFFRON-THISTLE. Viciously spiny glandular herbs, usually with woolly, spider-web-like pubescence; stems 0.4–1.8 m tall; leaves alternate with spine-tipped lobes; corollas yellow with red or black veins; achenes brownish, 5–6 mm long; pappus of ± rigid, flat, bristle-like, ciliate scales to 1.3 cm long as well as some outer short scales. Disturbed roadsides, rangelands, pastures; *not yet recorded in East TX but to be expected*; just w of our area in Edwards Plateau and nc TX; recorded in Coryell and Lampasas cos. (TEX), also Palo Pinto Co. (TEX); MA, SC, OK, AZ, CA, OR, ID, and WY; w Canada; invasive in many countries worldwide. May–Jun. A noxious weed native to the Mediterranean region. In rangelands it is known to injure the eyes and mouths of livestock. *I* *NOX*

Carthamus tinctorius L., (belonging to the dyers, of dyes), SAFFLOWER, FALSE SAFFRON, BASTARD SAFFRON. Glabrous taprooted herbs; stems 0.3–1 m tall; leaves alternate to subopposite above, lanceolate to broadly ovate or oblong, margins dentate; corollas bright orange to yellow-orange; achenes glabrous, ivory white, ca. 7 mm long and 4 mm wide; pappus usually absent (rarely of rudimentary or well-developed scales to 4 mm long). Yard weed or waif, likely from commercial birdseed; recorded from Brazos and McLennan cos. and Ellis and Hill cos. (BRIT); also Tarrant Co.; many states, mostly in the w U.S.; w

Canada. Summer. Native of Old World, possibly from the Near East. Cultivated since ancient times as a dye plant (orange from the flowers used in dyeing food and cosmetics) and now grown for its edible oil (from the seeds). Seeds were found in the tomb of Tutankhamun and mummy wrappings were sometimes dyed with this plant (Hepper 1990). *I*

CENTAUREA L. BASKET-FLOWER, STAR-THISTLE, KNAPWEED

Annuals, biennials, or perennials; leaves alternate, gradually reduced upwards, margins often toothed or pinnatifid, not prickly; heads solitary or in corymbose-paniculate arrays; phyllaries in several series, erect or spreading, usually dentate or fringed, sometimes prickly or spinose; receptacles bristly; ray flowers absent; peripheral disk flowers sterile, their corollas enlarged, often simulating rays; central disk flowers perfect, fertile, their corollas deeply (4-)5-lobed, the lobes linear, pink-purple to blue or yellow, rarely white; anthers with elongated appendages; achenes ± barrel-shaped, ± compressed, obliquely attached; pappus of numerous stiff bristles.

•A large genus (ca. 500 species) of herbs and subshrubs native to the Mediterranean, Turkey, the Near East, n Eurasia, tropical Africa, and Australia; some are cultivated as ornamentals, others are noxious weeds. The taxonomic limits of *Centaurea* have been controversial; various taxonomists have attempted to separate *Centaurea* into smaller genera and recent molecular work has reinforced some of these separations (e.g., Garcia-Jacas et al. 2001; Susanna et al. 2011). The two species native to the U.S., formerly *C. americana* (AMERICAN BASKETFLOWER) and *C. rothrockii*, fall outside redefined generic boundaries and are now treated as *Plectocephalus* (Keil & Ochsmann 2006). In recognition of the traditional placement of AMERICAN BASKETFLOWER in *Centaurea*, we have included it in this key as well. *X* *Centaurea stoebe* L. (SPOTTED KNAPWEED), a European native now naturalized and invasive in parts of the U.S. and recently recorded in TX, is suspected of being carcinogenic; a field worker in Idaho developed tumors in his fingers after pulling plants of this species and apparently getting sap in breaks in his skin (Jerry Niehoff, pers. comm.); as a precaution, gloves should be worn when handling *Centaurea* species. Some species are known to cause toxic effects in horses (Kingsbury 1964; James & Welsh 1992). (Greek: *kentaur*, centaur; the centaur Chiron in Greek mythology was said to know the medicinal value of plants) (tribe Cardueae)
REFERENCES: Moore 1972; Keil & Ochsmann 2006.

1. Corollas yellow; phyllaries with a conspicuous sharp spine at tip.
 2. Phyllary spine 5–10 mm long, often darker than phyllary body **C. melitensis**
 2. Phyllary spine 10–25 mm long, straw-colored, usually lighter than phyllary body **C. solstitialis**
1. Corollas blue, pink, purple, or white; phyllaries without a sharp spine at tip, margins variously toothed, lobed, or fringed.
 3. Heads large, the involucre of well-developed heads 3–5+ cm wide; pappus bristles 6–14 mm long; native species; formerly known as *Centaurea americana*..... see **Plectocephalus**
 3. Heads small, the involucre 2.5 cm or less wide; pappus bristles 2–5 mm long; introduced species.
 4. Annuals; involucre of well-developed heads 1.2–1.6 cm wide; corollas usually blue (sometimes purple or pink, rarely white); peripheral corollas enlarged, appearing broadly ligulate, 20–25 mm long; achenes 4–5 mm long..... **C. cyanus**
 4. Biennials or perennials; involucre of well-developed heads 1–1.3 cm wide; corollas usually pink to purple; peripheral corollas slender and only slightly enlarged or broadened, 15–25 mm long; achenes 3–3.5 mm long..... **C. stoebe**

Centaurea cyanus L., (blue), BACHELOR'S-BUTTON, CORNFLOWER, BLUEBOTTLE. Taprooted annuals, 20–100 cm tall; lower and basal leaves linear to narrowly oblanceolate, 3–10 cm long, loosely gray or white tomentose, entire or remotely pinnately lobed or toothed; upper stem leaves decurrent, usually entire; phyllary tips white to dark brown or black, with numerous small teeth; peripheral flowers with expanded ray-like corollas; corollas blue (sometimes pink-purple or white); achenes 4–5 mm long; pappus of many stiff bristles, 2–4 mm long. Cultivated, escaping from “wildflower seed” mixes, naturalized in disturbed areas, roadsides; scattered across c and e TX; widespread in North America; introduced elsewhere. Apr–Jun. [*Leucacantha cyanus* (L.) Nieuwl. & Lunell] Native of Mediterranean region. *I*

Centaurea melitensis L., (of Malta), STAR-THISTLE, MALTA CENTAUREA, MALTA STAR-THISTLE, TOCALOTE. Annuals or rarely biennials, 10–100 cm tall; herbage gray-tomentose; basal and lower leaves 2–15 cm long, entire to dentate or pinnately lobed; upper stem leaves linear, decurrent; phyllaries purplish in upper portion, spiny-margined and spine-tipped, the central spine to 1 cm long; corollas yellow; achenes ca 2.5 mm long; pappus of many stiff bristles, 2.5–3 mm long. Disturbed calcareous soils, roadsides, agricultural areas; w edge of East TX from Bell Co. s to Bexar and Guadalupe cos., also Dallas and Harris (SBSC) cos.; widespread in c and w TX but especially Edwards Plateau; scattered across w North America; Mexico; introduced elsewhere. Mar–May. Native of Europe. Cory (1940) reported that this species was first collected in TX in Bexar Co. in 1934. *I* *NOX*

Centaurea solstitialis L., (of the summer solstice), YELLOW STAR-THISTLE, BARNABY'S STAR-THISTLE. Annuals; 10–100 cm tall; basal leaves pinnatifid, 5–15 cm long, gray-tomentose to short-bristly; upper stem leaves linear, decurrent; phyllaries spiny-

margined and spine-tipped, the central spine tan or yellowish and 1–2.5 cm long; corollas yellow; achenes 2–3 mm long; pappus of many fine bristles, 2–4 mm long. Disturbed areas, roadsides, pastures; uncommon in TX; nc TX in Dallas and Ellis cos., also Edwards Plateau in Guadalupe Co. (TEX); scattered throughout North America; introduced elsewhere. May–Jun. Native of Eurasia. *X* Reportedly causes brain lesions and a nervous syndrome, “chewing disease,” in horses; the toxic principle is not known (Kingsbury 1964). First noted in Dallas Co. in 1962; this species has the potential of becoming a problematic weed in TX. It is considered noxious in many western states, where it has invaded millions of acres of rangeland (Keil & Ochsmann 2006). *I* *NOX*

Centaurea stoebe L. subsp. **micranthos** (Gugler) Hayek, (sp: obscure, possibly from Greek, *stoibe*, stuffing or padding; ssp: small-flowered), SPOTTED KNAPWEED. Biennials or short-lived perennials, 30–150 cm tall; herbage loosely gray-tomentose; basal and lower leaves pinnately lobed or pinnatifid, 10–15 cm long; upper stem leaves entire or dissected; phyllary tips dark brown or black, with numerous small teeth; corollas pink to purple or rarely white; achenes 3–3.5 mm long; pappus of many stiff bristles, to 5 mm long. Disturbed areas, roadsides, pastures; first confirmed in TX in 2014 in Travis Co. at the Balcones Canyonlands National Wildlife Refuge by botanist Arthur C. Gibson and vouchered by wildlife biologist Chuck Sexton (BCNWR; EDDMapS 2016); also collected in Tarrant Co. (R. O’Kennon, pers. comm.); scattered throughout North America; introduced elsewhere. May–Sep. [*C. maculosa* Lam., *C. maculosa* Lam. subsp. *micranthos* S.G. Gmel. ex Gugler, *C. biebersteinii* DC.] Native of Europe. This species has the potential of becoming a problematic weed in TX; it is considered noxious in many western states. *I* *NOX*

CHAETOPAPPA DC. LEAST DAISY

Small annual or perennial herbs; stems strigose to pilose; leaves alternate, small, entire; heads usually solitary at the ends of the upper branches; phyllaries in 2–6 series, elliptic to lanceolate, unequal, the margins whitish-scarious; receptacles naked; ray flowers pistillate and fertile, white to bluish, pinkish, or lavender, the ligule tips sometimes curling under; disk flowers perfect and fertile or functionally staminate, yellow; achenes cylindrical to narrowly obovoid, 2–10-nerved; pappus of rings, crowns, scales, and/or bristles.

☛A genus of 10 species native to s North America; including the previously-recognized monotypic genus *Leucelene*. (Greek: *chaite*, hair or bristle, and *pappos*, down, fuzz, pappus) (tribe Astereae)

REFERENCES: Shinnars 1946a, 1946b; Van Horn 1973; Nesom 1988, 2006h.

1. Perennials from fibrous roots and woody rhizomes; ray achenes with 2(–3) ribs or nerves.....**C. effusa**
1. Taprooted annuals; ray achenes with 5+ ribs or nerves.
 2. Pappus in 2 series, with short outer scales, alternating with inner bristles 1.5–3 mm long; ray achenes 5(–6)-nerved; common throughout e 1/2 of TX.....**C. asteroides**
 2. Pappus in 1 series, of thickened rings or a minute cup-like crown; ray achenes 8–10-nerved; endemics of rocky calcareous soils on Edwards Plateau, or of deep sands of the Carrizo Formation in sc TX.
 3. Pappus of minute, thickened rings; ray achenes 10-nerved; endemic to Edwards Plateau**C. bellidifolia**
 3. Pappus a white-hyaline, rough-margined, asymmetric, cup-like crown; ray achenes 8-nerved; mostly concentrated in Carrizo Formation sands in sc TX.....**C. imberbis**

Chaetopappa asteroides Nutt. ex DC., (resembling *Aster*), COMMON LEAST DAISY, ARKANSAS LEAST DAISY. Small taprooted annuals, 3.5–30 cm tall; midstem leaves linear to oblanceolate, 4–15 mm long; ray flowers 5–18, ligules white, turning bluish, pinkish, or lavender; ray achenes 1.6–2 mm long, 5(–6)-nerved; pappus in 2 series, the outer series of ca. 5 scales to 1.4 mm long, the inner series of ca. 5 awn-like bristles to 3 mm long. Sandy or gravelly open areas; widespread in e 1/2 TX; sc U.S. from MO s to LA and w to KS and TX; Mexico. Apr–Jun, sporadically later. Nesom (1988, 2006h) recognized two varieties of this species, var. *asteroides* and var. *grandis* Shinnars; ours would be the former, as the latter is restricted to s TX along the Rio Grande Valley. Turner (2016) found the characters defining those varieties to be sporadic across the range of the species.

Chaetopappa bellidifolia (A. Gray & Engelm.) Shinnars, (leaves resembling *Bellis*—English daisy), DWARF WHITE ASTER; HAIRY LEAST DAISY; WHITERAY LEAST DAISY. Small taprooted annuals, 8–40 cm tall; midstem leaves oblong-spatulate to oblanceolate, 7–35 mm long; ray flowers 6–15, ligules white, turning bluish, pinkish, or lavender; ray achenes 1.5–2.2 mm long, 10-nerved; pappus of minute, thickened rings. Calcareous soils, sandy or rocky open areas; sw border of East TX from McLennan Co. s to Bexar Co.; Edwards Plateau. Mar–May, sporadically later. [*Keerlia bellidifolia* A. Gray & Engelm.] *ET*

Chaetopappa effusa (A. Gray) Shinnars, (sprawling, for the open arrangement of the heads), SPREADING LEAST DAISY. Perennials, 20–80 cm tall, with fibrous roots and woody rhizomes; midstem leaves oblong to lanceolate-oblong, 10–20 mm

long, bases subclasping; ray flowers 6–9, ligules white; ray achenes 1.6–2.2 mm long, 2(–3)-nerved; pappus of thickened rings or a minute crown. Limestone hillsides and canyons, seeps, oak-juniper woodlands; sw border of East TX from Travis Co. s to Bexar Co.; Edwards Plateau. May–Oct. [*Keerlia effusa* A. Gray] *ET*

Chaetopappa imberbis (A. Gray) G.L. Nesom, (beardless, for the lack of pappus bristles), AWNLESS LEAST DAISY, CARRIZO CHAETOPAPPA. Small taprooted annuals, 4–15 cm tall; midstem leaves oblanceolate-spatulate to oblanceolate-obovate, 8–26 mm long; ray flowers 8–19, ligules white; ray achenes 1.5–1.8 mm long, 8-nerved; pappus a minute, cup-like crown. Deep sands in oak woodlands, Carrizo Formation; concentrated in sc TX from Bastrop Co. s to Bexar, Wilson, and Gonzales cos.; also Pleistocene sands on the Gulf Coast in Goliad and Victoria cos. (Carr 2009). Mar–May, sporadically later. [*C. asteroides* Nutt. ex DC. var. *imberbis* A. Gray] *ET*

CHAPTALIA Vent. SUNBONNETS

Acaulescent perennial herbs, 3–40(–100) cm tall; fibrous-rooted; leaves in a basal rosette, blades elliptic to obovate, margins entire or denticulate, usually densely pubescent beneath; heads borne singly, erect in flowering, often nodding in bud and again at maturity; phyllaries in 2–5 series, lanceolate to lance-linear, unequal; receptacles naked; heads with 2–3 series of flowers, varying by season; the peripheral series of ray-like flowers, pistillate, fertile, ligulate or unequally 2-lipped, corollas creamy white to purple, sometimes with a darker stripe beneath; the middle series (when present) of disk-like flowers, unequally 2-lipped or tubular, pistillate, fertile; the central series of disk flowers, perfect, fertile or functionally staminate, unequally 2-lipped, corollas whitish to pinkish; achenes fusiform, ribbed, beaked; pappus of 50+ bristles, pale tan to pinkish, finely-barbed.

☛ A genus of ca. 60 species of warm areas of the Americas. The key below is based on Harms (2011). (Named for J.A.C. Chaptal, 1756–1831, agricultural chemist, who invented the wine-making process of chaptalization, which makes the wine more alcoholic by adding sugar at the same time as squeezing the grape) (tribe Mutisieae)

REFERENCES: Vuilleumier 1969b; Simpson 1978; Nesom 1995, 2006i; Harms 2011.

1. Ligules of peripheral ray-like flowers with a purple midstripe beneath; central disk flowers functionally staminate; deep se TX **C. tomentosa**
1. Ligules of peripheral ray-like flowers uniformly colored on both sides; central disk flowers perfect and fertile; Edwards Plateau, s, and w TX.
 2. Ligules of peripheral ray-like flowers maturing to crimson, barely extending beyond phyllaries; phyllaries rigid, usually > 1.5 mm wide in the middle; pappus of mature achenes usually > 10.5 mm long **C. carduea**
 2. Ligules of peripheral ray-like flowers maturing to yellow (rarely crimson), extending beyond phyllaries; phyllaries flexible, usually ca. 1 mm wide in the middle; pappus of mature achenes usually < 10.5 mm long **C. texana**

Chaptalia carduea Greene, (thistle-like), SILVERPUFF, TEXAS SUNBONNETS. Leaves obovate to elliptic, sessile or short-petioled, margins undulate-lobed and finely denticulate, upper surfaces green and nearly glabrous, lower surfaces thinly tomentose; peduncles to 34 cm long, without bracts or rarely with 1–2 minute bracts; phyllaries rigid, usually > 1.5 mm wide in the middle; peripheral ray-like flowers creamy white, maturing to crimson, corollas 10–12.5 mm long; central disk flowers perfect and fertile; achenes 10–12.8 mm long, 1/2–2/3 of which is the beak; beaks filiform and papillate. Calcareous areas, oak woods, canyons; sw border of East TX from Travis Co. sw to Comal Co. and se to Goliad Co.; Edwards Plateau to s TX; endemic to TX; also likely n Mexico. Mar–Apr, sporadically all year. [*C. leonina* Greene] Formerly included in *C. texana* and recently resurrected by Harms (2011). *ET*

Chaptalia texana Greene, (of Texas), SILVERPUFF, TEXAS SUNBONNETS. Leaves obovate to elliptic to sublyrate, petiolate, margins undulate-lobed and finely denticulate, upper surfaces green and nearly glabrous, lower surfaces thinly gray-tomentose; peduncles to 46 cm long, without bracts or rarely with 1–2 minute bracts; phyllaries flexible, usually ca. 1 mm wide in the middle; peripheral ray-like flowers creamy white, maturing to yellowish (rarely to crimson), corollas 11–13.2 mm long; central disk flowers perfect and fertile; achenes 11.5–13 mm long, 1/2–2/3 of which is the beak; beaks filiform and papillate. Calcareous areas, thin soils, oak woods, canyons; sw border of East TX from Bastrop and Travis cos. s to Bexar and Wilson cos.; Edwards Plateau to Trans-Pecos; endemic to TX; also n Mexico. Mar–Apr, sporadically all year. [*C. nutans* (L.) Polak. var. *texana* (Greene) Burkart] *ET*

Chaptalia tomentosa Vent., (woolly), WOOLLY SUNBONNETS. Leaves elliptic to obovate, sessile, margins denticulate, upper surfaces green and ± glabrous, lower surfaces densely white-tomentose; peduncles to 40 cm long, without bracts; peripheral ray-like flowers creamy white with purple midstripe beneath, corollas to 12 mm long; central disk flowers functionally staminate; achenes 3.8–5.1 mm long, 1/4 of which is the beak; beaks stout and hairy. Coastal plains, pineywoods, moist

sands, acidic soils; known only from deep se TX in Hardin, Jasper, Newton, and Tyler cos.; se coastal U.S. from VA s to FL and w to TX. Feb–Apr.

CHLORACANTHA G.L. Nesom MEXICAN DEVILWEED, SPINY-ASTER

☛A monotypic genus occurring from the sw U.S. to Central America. It is distinctive, but of uncertain phylogeny, and has been placed in a variety of genera including *Aster*, *Erigeron*, and *Leucosyris*; based on DNA evidence, *C. spinosa* seems more closely related to *Boltonia* and *Heterotheca* than to either *Aster* or *Erigeron*; it is thus recognized in its own genus (Nesom et al. 1991). (Greek: *chloro*, green, and *acanthos*, spine or thorn, in reference to the evergreen thorny stems) (tribe Astereae)

REFERENCES: Nesom et al. 1991; Sundberg 1991; Nesom 1994b; Sundberg & Nesom 2006.

Chloracantha spinosa (Benth.) G.L. Nesom var. **spinosa**, (spiny), MEXICAN DEVILWEED, SPINY-ASTER, DEVILWEED-ASTER. Coarse, nearly leafless rhizomatous perennial, 50–120(–150) cm tall, the plant superficially rush-like in appearance, sometimes forming dense clumps; stems glabrous or glabrate, green and glaucous, strictly erect, freely branched, alive for up to ca. 4 growing seasons; branchlets sometimes modified into thorns 10–20 mm long; usually ± leafless or leaves early deciduous, or with a few small, alternate leaves to 40 mm long; heads numerous, in loose paniculate arrays; phyllaries in 4–5 series, lanceolate; involucre 4–5.5(–6) mm high; receptacles naked; ray flowers 10–33, pistillate, fertile, ligules to 5(–7) mm long, white, sometimes bluish-tinged; disk flowers perfect, fertile, yellow; achenes fusiform, glabrous; pappus of 30–60 tawny, barbellate bristles. Low disturbed or weedy areas, along streams, roadsides; widespread in TX but more common in sc and w parts of the state; sw U.S. from CA e to TX, OK, and LA; Mexico. Jun–Oct. [*Aster spinosus* Benth., *Leucosyris spinosa* (Benth.) Greene]

CHROMOLAENA DC. THOROUGHWORT

Perennials or subshrubs; leaves opposite, blades usually 3-nerved from bases; heads borne in corymbose arrays; phyllaries in 4–6+ series, unequal, usually deciduous at maturity; receptacles naked or chaffy; ray flowers absent; disk flowers with corollas usually light blue or lavender, sometimes nearly white or pinkish purple; achenes 3–5-ribbed, usually gland-dotted; pappus of ca. 40 barbellate bristles.

☛A genus of ca. 165 species of the warm-temperate and tropical Americas, especially Brazil; some are cultivated; a few are widespread weeds. (Greek: *chroma*, color, and *laina*, cloak, evidently alluding to the colored phyllaries of the type species) (tribe Eupatorieae)

REFERENCES: King & Robinson 1980, 1987; Nesom 2006j.

1. Leaves sessile or with petioles to 1(–3) mm long, blades linear-lanceolate to elliptic-lanceolate, 0.4–1.2 cm wide, bases tapered; involucre 5–6 mm high; inner phyllaries ± spreading **C. ivifolia**
 1. Leaves with petioles 5–20 mm long, blades narrowly lanceolate to deltate-lanceolate or ovate-lanceolate, 1–4 cm wide, bases ± abruptly contracted; involucre (7–)8–10 mm high; inner phyllaries appressed **C. odorata**

Chromolaena ivifolia (L.) R.M. King & H. Rob., (with leaves resembling *Iva*—sumpweed), IVY-LEAF THOROUGHWORT, IVY-LEAF FALSE THOROUGHWORT. Perennials or subshrubs, 50–150 cm tall; stems erect; leaves sessile or with petioles 0.5–1(–3) mm long, blades linear-lanceolate to elliptic-lanceolate, margins denticulate to nearly entire; involucre cylindrical to campanulate, 5–6 mm high; inner phyllary tips ± spreading; corollas light blue to purplish. Floodplains, bottomlands, roadsides, disturbed sites; se TX in Hardin, Harris, Jefferson, and Liberty cos.; se US from FL w to TX; Mexico, West Indies, Central & South America. Aug–Nov. [*Eupatorium ivifolium* L., *Osmia ivifolia* (L.) Sch.Bip.]

Chromolaena odorata (L.) R.M. King & H. Rob., (fragrant), BLUE MISTFLOWER, FRAGRANT BONESET, JACK-IN-THE-BUSH, SIAM WEED. Perennials or subshrubs, 80–250 cm tall; stems erect or sprawling; leaves with petioles 5–20 mm long, blades narrowly lanceolate to deltate-lanceolate or ovate-lanceolate, margins coarsely dentate to nearly entire; involucre cylindrical, (7–)8–10 mm high; inner phyllary tips appressed; corollas light blue to purplish or nearly white to pinkish. Thickets, pine flats, canal banks, disturbed sites; Jefferson, Harris, Jackson, and Victoria cos.; se Gulf Prairies to s TX; FL; Mexico and West Indies. Oct–Dec. [*Eupatorium odoratum* L., *Osmia odorata* (L.) Sch.Bip.] Native to North America, now a widespread and troublesome weed on many continents.

CHRYSACTINIA A. Gray

☛A genus of 5 species occurring from the sw U.S. to Mexico. (Greek: *chrysos*, gold, and *actinos*, ray) (tribe Heliantheae)

REFERENCES: Strother 1977, 2006e.

Chrysactinia mexicana A. Gray, (of Mexico), DAMIANITA. Bushy evergreen perennial herbs or subshrubs to 50 cm tall; aromatic; leaves usually alternate, simple, linear to club- or needle-shaped, entire, semi-succulent, with conspicuous oil glands; heads borne singly; involucre 4–5 mm high; phyllaries ca. 13 in \pm 2 series, lance-linear, each tipped with an oil gland; receptacles naked or rarely chaffy (pales soon deciduous); ray flowers 8(–13), pistillate, fertile, ligules bright yellow, 6–12 mm long; disk flowers perfect, fertile, yellow to orange; achenes cylindric or fusiform, 3–4 mm long; pappus of 20–40 bristles, 3–5.5 mm long. Calcareous soils, juniper woodlands; sw border of East TX in Bexar, Comal, Travis, and Williamson cos.; Edwards Plateau and Trans-Pecos; NM; Mexico. Mar–Nov. This species is gaining popularity as a drought-tolerant garden plant.

CHRYSOPSIS (Nutt.) ELLIOTT GOLDEN-ASTER

☛A genus of 11 species native to the se U.S., especially Florida; some are rare or threatened. *Chrysopsis* was formerly treated as including many species now segregated to *Bradburia*, *Heterotheca*, and *Pityopsis*; generic boundaries for the GOLDEN-ASTERS have long been problematic. (Greek: *chrysos*, gold, and *opsis*, appearance, for the golden inflorescences) (tribe Astereae)

REFERENCES: Shinners 1951a; Harms 1968, 1974; Semple 1977, 1981, 1996, 2006c; Semple et al. 1980; Semple & Chinnappa 1984; Nesom 1991b, 1991c, 1997c.

Chrysopsis mariana (L.) Elliott, (of Maryland), SOFT GOLDEN-ASTER. Biennial or short-lived perennial herbs, 20–90 cm tall; fibrous-rooted or with short lateral rhizomes; stems often purplish, silky-sericeous; basal leaves oblanceolate to spatulate, stem leaves alternate, sessile, lanceolate to elliptic-oblong, glabrate to long silky-sericeous, margins entire or obscurely dentate, reduced up the stem; heads in crowded subumbelliform arrays; peduncles with dense stalked glands; involucre 7–10 mm high; phyllaries in 4–5 series, unequal, with dense stalked glands; receptacles naked; ray flowers pistillate, fertile, ligules yellow; disk flowers perfect, fertile, corollas yellow; achenes shallowly ribbed or smooth, 2–3 mm long, short-strigose; pappus of 2–3 series of bristles, the outer series 0.5–1 mm long, the inner series 4–6 mm long. Sandy and clay soils, open woods, old fields, roadsides; se TX; e and se U.S. from RI s to FL and w to OH, TN, and TX. Aug–Nov. [*C. mariana* (L.) Elliott var. *macradenia* Fernald, *Heterotheca mariana* (L.) Shinners]

CICHORIUM L. CHICORY

☛A genus of 6 species native to Europe, the Mediterranean, and Ethiopia. The Old World *C. endivia* L., ENDIVE, has long been cultivated for its edible leaves. (Arabic: *chikourych*, a salad vegetable (Holloway 2005) (tribe Cichorieae)

REFERENCES: Vuilleumier 1973; Strother 2006f.

Cichorium intybus L., (old generic name, from Greek *intubos*, for endive or chicory), COMMON CHICORY, BLUE-SAILORS, SUCCORY, WITLOOF, RAGGED-SAILORS. Glabrous perennial herbs with deep taproots, 30–100(–170) cm tall, sap milky; basal leaves toothed or pinnately lobed, oblong-lanceolate; stem leaves alternate, much reduced; heads sessile and axillary, or terminating naked branchlets, the interrupted arrays racemose; phyllaries in 2 series, the outer much shorter, all with hardened, whitish bases and loose, green tips; receptacles hispid, usually lacking pales; flowers all ligulate, corollas lavender-blue, rarely white or pink, open during the morning, later on cloudy days, ligules 15–25 mm long; achenes prismatic, 2–3 mm long; pappus a minute crown of scales to 0.2 mm long. A cool-climate species, uncommon in TX; roadsides; nc TX in Collin, Grayson, and Rockwall cos.; c TX in McLennan Co. and Bell and Travis cos. (TEX); also Harris Co. (Brown 2014); a few scattered records elsewhere throughout the state; throughout the continental U.S. and s Canada. Jun–Oct. Native of Eurasia, now a widespread weed. The roots, when ground and roasted, are the chicory often mixed with coffee; the blanched leaves are reported to be edible (Mabberley 1987). *I*

CIRSIIUM Mill. THISTLE, PLUMED THISTLE, TRUE THISTLE

Erect annual, biennial, or perennial herbs; stems sometimes spiny-winged, sometimes hollow; leaves sometimes in a basal rosette, stem leaves alternate, simple to deeply pinnatifid, prickly-toothed or -lobed, glabrate to often strikingly white or gray tomentose on one or both sides; heads borne singly or in racemose or paniculate to corymbose arrays; phyllaries many, in 5–20 series, imbricated, usually unequal, appressed, spine-tipped, spines deflexed or spreading to erect; receptacles covered with bristles or hair-like scales, but lacking pales; ray flowers absent; disk flower corollas purplish, pink-lavender, white, or rarely pale yellow to reddish, long-tubular, the lobes linear; achenes ovoid, \pm compressed, smooth, glabrous; pappus of 3–5

series of many plumose bristles or narrow, plumose scales, united at bases and persistent, or falling in rings.

• A n temperate genus of ca. 200 species; some are problematic weeds. *Cirsium* is taxonomically complex and prone to hybridization, and subsequently has become nomenclaturally overwrought; overlapping morphological characters make keying difficult. Collection of the entire plant, including below-ground parts, is recommended. Keil (2006d) opines several of the New World species complexes of *Cirsium* "...are apparently evolutionary works in progress;" our understanding of this group is still in flux. (Greek: *cirsion*, thistle, from *cirso*s, a swollen vein, for which thistle was a reputed remedy) (tribe Cardueae)

REFERENCES: Howell 1959; Moore & Frankton 1969; O'Kennon & Nesom 1988; Dabydeen 1997; Kelch & Baldwin 2003; Keil 2004, 2006d.

1. Upper surface of leaf blades covered with short, yellowish, appressed, bristle-like spines or prickles; leaf blade bases decurrent along stem as spiny wings **C. vulgare**
1. Upper surface of leaf blades glabrous to variously pubescent but without bristle-like spines or prickles; leaf blades decurrent along stem or not.
 2. Involucres closely subtended by an involucre-like ring of spiny-margined bracts, equaling the phyllaries in length **C. horridulum**
 2. Involucres without whorl of spiny-margined bracts just below the phyllaries (peduncles may be naked, leafy-bracted, or overtopped by upper leaves, but these features not in a whorl).
 3. Outer phyllaries not or only minutely spine-tipped, any spines to 0.5 mm long; plants of wet soil (marshes and bogs) **C. muticum**
 3. Outer phyllaries tipped with spines 1–12 mm long; plants of moist or dry habitats.
 4. Involucres 1.2–2 cm high.
 5. Midstem and lower leaves linear to narrowly elliptic, bases tapered, cuneate, not decurrent; corollas 15–20 mm long; pappus 12–14 mm long; mostly restricted to e 1/4 TX **C. carolinianum**
 5. Midstem and lower leaves ovate to oblong or elliptic, broadly sessile, sometimes auriculate-clasping or short-decurrent; corollas 20–25 mm long; pappus 15–16 mm long; widespread in TX but less common in East TX **C. texanum**
 4. Involucres usually 2.5–5 cm high.
 6. Biennials or short-lived perennials with taproots and clusters of coarse, fibrous roots; stems thinly tomentose when young, ± glabrate or tomentum persisting on the upper stems in age; midstem leaves green and glabrate on upper surfaces, bases narrowed or weakly clasping; achenes 4–6 mm long.
 7. Usually some roots with tuber-like enlargements; leaf margins revolute, upper stem leaves reduced and bract-like; peduncles essentially naked (or with much-reduced bracts); pappus 25–30 mm long **C. engelmannii**
 7. Roots without tuber-like enlargements; leaf margins flat, upper stem leaves well-developed; peduncles leafy-bracted; pappus 12–24 mm long **C. altissimum**
 6. Perennials with crown sprouts and/or runner roots that produce adventitious buds; stems uniformly and persistently gray-tomentose; midstem leaves thinly to densely gray- or white-tomentose on upper surfaces (at least on young leaves), bases ± clasping-auriculate or decurrent into long or short stem wings; achenes 6–9 mm long.
 8. Stem leaves not decurrent, or with decurrent wings to 1 cm long; outer phyllaries tipped with spines 1.5–5 mm long **C. undulatum**
 8. Stem leaves decurrent, stem wings 1–5+ cm long; outer phyllaries tipped with spines 3–12 mm long **C. ochrocentrum**

Cirsium altissimum (L.) Hill, (very tall), IOWA THISTLE, TALL THISTLE, ROADSIDE THISTLE. Biennials or short-lived perennials, to 300(–400) cm tall, taprooted and often with a cluster of coarse fibrous roots; stems glabrate, or thinly tomentose in the upper portion; basal leaves often absent at flowering, stem leaves green and glabrate to villous above, white-tomentose beneath, undivided and spiny-toothed to coarsely toothed or shallowly pinnatifid, bases narrowed and sometimes weakly clasping, upper leaves well-developed; involucre usually 2.5–3.5 cm high; outer phyllary spines abruptly spreading, 3–4 mm long; corollas 20–35 mm long; achenes 4–5.5 mm long; pappus 12–24 mm long. Stream bottom thickets, pastures, often calcareous soils; scattered from ne to se TX; nc TX; e 1/2 U.S. Jun–Sep. [*C. altissimum* (L.) Hill var. *biltmoreanum* Petr., *C. iowense* (Pammel) Fernald] Hybrids with *C. discolor* are well documented (Dabydeen 1997) and have sometimes been treated as *Cirsium* × *iowense* (Pammel) Fernald.

Cirsium carolinianum (Walter) Fernald & B.G. Schub., (of the Carolinas), SOFT THISTLE, CAROLINA THISTLE, PURPLE THISTLE, SMALLHEAD THISTLE. Biennials, to 180 cm tall, taprooted with slender, lateral fibrous roots; stems glabrous to ± tomentose; basal leaves often present at flowering, stem leaves green and glabrous or sparsely villous above, gray-tomentose beneath, unlobed and spiny-toothed to irregularly dentate or pinnatifid, bases tapered, petiolate or sessile, upper leaves reduced or bract-like; involucre 1.2–2 cm high; outer phyllary spines ascending to spreading, 1–4 mm long; corollas 15–20 mm long; achenes 3–4 mm long; pappus 12–14 mm long. Wooded areas, fields, roadsides; scattered from ne to se TX; se U.S. from OH s to GA and w to IL, MO, and TX. Jun–Sep. [*C. flaccidum* (Small) Petr.]

Cirsium engelmannii Rydb., (for George Engelmann, 1809–1884, German-born botanist and physician of St. Louis), ENGELMANN'S THISTLE, BLACKLAND THISTLE. Biennials or short-lived perennials, to 200 cm tall, taprooted and often with a cluster of coarse fibrous roots with tuber-like thickenings; stems glabrate to thinly arachnose-tomentose; basal leaves usually absent at flowering, stem leaves green and glabrate to villous above, white-tomentose beneath, usually deeply pinnatifid, lobes entire or spiny-toothed to few-toothed or sharply lobed, bases narrowed and sometimes weakly clasping, upper leaves reduced or bract-like; involucre 2.5–3.5 cm high; outer phyllary spines abruptly spreading to deflexed, 2–4 mm long; corollas 32–38 mm long; achenes 5–6 mm long; pappus 25–30 mm long. Prairies, oak savannas, in calcareous clay, rarely sandy soils; Blackland Prairie w to Grand Prairie and s to Edwards Plateau, also se TX; AR, LA, and OK. May–Sep. [*C. altissimum* (L.) Hill var. *filipendulum* (Engelm.) A. Gray, *C. terrae-nigrae* Shinnery, *C. virginianum* (L.) Michx. var. *filipendulum* A. Gray] Previously included by some in *C. altissimum*, and often confused with *C. discolor* (Muhl. ex Willd.) Spreng., which according to Keil (2006d) does not occur in TX.

Cirsium horridulum Michx., (prickly, horribly armed), BULL THISTLE, YELLOW THISTLE, HORRID THISTLE. Biennials or perennials, to 250 cm tall, taprooted with a cluster of fleshy lateral roots, often perenniating by root sprouts; stems glabrous to densely tomentose; basal leaves present at flowering, stem leaves green and glabrous to loosely tomentose above and beneath, shallowly to deeply pinnatifid, lobes spiny-dentate to coarsely lobed, bases often \pm auriculate-clasping, upper leaves well-developed, often spinier than lower leaves; involucre 4–5 cm high, immediately subtended by a conspicuous ring of spiny-margined bracts as long as the phyllaries; outer phyllaries reddish-tinged, spines to 1mm long; corollas pink to purple or rarely pale yellow to reddish, 30–47 mm long; achenes 4–6 mm long; pappus 25–35 mm long. Open woods, low fields, roadsides; mainly e and sc TX; nc TX to c TX and s TX. Mar–Jun. Two of the varieties apparently have overlapping ranges in East TX; var. *megacanthum* was published by Keil in 2004, too recently for reassessment of many TX specimens previously identified as var. *horridulum*, therefore we are not providing TX ranges or maps for these varieties. Keil (2006d) divided the two East TX varieties of this variable species as follows:

1. Stems densely tomentose; main leaf spines mostly 5–10 mm long; involucre \pm densely tomentose.....var. **horridulum**
1. Stems glabrous or sparsely tomentose; main leaf spines 10–30 mm long; involucre glabrous.....var. **megacanthum**

var. **horridulum**. E and s U.S. from ME s to FL and w to TX. [*C. horridulum* Michx. var. *elliottii* Torr. & A. Gray]

var. **megacanthum** (Nutt.) D.J. Keil, (large-spined). Se U.S. from FL w to OK and TX. [*C. megacanthum* Nutt.] Thomas Nuttall, the original author of this taxon, described it as “one of the most terribly armed plants in the genus” (Keil 2006d).

Cirsium muticum Michx., (muted, blunt, for the phyllaries), SWAMP THISTLE, DUNCE-NETTLE, HORSETOPS. Biennials, to 230 cm tall, taproots fleshy; stems glabrate or villous to thinly tomentose; basal leaves usually absent at flowering, stem leaves green and glabrate to thinly tomentose above, green and thinly pilose beneath, deeply pinnatifid, lobes irregularly few-toothed or lobed, bases tapered and sometimes \pm clasping, petiolate or sessile, upper leaves gradually reduced, often spinier than lower leaves; involucre 1.7–3 cm high; outer phyllary spines erect, to 0.5 mm long; corollas 16–32 mm long; achenes 4.5–5.5 mm long; pappus 12–20 mm long. Marshes, bogs, wet soil in open woods; Anderson, Gonzales, and Wood cos., also Bastrop Co. (Kartesz 2015); e 1/2 North America but more common in ne U.S. and Canada. Sep–Oct. [*C. muticum* Michx. var. *monticola* Fernald] Hybridizes with *C. discolor* (Keil 2006d).

Cirsium ochrocentrum A. Gray var. **ochrocentrum**, (yellow-centered), YELLOWSPINE THISTLE. Perennials, to 90 cm tall, with crown sprouts or runner roots; stems densely gray-tomentose; basal leaves usually present at flowering, stem leaves thinly gray-tomentose above, densely white-tomentose beneath, coarsely dentate or shallowly to deeply pinnatifid, bases usually long-decurrent as spiny stem wings, upper leaves much reduced; involucre 2.5–4.5 cm high; outer phyllary spines spreading, 3–12 mm long; corollas 25–45 mm long; achenes 6–9 mm long; pappus 20–40 mm long. Sandy or rocky prairies and roadsides, mesquite and juniper scrub, desert grasslands; w border of East TX in Ellis, Bell, Hays, and DeWitt cos.; nc TX to Edwards Plateau, Trans-Pecos, and Panhandle; w U.S. from SD s to TX and w to OR and CA; introduced in a few states; Mexico. May–Jul.

Cirsium texanum Buckley, (of Texas), TEXAS THISTLE, SOUTHERN THISTLE. Annuals or biennials, to 200 cm tall, taprooted; stems glabrate to tomentose; basal leaves often absent at flowering, stem leaves green and glabrous or thinly arachnose above, thinly grayish or whitish arachnose-tomentose beneath, undivided and spiny-toothed to irregularly dentate or shallowly to deeply pinnatifid, bases broadly \pm auriculate-clasping or decurrent, upper leaves reduced or bract-like; involucre 1.5–2 cm high; outer phyllary spines spreading, 1–5 mm long; corollas 20–25 mm long; achenes 3–5 mm long; pappus 15–16 mm long. Prairies and roadsides, silty-clay and calcareous soils; nearly throughout the state but less common in deep East TX, Panhandle, and Trans-Pecos; sc U.S. from MO s to LA and w to NM; Mexico. May–Jun. [*C. austrinum*

(Small) E.D. Schultz, *C. texanum* Buckley var. *stenolepis* Shinnery] May hybridize with *C. undulatum* (Correll & Johnston 1970). Goldfinches are reported to use the plumose pappus bristles to line their nests (Ajilvsgi 1984).

Cirsium undulatum (Nutt.) Spreng., (undulated, wavy), WAVY-LEAF THISTLE, PASTURE THISTLE, GRAY THISTLE. Perennials, to 230 cm tall, with runner roots; stems densely gray-tomentose; basal leaves sometimes present at flowering, stem leaves thinly gray-tomentose above, densely gray-tomentose beneath, coarsely dentate or shallowly to deeply lobed, bases broadly \pm auriculate-clasping or short-decurrent, upper leaves reduced, often spiner than lower leaves; involucre 2.5–4.5 cm high; outer phyllary spines spreading, 1.5–5 mm long; corollas 25–50 mm long; achenes 6–7 mm long; pappus 20–38 mm long. Prairies, pastures, sagebrush deserts, roadsides and disturbed areas; Blackland Prairie from ne and nc TX to sc TX; Edwards Plateau, Trans-Pecos, and Panhandle; mostly w 1/2 North America; introduced in a few e states; Mexico. May–Jul. [*C. megacephalum* (A. Gray) Cockerell, *C. undulatum* (Nutt.) Spreng. var. *megacephalum* (A. Gray) Fernald] May hybridize with *C. texanum* (Correll & Johnston 1970).

Cirsium vulgare (Savi) Ten., (common), BULL THISTLE, COMMON THISTLE, SPEAR THISTLE. Biennials, to 200(–300) cm tall, taprooted; stems villous; basal leaves sometimes present at flowering, stem leaves green and covered with short and appressed bristle-like spines above, gray-tomentose beneath, coarsely spinose-dentate or coarsely 1–2-pinnatifid, bases decurrent as long spiny stem wings, upper leaves reduced, often spiner than lower leaves; involucre 3–4 cm high; outer phyllary spines spreading, 2–5 mm long; corollas 25–30 mm long; achenes 3–4.5 mm long; pappus 20–30 mm long. Roadsides, pastures, waste areas; Red River Co. (R. O’Kennon, pers. obs.) and w border of East TX in Bell, Hays, Comal, and Bexar cos. (all at TEX-LL); Edwards Plateau and nc TX; first collected in TX in Gillespie Co. in 1987 (O’Kennon & Nesom 1988); throughout North America but less common in se U.S.; Eurasia; introduced and weedy elsewhere. Jun–Sep. Native of Eurasia; a noxious weed that is distasteful to livestock and increases in heavily-grazed pastures. *I* *NOX*

Cirsium arvense (L.) Scop., (of the fields), CANADA THISTLE, CREEPING THISTLE, FIELD THISTLE. which would possibly have keyed to *C. muticum* or *C. carolinianum* here, can be distinguished by its colonial habit, small heads (1–2 cm high and wide), outer phyllary tips with no spines or minute spines to 1 mm long, and unusual dioecious habit (with most plants having either all staminate flowers or all pistillate flowers). Roadsides, pastures, waste areas; reported as present in TX by Keil (2006d); included here based on records from adjacent Bryan Co., OK (OKL); throughout North America except se U.S.; Eurasia; introduced and weedy in temperate regions worldwide. Jun–Oct. Despite its common name implying Canadian origin, a native of Eurasia; a highly noxious weed that is distasteful to livestock, increases in heavily-grazed pastures, and easily proliferates in cultivated fields. *I* *NOX*

CONOCLINIUM DC. THOROUGHWORT, MISTFLOWER

☛A genus of 4 species occurring from e North America to Mexico; formerly included in *Eupatorium*. *Conoclinium dissectum*, GREGG’S MISTFLOWER, is growing in popularity as a garden plant; its native range begins just to the sw of East TX (Edwards Plateau). (Greek: *konos*, cone, and *kline*, bed, referring to the conical receptacles) (tribe Eupatorieae)
REFERENCES: King & Robinson 1970c; Wooten & Clewell 1971; Patterson 1994; Patterson & Nesom 2006.

Conoclinium coelestinum (L.) DC., (sky-blue), BLUE MISTFLOWER, WILD AGERATUM, BLUE BONESET. Rhizomatous perennial herbs; stems erect or decumbent, 50–200 cm long, sometimes rooting at nodes; leaves opposite, petiolate, blades triangular to deltoid or ovate, gland-dotted, margins serrate to crenate; heads in tight, corymbose arrays; involucre 3–6 mm across; phyllaries in 2–3 series, \pm equal; receptacles naked; ray flowers absent; disk flowers with corollas blue to violet-purple, rarely white; achenes 5-angled, 1–1.5 mm long; pappus of barbellate bristles. Moist sandy soils, low woods, ravines, stream banks; throughout e 1/2 of TX; extending into s TX; e U.S. from NY s to FL and w to NE and TX; Canada. (Jun–)Aug–Nov. [*Eupatorium coelestinum* L.] This species is gaining popularity as a native TX garden plant, although it can spread aggressively in favorable sites.

CONYZA Less. HORSEWEED

Annual herbs; stems glabrous to pubescent; leaves alternate, mostly lanceolate or linear, usually strigose to hispid, heads numerous, small, borne in paniculate or corymbose arrays or \pm singly (in 1 species); phyllaries in 2–4 series, unequal, appressed (usually reflexed in fruit); receptacles naked; peripheral “ray” flowers pistillate, fertile, corollas whitish, cream, or pinkish purple, the tubes filiform, the ligules mostly inconspicuous, shorter than the tubes and scarcely if at all surpassing the pappus, or sometimes ligules lacking; disk flowers perfect, fertile; corollas yellowish; achenes biconvex, 2-ribbed, 1–1.5 mm long; pappus of hair-like, minutely-barbed bristles, extending beyond phyllaries at maturity.

☛A genus of ca. 40 species of warm-temperate and subtropical areas; similar to *Erigeron* and previously often lumped with that genus; some species once treated in *Conyza* are now included in *Laennecia*. (Ancient name for fleabane, perhaps from Greek: *konops*, flea, or *konis*, dust, alluding to insect-repelling properties when dried and powdered) (tribe Astereae)

REFERENCES: Cronquist 1943; Shinnars 1949b; Nesom 1978, 1990b; Strother 2006g.

1. Plants low and spreading, branching from near base, < 30 cm tall; heads 0.7–1 mm wide in fruit..... **C. ramosissima**
 1. Plants stiffly erect, often single-stemmed, branching only in the upper portion, usually > 30 cm tall; heads 1–5 mm wide in fruit.
 2. Phyllaries usually strigose to somewhat hispid; heads 3–5 mm wide in fruit; pistillate flowers 60–150+ per head; pappus 3–4+ mm long..... **C. bonariensis**
 2. Phyllaries glabrous to sparsely strigose; heads 1–3 mm wide in fruit; pistillate flowers 20–45+ per head; pappus 2–3 mm long.
 3. Phyllaries usually sparsely strigose; pistillate flower ligules absent or to 0.3 mm long; usually at least a few achenes in each head with reddish nerves **C. sumatrensis**
 3. Phyllaries usually glabrous; pistillate flower ligules 0.3–1+ mm long; achenes uniformly colored, without reddish nerves **C. canadensis**

Conyza bonariensis (L.) Cronquist, (of Bonaria, near Buenos Aires, Argentina, where first collected), ASTHMAWEED, HAIRY FLEABANE. Plants erect, 10–100(–150+) cm tall, branched in the upper portion; leaves oblanceolate to linear, entire or toothed; heads borne in paniculate or racemose arrays; heads 3.5–5 mm high, 3–5 mm wide at maturity; pistillate flower ligules 0–0.3 mm long; pappus 3–4+ mm long. Disturbed sites, roadsides; se TX; also Trans-Pecos; s and w U.S.; South America; introduced elsewhere. Mostly late summer–fall. [*Erigeron bonariensis* L.] Thought to be native to South America; now a widespread weed. *I*

Conyza canadensis (L.) Cronquist, (of Canada), HORSEWEED, HORSE-TAIL CONYZA, CANADA FLEABANE. Plants erect, 50–200(–350+) cm tall, branched in the upper portion; leaves oblanceolate to linear, entire or toothed; heads borne in paniculate arrays; heads 3–4 mm high, 1–1.5(–3) mm wide at maturity; pistillate flower ligules 0.3–1 mm long; pappus 2–3 mm long. Disturbed sites, eroded ground, waste areas; common and widespread across TX; throughout North America; Mexico and Central America; introduced and weedy elsewhere. Mostly summer–fall. [*C. canadensis* (L.) Cronquist var. *pusilla* (Nutt.) Cronquist, *Erigeron canadensis* L., *E. canadensis* var. *glabratus* A. Gray]

Conyza ramosissima Cronquist, (much-branched), DWARF HORSEWEED, LOW FLEABANE, LOW CONYZA, SPREADING FLEABANE. Plants spreading, 5–25+ cm tall, branched throughout; stems ± strigose; leaves narrowly spatulate to linear, entire; heads borne ± singly or in loose corymbose arrays; heads 3–4 mm high, 0.7–1 mm wide at maturity; pistillate flower ligules 0.3–0.8 mm long; pappus 2–2.5 mm long. Clay soils, disturbed habitats; ne and nc TX s to Edwards Plateau; also Brazos Co.; Plains Country; c U.S. Jun–Oct. [*Erigeron divaricatus* Michx.]

Conyza sumatrensis (Retz.) E. Walker, (of Sumatra), BILBAO FLEABANE. Plants erect, 30–150+ cm tall, branched in the upper portion; leaves narrowly oblanceolate to linear, entire or toothed; heads borne in paniculate arrays; heads 3–4 mm high, 1–2+ mm wide at maturity; pistillate flower ligules 0–0.3 mm long; pappus 2–3 mm long. Disturbed sites; in East TX recorded only from Waller Co. (iNaturalist.org observation 408969 by Jason Singhurst, TPWD State Botanist, Sep 2013 (as *C. floribunda*; iNaturalist.org 2016)); first reported for TX in 2013 in Chambers Co. (as *C. floribunda*; Singhurst & Holmes 2013); GA, AL, and CA; South America; introduced elsewhere. Summer–fall. [*C. albida* Willd ex Spreng., *C. bonariensis* (L.) Cronquist var. *leiotheca* (S.F. Blake) Cuatrec., *C. floribunda* Kunth, *Erigeron bilboanus* (Remy) Cabrera] Thought to be native to South America; now a widespread weed. The complexity of this species is discussed in Pruski & Sancho (2006). *I*

COREOPSIS L. GOLDEN-WAVE, TICKSEED

Ours herbaceous annuals or perennials, glabrous or pubescent; leaves sometimes in a basal rosette, stem leaves usually opposite, sometimes alternate, usually petiolate, simple and entire to pinnately or pedately dissected or compound; heads pedunculate, solitary or in corymbose arrays; primary (inner) phyllaries usually 8, in 2 series, membranous, forming a cup, margins ± scarios, subtended by secondary, phyllary-like bracts, these distinct and herbaceous; receptacles chaffy; ray flowers ca. 8 (more in “double” cultivars), neuter, the ligules yellow, sometimes with a reddish brown to purplish basal spot or flecks, often lobed or toothed at the tip; disk flowers perfect, fertile, corollas solid yellow or with lobes reddish brown to purplish, 4–5-lobed; achenes flattened, usually thin-margined or winged; pappus none, or of 2 bristly scales, or sometimes shoulders of achene wings ± bristly and pappus-like.

☛A genus of ca. 35 species, mostly of North America, also tropical New World and Old World; closely related to *Bidens*.

Some are cultivated as ornamentals and for the cut-flower trade. (Greek: *korios*, bedbug, and *opsis*, appearance, from the form of the achene) (tribe Heliantheae)

REFERENCES: Sherff & Alexander 1955; Smith & Parker 1971; Smith 1974, 1976; Jansen et al. 1987; Tadesse et al. 1995, 2001; Strother 2006h.

1. Disk flowers 4-lobed.
 2. Plants perennial; leaf blades entire or sometimes with 1–2 lateral lobes; ray ligules usually solid yellow; achenes with toothed wings; restricted to deep e TX **C. gladiata**
 2. Plants annual; leaf blades usually 1–2(–3)-pinnately lobed; ray ligules usually yellow with a red-brown to purplish spot or band at or near the base, rarely solid yellow; achenes unwinged or with entire wings; widespread in TX.....**C. tinctoria**
1. Disk flowers 5-lobed.
 3. Leaf blades usually 3-foliolate; ray ligules oblong to elliptical, widest near the middle, the tips entire or with inconspicuous notches**C. tripteris**
 3. Leaf blades simple or pinnately or pedately lobed; ray ligules ± cuneate, widest above the middle, the tips usually lobed or toothed.
 4. Annuals (rarely persisting); ray ligules yellow, usually with a red-brown to purplish spot, band, or flecks at or near the base.
 5. Stems with well-developed leaves nearly to the top (3/4+ of plant height); secondary phyllary-like bracts 6–9(–12+) mm long; disk corolla lobes red-brown to purple; achenes wingless..... **C. basalis**
 5. Stems with well-developed leaves crowded near base (most on lower 1/2 of stem); secondary phyllary-like bracts 4–6(–8) mm long; disk corolla lobes yellow; achenes winged..... **C. nuecensis**
 4. Perennials (sometimes flowering first year); ray ligules solid yellow.
 6. Stems with well-developed leaves crowded near base (most on lower 1/2 of stem); disk corollas 6–7.5 mm long; achenes (2.6–)3–4 mm long **C. lanceolata**
 6. Stems with well-developed leaves not crowded near the base (>1/2 of plant height); disk corollas 2.2–5.4 mm long; achenes 2–3 mm long.
 7. Leaf blades rarely simple, usually 1(–2)-pinnately or pedately lobed with (3–)5–9+ lobes, terminal lobes (or blades) narrowly lanceolate to linear or filiform **C. grandiflora**
 7. Leaf blades usually simple, rarely with 1–2(–3+) lateral lobes, blades (or terminal lobes) oblong-elliptic to ovate or lanceolate to oblanceolate.
 8. Leaf blades (or terminal lobes) oblong to elliptic or ovate; primary phyllaries 9–12 mm long; ray ligules 20–30+ mm long; disk corollas 3.4–4.4 mm long **C. intermedia**
 8. Leaf blades (or terminal lobes) lance-elliptic to lanceolate or oblanceolate; primary phyllaries 5–8+ mm long; ray ligules 12–15+ mm long; disk corollas 4.6–5.4 mm long..... **C. pubescens**

Coreopsis basalis (A. Dietr.) S.F. Blake, (basal), GOLDEN-MANE COREOPSIS, GOLDEN-MANE TICKSEED. Annuals, 10–50+ cm tall; leaves opposite, blades simple or 1(–2)-pinnately lobed; secondary phyllary-like bracts 6–9(–12+) mm long; ray ligules 15–20+ mm long, yellow, usually with a basal red-brown to purple spot or band; disk corollas 5-lobed, lobes red-brown to purplish; achenes 1.2–1.8 mm long, wingless. Sandy soils, calcareous prairies, disturbed areas; se and sc TX; nc TX s to Edwards Plateau and s TX; AR, LA, and OK; apparently adventive in se U.S. and a few other states (Kartesz 2015). Apr–Jun. [*Calliopsis basalis* A. Dietr., *C. basalis* (A. Dietr.) S.F. Blake var. *wrightii* (A. Gray) S.F. Blake]

Coreopsis gladiata Walter, (sword-like), COASTAL PLAIN TICKSEED, TEXAS TICKSEED. Perennials, 30–70 cm tall; leaves usually alternate, sometimes opposite, blades simple or sometimes with 1(–2) lateral lobes; secondary phyllary-like bracts 2–6+ mm long; ray ligules (12–)15–20+ mm long, yellow; disk corollas 4-lobed, lobes red-brown to purplish; achenes 3–4 mm long, wings toothed. Peaty bogs, pine barrens, sandy soils; se TX in Angelina, Hardin, Newton, Polk, and Tyler cos.; se U.S. from VA s to FL and w to TX. Aug–Oct. [*C. gladiata* Walter var. *linifolia* (Nutt.) Cronquist, *C. helianthoides* Beadle, *C. linifolia* Nutt.] We are following Strother (2006h) in including *C. linifolia* as a synonym.

Coreopsis grandiflora Hogg ex Sweet, (large-flowered), LARGE-FLOWER TICKSEED, SHOWY TICKSEED. Perennials, 40–60+ cm tall; leaves opposite, blades usually irregularly pinnately or pedately lobed (usually with 5–9+ lobes), rarely simple; secondary phyllary-like bracts 3.5–9+ mm long; ray ligules 12–25+ mm long, yellow; disk corollas 5-lobed, lobes yellow; achenes 2–3+ mm long, wings entire or toothed. Sandy woods, roadsides, disturbed sites; scattered in e 1/2 TX; se and sc U.S. from NC s to FL and w to NM; records in the ne and sw U.S. are apparently adventive (Kartesz 2015); Canada. Apr–Jun. [*C. grandiflora* Hogg ex Sweet var. *harveyana* (A. Gray) Sherff, *C. grandiflora* Hogg ex Sweet var. *longipes* (Hook.) Torr. & A. Gray] We are following Strother (2006h) in not recognizing varieties. Widely cultivated as an ornamental and spreading outside of its native range.

Coreopsis intermedia Sherff, (intermediate), GOLDEN-WAVE TICKSEED. Perennials, 60–90+ cm tall; leaves opposite, blades usually simple, rarely with 1(–3+) lateral lobes; secondary phyllary-like bracts 6–9 mm long; ray ligules 20–30+ mm long,

yellow; disk corollas 5-lobed, lobes yellow; achenes 2.2–2.8 mm long, wings entire. Sandy soils, openings in oak woods, roadsides, disturbed sites; e 1/3 TX; AR, LA, and OK. May–Jul.

Coreopsis lanceolata L., (lanceolate, lance-shaped), LANCE-LEAF TICKSEED, LANCE COREOPSIS. Perennials, 10–30(–60+) cm tall; leaves opposite, blades simple or with 1–2+ lateral lobes; secondary phyllary-like bracts 4–8(–12) mm long; ray ligules 15–30+ mm long, yellow; disk corollas 5-lobed, lobes yellow; achenes (2.6–)3–4 mm long, wings entire. Sandy soils, roadsides, disturbed areas; e 1/2 TX, mainly se TX; adventive in Trans-Pecos; Great Lakes s to FL and w to KS and TX; apparently adventive in ne and w U.S. (Kartesz 2015); Canada. Apr–Jul. [*C. lanceolata* L. var. *villosa* Michx.] Widely cultivated as an ornamental and popular in wildflower seed mixes; spreading outside of its native range, especially along highways.

Coreopsis nuecensis A. Heller, (of the Nueces River area of TX), NUECES TICKSEED, CROWN COREOPSIS, RIO GRANDE TICKSEED. Annuals, 10–30(–50+) cm tall; leaves opposite, blades simple or 1(–2)-pinnately lobed; secondary phyllary-like bracts 4–6(–8) mm long; ray ligules 12–18+ mm long, yellow, usually with basal flecks of red-brown to purple; disk corollas 5-lobed, lobes yellow; achenes 2.5–4 mm long, wings entire. Sandy soils, open oak and mesquite woods; se and sc TX; s TX; LA; adventive in a few states; Mexico (probably). Mar–May. [*C. coronata* Hook., *C. nuecensoides* E.B. Sm.] We are following Strother (2006h) in including *C. nuecensoides* as a synonym.

Coreopsis pubescens Elliott, (pubescent), STAR TICKSEED. Perennials, 20–70(–90+) cm tall; leaves opposite, blades usually simple, rarely with 1–2(–3+) lateral lobes; secondary phyllary-like bracts 3–7 mm long; ray ligules 12–15+ mm long, yellow; disk corollas 5-lobed, lobes yellow; achenes 2.5–3 mm long, wings entire. Sandy soils, open pine-oak woods, ditches and roadsides; in TX recorded only from Newton and Jasper cos; se U.S. from WV s to FL and w to IL, KS, and TX; apparently adventive in ne U.S. (Kartesz 2015). Jul–Aug. [*C. pubescens* Elliott var. *debilis* (Sherff) E.B. Smith] We are following Strother (2006h) in not recognizing varieties.

Coreopsis tinctoria Nutt., (of dyes), PLAINS COREOPSIS, GOLDEN TICKSEED, CARDAMINE COREOPSIS, MANZANILLA SILVESTRE, CALLIOPSIS. Annuals, 10–70(–150+) cm tall; leaves usually opposite, blades usually 1–2(–3)-pinnate, rarely simple; secondary phyllary-like bracts 1–3+ mm long; ray ligules 12–18+ mm long, usually yellow with a basal red-brown to purple spot or band, rarely solid yellow; disk corollas 4-lobed, lobes red-brown to purplish; achenes 1.5–3(–4+) mm long, wingless or wings entire. Low moist areas, often sandy soils; throughout TX; throughout U.S. but mostly in Great Plains, adventive farther e and w; Canada; Mexico. May–Aug (sporadically year-round). [*C. cardaminefolia* (DC.) Torr. & A. Gray, *C. tinctoria* Nutt. var. *similis* (Boynt.) H.M. Parker] We are following Strother (2006h) in not recognizing varieties. This species has been used as a source of red and yellow dyes—hence the specific epithet (Tveten & Tveten 1993). Widely cultivated for its showy flowers and popular in wildflower seed mixes, spreading along highways and well-established outside its native range.

Coreopsis tripteris L., (3-winged), TALL TICKSEED, TALL COREOPSIS. Perennials, 90–180+ cm tall; leaves opposite, blades usually 3-foliolate, leaflets usually simple, sometimes ± pinnately lobed; secondary phyllary-like bracts 1.5–5 mm long; ray ligules 12–22+ mm long, yellow; disk corollas 5-lobed, red-brown to purplish; achenes 4–5(–6) mm long, wings entire. Bogs and seeps, moist sands, along streams; Anderson, Bowie, Henderson, Jasper, Newton, and Wood cos.; e U.S. from PA s to FL and w to WI, KS, and TX; Canada. Jul–Sep. [*C. tripteris* L. var. *deamii* Standl., *C. tripteris* L. var. *smithii* Sherff]

Coreopsis palmata Nutt., (palmate, for the leaves), STIFF TICKSEED, which would not have keyed satisfactorily to any other species here, can be distinguished by its perennial habit, palmately 3(–5+) lobed leaves that are nearly sessile, ray ligules that are solid yellow and widest near the middle, yellow-lobed disk flowers, and winged achenes that are 5–6 mm long. Prairies, open woods; not yet reported in TX but included here based on records from adjacent Choctaw and McCurtain cos., OK (OKL); c U.S. from MI s to LA and w to MN, NE, and OK. Jun–Aug.

COSMOS Cav.

Ours showy annual herbs; stems usually 1, erect; leaves opposite, blades usually 1–3-pinnately-lobed, sometimes entire, ultimate margins usually entire; heads solitary or few to numerous in terminal corymbose arrays; primary (inner) phyllaries usually 8, in 2 series, equal, subtended by secondary, phyllary-like bracts, these usually 8; receptacles chaffy; ray flowers usually 8 (more in “double” cultivars), neuter, corollas white to pink to purple or yellow to red-orange; disk flowers perfect, fertile, corollas yellow to orange (at least the lobes); achenes spindle-shaped, usually with 1 groove, beaked; pappus of 2–4(–8) barbed awns, or sometimes absent.

☛A genus of ca. 26 species of the tropical and subtropical Americas; most speciose in Mexico. Some have a long history of being cultivated as ornamentals; cultivars may vary considerably from these descriptions in both stature and corolla coloration. (Greek: *kosmo*, ornament) (tribe Heliantheae)

REFERENCES: Safford 1918; Sherff 1955; Melchert 1975; Kiger 2006.

1. Ray ligules white, pink, or purplish..... **C. bipinnatus**
 1. Ray ligules yellow to red-orange..... **C. sulphureus**

Cosmos bipinnatus Cav., (bipinnate), GARDEN COSMOS. Plants 30–200 cm tall; leaves sessile or petiolate, 6–11 cm long, heads 7–15 mm across; primary phyllaries lanceolate to ovate-lanceolate; ray ligules white, pink, or purplish, 15–50 mm long, toothed at the tips; achenes 7–16 mm long; pappus absent, or of 2–3 awns, 1–3 mm long. Disturbed sites, roadsides; recorded in Harris and Polk cos. (Brown et al. 2007); scattered across U.S.; Mexico; introduced elsewhere. Summer–fall. Native of Mexico and sw U.S.; widely cultivated and escaping and naturalizing in warm climates worldwide. In TX, occurring as an occasional escape or waif, often introduced in “wildflower” seed mixes, and probably not persisting in the flora. *I*

Cosmos sulphureus Cav., (yellow-orange), YELLOW COSMOS, SULPHUR COSMOS. Plants 30–200 cm tall; leaves petiolate, 5–12(–25) cm long, heads 6–10 mm across; primary phyllaries oblong-lanceolate; ray ligules yellow to red-orange, 18–30 mm long, toothed at the tips; achenes 15–30 mm long; pappus absent, or of 2–3 awns, 1–7 mm long. Disturbed sites, roadsides; recorded in Bexar, Brazos, Dallas, Travis, and Tyler cos.; a few other counties across TX; scattered across U.S.; Mexico; introduced elsewhere. Summer–fall. Native of Mexico; widely cultivated and escaping and naturalizing in warm climates worldwide. According to Safford (1918), this species was used by the Aztecs as a dye plant and was known as *xochipalli*, flower paint. In TX, occurring as an occasional escape or waif, often introduced in “wildflower” seed mixes, and probably not persisting in the flora. *I*

COTULA L. WATER-BUTTONS

☛A genus of ca. 55 species of the s hemisphere, mostly native to the Old World. (Greek: *kotule*, small cup, probably in reference to the appearance of the heads) (tribe Anthemideae)

REFERENCES: Lloyd 1972; Watson 2006b.

Cotula australis (Sieber ex Spreng.) Hook. f., (southern), AUSTRALIAN WATERBUTTONS, SOUTHERN BRASSBUTTONS. Annual herbs 2–25+ cm tall, pubescent; stems branched throughout, sometimes decumbent and rooting at the nodes; leaves alternate, petiolate or sessile, blades obovate to spatulate, 2–3-pinnately lobed, ultimate lobes narrowly spatulate or linear; heads borne singly; phyllaries in 2–3 series, subequal, tips brown; receptacles naked; ray flowers pistillate, fertile, in 1–3 series, lacking corollas; disk flowers functionally staminate, corollas yellowish white to pale creamy yellow; peripheral achenes stalked, 1–1.2 mm long, winged, central achenes sessile, 0.8–1 mm long, unwinged; pappus absent. Disturbed, moist sites; rare in TX; recorded in Brazos Co. in 1970; scattered in coastal states, mostly w and sw U.S.; introduced elsewhere. Jan–Sep. Native of Australia; widely introduced as a weed worldwide. In TX, occurring as an occasional escape and probably not persisting in the flora. *I*

CREPIS L. HAWK’S-BEARD

Ours annual herbs, often pubescent, usually taprooted; sap milky; leaves in a basal rosette, alternate and reduced up the stem, variously lobed, toothed, or pinnatifid; heads solitary or few to numerous in terminal cymose arrays; inner (primary) phyllaries in 1–2 series, lanceolate, equal to subequal, subtended by secondary, phyllary-like bracts, these reduced and subulate to lanceolate; receptacles naked or hairy, usually not chaffy; all flowers ligulate, perfect, fertile, corollas usually yellow; achenes narrowly columnar, ribbed, the apices usually tapered or beaked; pappus of numerous hair-like, minutely barbed bristles.

☛A genus of ca. 200 species of the n hemisphere, s Africa, and South America; a number are weeds and a few are cultivated as ornamentals. (Greek: *crepis*, a classical Greek name of some plant that also meant sandal or boot, possibly alluding to the shape of the achene) (tribe Cichorieae)

REFERENCES: Babcock & Stebbins 1938; Babcock 1947; Clausen 1949; Stebbins 1949; Vuilleumier 1973; Bogler 2006a.

1. Stems dichotomously branched; heads solitary and ± sessile in branch axils; primary phyllaries becoming basally swollen and angular at maturity, enclosing and partially fusing to achenes..... **C. zacintha**
 1. Stems not dichotomously branched; heads many, in terminal cymose arrays, not sessile; primary phyllaries strongly keeled but not enclosing nor partially fusing to achenes at maturity.

2. Primary phyllaries coarsely hispid; achenes beaked..... **C. setosa**
 2. Primary phyllaries glabrous, achenes with apices sometimes narrowed but not beaked..... **C. pulchra**

Crepis pulchra L., (handsome), SHOWY HAWK'S-BEARD, SMALLFLOWER HAWK'S-BEARD. Taprooted annuals, 50–100 cm tall; stem pubescence glandular; leaves petiolate, with glandular pubescence like the stems, blades oblanceolate, often runcinate, margins deeply pinnately lobed to denticulate; heads numerous; involucre 8–12 mm high; secondary phyllary-like bracts 5–7, ovate to lanceolate; primary phyllaries 10–14, lanceolate, strongly keeled, glabrous; corollas yellow, ligules 5–12 mm long; achenes 4–6 mm long, subcylindric, 10–12 ribbed, apices tapered; pappus bristles dusky white, 4–5 mm long. Disturbed and weedy areas; scattered in nc, c, and e TX; se and c U.S. and CA and OR; introduced elsewhere. Apr–May. Native of Eurasia; now a widespread weed. *I*

Crepis setosa Haller f., (bristly), BRISTLY HAWK'S-BEARD. Shallowly-taprooted annuals, 8–80 cm tall; stems often reddish, coarsely bristly; leaves petiolate, finely hispid, blades oblanceolate, often runcinate or lyrate, margins dentate to pinnately lobed or lacinate; heads numerous; involucre 6–10 mm high; secondary phyllary-like bracts 10–14, linear; primary phyllaries 12–16, lanceolate, strongly keeled, coarsely hispid; corollas yellow, sometimes reddish beneath, ligules 8–10 mm long; achenes 3–5 mm long including beak (beaks 1–2 mm long), fusiform, 10- ribbed; pappus bristles white, 4 mm long. Disturbed and weedy areas; recorded only from Travis (TEX) and Williamson cos.; scattered in North America in c and ne U.S. and Pacific and mountain states; introduced elsewhere. Apr–May. Native of the Mediterranean; now a widespread weed. *I*

Crepis zacintha (L.) Bab. (likely from *Zacynthus*, Latinized from Zakyntos, an island in the Ionian Sea), STRIPED HAWK'S-BEARD. Shallowly-taprooted annuals, 20–30 cm tall; stems hispid; leaves petiolate, finely hispid, blades lyrate, margins pinnately lobed; heads borne singly in branch axils, ± sessile; involucre 5–7 mm high; secondary phyllary-like bracts 5, lanceolate; primary phyllaries 10, lanceolate, becoming basally swollen and angular at maturity (then often purplish), enclosing and partially fusing to achenes; corollas yellow, striped or tipped purplish red beneath, ligules 7 mm long; achenes 2–2.5 mm long, triangular and flattened or columnar with apices tapered; pappus bristles white, 1.5 mm long. Disturbed and weedy areas; recorded only from Henderson Co. (SBSC) and Waller Co., which in 1992 was the first record for the U.S. (Gandhi & Brown 1993); introduced elsewhere. Apr–May. Native of the Mediterranean. *I*

CROPTILON Raf. SCRATCH DAISY

Ours usually annual, taprooted herbs; leaves alternate, sessile, 3-nerved, narrowly oblanceolate to linear, margins entire to serrate; heads in loose, paniculate arrays; phyllaries in 3–5 series, strongly unequal; receptacles naked; ray flowers pistillate, fertile, ligules bright yellow to yellow-orange, coiling at maturity; disk flowers perfect, fertile, corollas yellow; achenes columnar, 6–14+-nerved, pubescent, 2–3 mm long; pappus of persistent, barbed bristles.

☛A genus of 3 species of the se U.S. and n Mexico; previously treated by some in *Haplopappus*. (Greek: *kropion*, scythe, and *ptilon*, wing or feather, perhaps alluding to the appearance of the leaves) (tribe Astereae)

REFERENCES: Hall 1928; Smith 1965, 1981; Nesom 1991c, 2006k.

1. Stem leaves spatulate to lanceolate, not much reduced up the stem, margins usually entire, sometimes serrate in the upper portion; peduncles eglandular **C. rigidifolium**
 1. Stem leaves lanceolate to linear, much reduced up the stem and becoming bract-like, margins usually serrate in the upper portion, rarely entire; peduncles with stalked glands.
 2. Involucre turbinate, (2–)2.5–5 mm wide; ray flowers 5–11, ligules 4–6 mm long..... **C. divaricatum**
 2. Involucre campanulate, (3.5–)5–8(–10) mm wide; ray flowers (10–)13–21(–29), ligules 6–12 mm long..... **C. hookerianum**

Croptilon divaricatum (Nutt.) Raf., (spreading, widely divergent), SLENDER GOLDENWEED, SCRATCH DAISY, SPREADING GOLDEN-ASTER. Erect annuals, 20–100 cm tall; stem leaves lanceolate to linear, margins usually serrate in the upper portion or rarely entire; leaves reduced up the stem and becoming bract-like; peduncles with stalked glandular hairs; involucre turbinate, (2–)2.5–5 mm wide; ray flowers 5–11, ligules 4–6 mm long. Sandy soils, open woods, roadsides; ne to se and sc TX; se U.S. from VA s to FL and w to OK and TX. Aug–Oct. [*Haplopappus divaricatus* (Nutt.) A. Gray]

Croptilon hookerianum (Torr. & A. Gray) House, (for William Jackson Hooker, 1785–1865, director of Kew Gardens), HOOKER'S SCRATCH DAISY, HOOKER'S GOLDEN-ASTER. Erect annuals, 20–80(–120) cm tall; stem leaves lanceolate to linear, margins usually serrate in the upper portion or rarely entire; leaves reduced up the stem and becoming bract-like; peduncles with stalked glandular hairs; involucre campanulate, (3.5–)5–8(–10) mm wide; ray flowers (10–)13–21(–29), ligules 6–12 mm long. Jul–Oct. According to Nesom (2006k), three varieties exist, more easily distinguished by geography and habitat

than by morphology:

1. Peduncles with long-stalked glandular pubescence (longest hairs 0.4–0.5 mm long including gland), often slightly hispid just below heads; ray ligules 1–2.5 mm wide; nc TX to Panhandle var. **validum**
1. Peduncles with short-stalked glandular pubescence (longest hairs 0.2–0.3 mm long including gland), never hispid; ray ligules (1.2–)2–3(–4) mm wide; c and s TX to Edwards Plateau.
 2. Peduncles densely stalked-glandular; ray ligules 1.2–2.2 mm wide; sandy habitats var. **hookerianum**
 2. Peduncles sparsely stalked-glandular; ray ligules (1.5–)2–3(–4) mm wide; granitic habitats var. **graniticum**

var. **graniticum** (E.B. Sm.) E.B. Sm., (of granite). Stems and leaves sparsely stalked-glandular, never hispid; ray ligules (1.5–)2–3(–4) mm wide. Granite outcrops, gravelly slopes; *not yet reported in East TX but included here based on records from adjacent counties just to the w of our area*; central mineral region of Edwards Plateau: Burnett, Llano, and Mason cos., also Gillespie and Kimble cos. (TEX-LL). [*C. divaricatum* (Nutt.) Raf. var. *graniticum* (E.B. Sm.) Shinnery, *Haplopappus validus* (Rydb.) Cory subsp. *graniticus* E.B. Sm.] *ET*

var. **hookerianum**. Stems and leaves densely stalked-glandular, never hispid; ray ligules 1.2–2.2 mm wide. Sandy loam, silt, stream banks, fields; sw edge of East TX from Milam Co. s to Goliad and Victoria cos.; Edwards Plateau to s TX Plains. [*C. divaricatum* var. *hookerianum* (Torr. & A. Gray) Shinnery, *Haplopappus divaricatus* (Nutt.) A. Gray var. *hookerianus* (Torr. & A. Gray) Waterfall] *ET*

var. **validum** (Rydb.) E.B. Sm., (strong). Stems and leaves densely long-stalked-glandular, often slightly hispid just below heads; ray ligules 1–2.5 mm wide. Sandy gravel, sandstone outcrops, open oak woodlands; nw border of East TX in Grayson, Denton, and McLennan cos.; Blackland Prairie in nc TX w to Rolling Plains and Panhandle; KS, OK, and AR. [*Haplopappus validus* (Rydb.) Cory]

Croptilon rigidifolium (E.B. Sm.) E.B. Sm., (stiff-leaved), STIFF-LEAF SCRATCH DAISY, STIFF-LEAF GOLDEN-ASTER. Erect or decumbent annuals (sometimes seemingly overwintering), 20–150 cm tall; stem leaves spatulate to lanceolate, margins usually entire or sometimes serrate in the upper portion; leaves not much reduced up the stem; peduncles without glands; involucre turbinate to nearly cylindrical, (4–)5–7 mm wide; ray flowers (5–)9–22, ligules usually 4.5–6.3 mm long. Sandy soils, creek terraces, prairies; Post Oak Savanna in Leon, Madison, and Robertson cos. s to Wilson, Victoria, and Wharton cos.; South TX Plains and Gulf Prairies; Mexico. Sep–Nov. [*C. divaricatum* (Nutt.) Raf. var. *hirtellum* (Shinnery) Shinnery, *Haplopappus rigidifolius* E.B. Sm.] *ET*

DIAPERIA Nutt. RABBIT-TOBACCO, EVAX, PYGMY CUDWEED

Very small annuals, 3–25 cm tall, taprooted, densely and conspicuously white- to gray-pubescent with cottony hairs; stems ascending or ± prostrate; leaves basal and alternate or uppermost crowded and apparently whorled, small (usually > 15 mm long), oblanceolate to obovate, entire; heads sessile, in dense clusters, axillary or terminal, small and inconspicuous, usually embedded in cottony pubescence; phyllaries (2–)4–6; receptacles chaffy; ray flowers absent; disk flowers of 2 series, the peripheral pistillate and fertile, the central functionally staminate or perfect and fertile, corollas pinkish or obscured by hairs; achenes minute, ellipsoid; pappus absent.

•A genus of 3 species native to sc U.S. and n Mexico; formerly and variously included in the genera *Evax*, *Calymmandra*, and *Filago*. (Greek: *diapero*, to pass through, alluding to what was interpreted as multifurcating (as opposed to bifurcating) branching patterns in the first species described in the genus) (tribe Inuleae)

REFERENCES: Shinnery 1951c, 1964; Anderberg 1991; Morefield 1992, 2004, 2006a.

1. Plants unbranched, or only branched from the base; clusters of heads axillary, in racemose or spicate arrays; heads 1.5–2 mm high; central flowers of heads usually fertile (producing achenes) **D. candida**
1. Plants usually branched at the base and along the stem, rarely unbranched; clusters of heads nearly all terminal at the branch tips; heads 2–4.5 mm high; central flowers of head usually infertile (functionally staminate).
 2. Leafy bracts among the heads shorter than or equal to the heads in length (bracts thus largely concealed by dense, cottony pubescence associated with the heads); heads ± spherical, 2–3.3 mm high and about as wide **D. verna**
 2. Leafy bracts among the heads exceeding the heads in length (bracts thus conspicuously visible, protruding from between the crowded heads); heads ellipsoid, 3.5–4.5 mm high, the height 2–3 times the width **D. prolifera**

Diaperia candida (Torr. & A. Gray) Benth., (pure white, shining), SILVER RABBIT-TOBACCO, SILVER EVAX. Plants silvery gray, with dense silky hairs; stems usually unbranched, or only branched from the base; clusters of heads axillary, in racemose or spicate arrays; leafy bracts subtending the clusters of heads, and sometimes also among the heads, shorter than the heads in

length; heads 1.5–2 mm high; central flowers of heads usually fertile; achenes 0.5–0.6 mm long. Dry sandy soils, open woods, roadsides, disturbed sites; e 1/2 TX; AR, OK, and LA. Mar–Jun. [*Calymmandra candida* Torr. & A. Gray, *Evax candida* (Torr. & A. Gray) A. Gray, *Filago candida* (Torr. & A. Gray) Shinners]

Diaperia prolifera (Nutt. ex DC.) Nutt., (producing offshoots). Plants grayish green to silvery white, with silky or woolly hairs; stems branched at the base and along the stem, rarely unbranched; clusters of heads nearly all terminal at the branch tips; leafy bracts among the heads exceeding the heads in length; heads 3.5–4.5 mm high; central flowers of head usually infertile; achenes 0.9–1.2 mm long.

1. Plants silvery white, with dense silky hairs; leafy bracts subtending the head clusters erect and simulating an involucre; heads borne singly or 2–3 in largest clusters.....var. **barnebyi**
 1. Plants grayish to greenish, with loose woolly hairs; leafy bracts subtending the head clusters ± spreading, not involucre in appearance; heads 4–40+ in largest clusters..... var. **prolifera**

var. **barnebyi** Morefield, (for Rupert C. Barneby (1911–2000), of the New York Botanical Garden, who collected the type specimen), BARNEBY'S RABBIT-TOBACCO. Thin rocky or gravelly soils, usually over limestone or gypsum, dry drainages; Bell & McLennan cos. (Kartesz 2015); scattered in w 1/2 TX; OK and NM. Apr–Jun.

var. **prolifera**, BIG-HEAD RABBIT-TOBACCO, BIG-HEAD EVAX. Dry, silty soils, prairies, rocky slopes, often over limestone; Blackland Prairies and Post Oak Savanna; Rolling Plains and Edwards Plateau; c U.S. from MS n to MT and s to AZ and TX. Mostly May–Jun. [*Evax prolifera* Nutt. ex DC., *Filago nuttallii* Shinners, *F. prolifera* (Nutt. ex DC.) Britton]

Diaperia verna (Raf.) Morefield var. **verna**, (of Spring), SPRING RABBIT-TOBACCO, MANY-STEM EVAX. Plants grayish green, with woolly hairs; stems branched at the base and along the stem, rarely unbranched; clusters of heads nearly all terminal at the branch tips; leafy bracts among the heads shorter than or equal to the heads in length; heads 2–3.3 mm high; central flowers of head usually infertile; achenes 0.7–0.9 mm long. Sandy or eroding silty or rocky ground, disturbed sites, roadsides; nearly throughout TX; s U.S. from GA w to AZ; Mexico. Apr–Jun. [*Evax multicaulis* DC., *E. verna* Raf., *Filago verna* (Raf.) Shinners]

DIMORPHOTHECA Moench CAPE MARIGOLD, AFRICAN DAISY

☛A genus of 7–18 species from South Africa; some are cultivated as ornamentals. (Greek: *di-*, two, *morphe*, shape, and *theca*, case or container, alluding to two forms of achenes in each head) (tribe Calenduleae)

REFERENCES: Keith 2004a; Strother 2006i.

Dimorphotheca sinuata DC., (sinuous), CAPE MARIGOLD, AFRICAN DAISY. Showy annual herbs 5–30+ cm tall; leaves alternate, narrowly oblong to lanceolate or linear, margins usually sinuately fine-toothed, sometimes serrate or entire, rarely pinnatifid; heads borne singly; terminating stems on long peduncles; phyllaries in 2–3 series, lance-linear; receptacles naked; ray flowers 10–21+, ligules 15–20(–30+) mm long, mostly yellow to orange, sometimes marked with purple; disk flowers perfect, fertile, or the central flowers sometimes functionally staminate, corollas yellow to orange, lobes purplish; ray achenes 4–5 mm long, disk achenes 6–8 mm long; pappus absent. Disturbed sites; rare in TX; recorded in Walker Co. (Keith 2004a); scattered in w and sw U.S.; introduced elsewhere. Feb–May. Native of South Africa. In TX, occurring as an occasional escape or waif and probably not persisting in the flora. *I*

DOELLINGERIA Nees WHITETOP ASTER

☛A genus of 3 species of e North America, previously included in *Aster*. (For Ignatz Doellinger (1770–1841), German botanist) (tribe Astereae)

REFERENCES: Nesom 1993b, 1994b; Semple & Chmielewski 2006.

Doellingeria sericarpoides Small, (silky-fruited), SOUTHERN WHITETOP ASTER, SOUTHERN FLAT-TOPPED ASTER. Perennial herbs, rhizomatous; stems 50–150 cm tall; leaves alternate, sessile, blades lanceolate to ovate, margins entire, the basal and sometimes lower leaves withering before flowering, midstem and upper leaves crowded and reduced up the stem; heads in flat-topped corymbose arrays; phyllaries in 3–4 series, unequal, the tips broadly rounded; receptacles naked; ray flowers 2–7, pistillate and fertile, corollas white; disk flowers perfect and fertile, corollas pale yellow; achenes terete, 1.5–3.7 mm long, 6–8-ribbed, sparsely strigose; pappus of an outer series of short bristles and 3 inner series of minutely-barbed bristles, 4–7 mm long. Bogs, wet thickets, permanently wet areas; uncommon in East TX; e and se U.S. from NJ a to FL and w to OK and TX. Oct–Nov. [*Aster sericarpoides* (Small) K. Schum., *A. umbellatus* Mill. var. *latifolius* A. Gray, *D. umbellata* (Mill.) Nees var.

latifolia (A. Gray) House]

DYSODIOPSIS (A. Gray) Rydb. DOGWEEED, FOETID-MARIGOLD

☛A monotypic genus native to the s U.S.; previously recognized in *Dyssodia*; we are following Karis and Ryding (1994) and Strother (2006j) in treating it separately. (From related genus *Dyssodia*, Greek: *dysodia*, an ill smell, and *opsis*, aspect or appearance) (tribe Heliantheae)

REFERENCES: Johnston 1956; Johnston & Turner 1962; Strother 1969, 1986, 2006j; Karis & Ryding 1994.

Dysodiopsis tagetoides (Torr. & A. Gray) Rydb., (resembling *Tagetes*—marigold), MARIGOLD DOGWEEED. Annuals or short-lived perennials 0.4–0.9 m tall; glabrous; leaves mostly opposite, becoming alternate on upper stems, linear, 2–6 mm wide, with conspicuous yellowish brown or orange dot-like glands, unpleasantly aromatic, the margins with coarse, conspicuous teeth; involucre 9–12 mm high; phyllaries in 2 series, connate, with conspicuous orange glands, subtended by 5–8 bractlets; receptacles naked; ray flowers 7–12, pistillate and fertile, with ligules 10–15 mm long, lemon yellow; disk flowers perfect, fertile, corollas brownish yellow; achenes obpyramidal, 3–3.5 mm long; pappus of 10–12 scales, 1–2.5 mm long, with 1(–3) awns at the tip of each scale. Calcareous soils, limestone outcrops; Blackland Prairie and West Cross Timbers from the Red River s to c TX; OK. Jun–Aug. [*Dyssodia tagetoides* Torr. & A. Gray, *Hymenatherum tagetoides* (Torr. & A. Gray) A. Gray]

ECHINACEA Moench CONEFLOWER, PURPLE CONEFLOWER

Perennial herbs; basal and lower stem leaves long-petioled, alternate, blades simple, usually entire or subentire, rarely serrate or dentate, often with 3–5 prominent veins; heads large, solitary, terminal, long-peduncled; phyllaries in 2–4 series, usually spreading, recurved, or reflexed; receptacles convex to conical, chaffy, pales sharp-pointed and stiff, reddish orange to dark reddish purple, projecting beyond the disk corollas and partially surrounding achenes; ray flowers neuter, with ligules spreading to reflexed, purple to pink or rarely white; disk flowers perfect and fertile, corollas pinkish, greenish, reddish purple, or yellow; achenes 3–4-angled; pappus a minute crown, sometimes with a few teeth.

☛A genus of 9 species of the c and e U.S.; several species and many cultivars of *Echinacea* are popular ornamentals. *Echinacea* species were widely used medicinally by Native Americans for a variety of purposes, and are still valued today as herbal remedies that apparently act as immune system stimulants; unfortunately some wild populations are under pressure from over-collecting (Foster 1991; Kindscher 2006, 2016). (Greek: *echinus*, spiny, for the prickly pales that protrude beyond the disk flowers) (tribe Heliantheae)

REFERENCES: McGregor 1968a, 1968b; Cox & Urbatsch 1990; Baskin et al. 1993; Binns et al. 2002; Kindscher 2006, 2016; Urbatsch et al. 2006; Keller 2014.

1. Plants fibrous-rooted; leaf blades abruptly contracted to the petiole, bases rounded to cordate, margins usually serrate to dentate, rarely entire..... **E. purpurea**
1. Plants with ± branched taproots; leaf blades gradually tapering to base, bases cuneate or attenuate; margins usually entire or nearly so.
 2. Hairs of stems and peduncles appressed to ascending.
 3. Ray ligules 19–35 mm long; ray achenes glabrous in the upper portion; pales with tips usually straight **E. atrorubens**
 3. Ray ligules 30–70 mm long; ray achenes hairy in the upper portion (at least on angles); pales with tips often incurved **E. paradoxa**
 2. Hairs of stems and peduncles spreading.
 4. Ray ligules 15–40 mm long and 5–8 mm wide **E. angustifolia**
 4. Ray ligules 40–90 mm long and 3–4 mm wide.
 5. Pales 8–11 mm long, tips rounded; pollen yellow **E. sanguinea**
 5. Pales 9–14 mm long, tips sharp-pointed; pollen usually white, rarely lemon yellow **E. pallida**

Echinacea angustifolia DC., (narrow-leaved), BLACKSAMSON, NARROW-LEAVED PURPLE CONEFLOWER. Plants to 70 cm tall, with ± branched taproots; stems green to purplish, moderately to densely rough-hairy, hairs spreading; basal leaves elliptic to lanceolate, bases cuneate to attenuate; pales with tips purple, straight, sharp-pointed; ray ligules 15–40 mm long and 5–8 mm wide, pink to purplish, reflexed; disk corolla lobes usually purple; achenes 4–5 mm long. Gravelly or rocky limestone prairies (on mixed sand and gravel farther w); scattered in East TX; mostly nc TX Blackland Prairie w to Plains Country and s to Edwards Plateau; Great Plains of c North America. May–Jun. [*E. angustifolia* DC. var. *strigosa* R.L. McGregor, *E. pallida* (Nutt.) Nutt. var. *angustifolia* (DC.) Cronquist, *E. pallida* (Nutt.) Nutt. var. *strigosa* (R.L. McGregor) Gandhi]

Echinacea atrorubens (Nutt.) Nutt., (dark red), TOPEKA PURPLE CONEFLOWER. Plants to 90 cm tall, with ± branched taproots; stems light green to tan, hairy, hairs appressed to ascending (rarely glabrous); basal leaves linear to lanceolate, rarely ovate,

bases attenuate; pales with tips red to orange, usually straight, sharp-pointed; ray ligules 19–35 mm long and 2–7 mm wide, purple or rarely pink or white, reflexed; disk corolla lobes greenish to pink or purple; achenes 4–5 mm long. Limestone hillsides, dry prairies, sandstone outcrops; ne to se TX on Blackland Prairie; endemic to a narrow band of prairie from KS through OK to TX. May–Jul. [*Rudbeckia atrorubens* Nutt.]

Echinacea pallida (Nutt.) Nutt., (pale), PALE ECHINACEA; PALE PURPLE CONEFLOWER. Plants to 140 cm tall, with ± branched taproots; stems green to purplish, sparsely to densely hairy, hairs spreading; basal leaves elliptic to lanceolate, bases cuneate to attenuate; pales with tips purple, usually incurved, sharp-pointed; ray ligules 40–90 mm long and 3–4 mm wide, pale pink to reddish purple, reflexed; disk corolla lobes pink to purple; pollen usually white, rarely lemon yellow; achenes 2.5–5 mm long. Silty-clay hillsides, open woods, rocky prairies; sc to ne TX, mostly in Red River drainage; nc TX; scattered in e 1/2 North America but concentrated in c U.S. plains and prairies; apparently introduced in several states in ne U.S. May–Jun. [*Rudbeckia pallida* Nutt.]

Echinacea paradoxa (J.B.S. Norton) Britton var. ***neglecta*** R.L. McGregor, (sp.: a paradox, illogical; var.: neglected), BUSH'S PURPLE CONEFLOWER. Plants to 90 cm tall, with ± branched taproots; stems yellowish green, sparsely to densely hairy, hairs appressed to ascending; basal leaves linear to lanceolate, rarely ovate, bases usually attenuate; pales with tips red to orange, often incurved, sharp-pointed; ray ligules 30–70 mm long and 3–8 mm wide, light purple to pink or white, reflexed; disk corolla lobes pinkish to yellowish; achenes 4–5.5 mm long. Rocky limestone prairies, open wooded hillsides; *may or may not occur in TX, depending on the source*; mapped as occurring in Montgomery Co. (Kartesz 2015) or Harris Co., potentially only as a historical record (Poole et al. 2010); Urbatsch et al. (2006) include TX within the range; Kindscher (2006, 2016) does not map it in TX; the subsp. is apparently otherwise restricted to the Arbuckle Mts. in sc OK. Late spring. [*E. atrorubens* (Nutt.) Nutt. var. *neglecta* (McGregor) Binns, B. R. Baum & Arnason] This subspecies is of conservation concern; OK populations are considered to be imperiled (Kindscher 2006). *!*

Echinacea purpurea (L.) Moench, (purple), EASTERN PURPLE CONEFLOWER. Plants to 120 cm tall, with fibrous roots; stems usually brownish green, hairy, hairs spreading to ascending (sometimes glabrous); basal leaves ovate to narrowly lanceolate, bases usually rounded to cordate; pales with tips red-orange, straight or slightly curved, sharp-pointed; ray ligules 30–80 mm long and 7–19 mm wide, pink to purple, spreading to recurved; disk corolla lobes greenish to pink or purple; achenes 3.5–5 mm long. Silty-sandy soils, open oak woods, prairies; rare in TX outside of cultivation; recorded only from Bowie Co.; scattered in e 1/2 North America but concentrated in the Midwest; apparently introduced in numerous states outside of that area. Jun–Jul. [*Rudbeckia purpurea* L.] This *Echinacea* species and its cultivars are horticulturally popular as ornamentals and in “wildflower” seed mixes, and are also grown commercially for herbal uses; naturalized and persisting populations continue to extend the native range (Urbatsch et al. 2006).

Echinacea sanguinea Nutt., (blood-red), WOODLAND ECHINACEA, SANGUINE PURPLE CONEFLOWER. Plants to 120 cm tall, with ± branched taproots; stems green to purplish, glabrate or sparsely to densely hairy, hairs spreading; basal leaves elliptic to lanceolate, bases attenuate; pales with tips purple, slightly curved, usually rounded; ray ligules 40–70 mm long and 3–4 mm wide, pink to reddish purple, reflexed; disk corolla lobes usually purple; pollen usually yellow; achenes 2.5–5 mm long. Sandy soils, open pine-oak woods, prairies; throughout e and se TX; also sc TX; AR, LA, and OK. May–Jun. [*E. pallida* (Nutt.) Nutt. var. *sanguinea* (Nutt.) Gandhi & R.D. Thomas]

ECLIPTA L.

☛A genus of 3 or 4 species found in warm areas of the world. (Greek: *eclipse*, to be deficient or lack, alluding to the absence of pappus) (tribe Heliantheae)
REFERENCE: Strother 2006k.

Eclipta prostrata (L.) L., (prostrate, flat to the ground), PIEPLANT, YERBA DE TAGO. Low, prostrate to erect annuals, appressed-scabrous-pubescent, usually freely-branched and rooting at nodes; leaves opposite, sessile or short petiolate, lanceolate to narrowly elliptic, entire or slightly toothed, dark green; heads small, short-peduncled, terminal and in upper leaf axils, rather inconspicuous; phyllaries in 2–3 series, lanceolate; receptacles chaffy; ray flowers numerous, pistillate and fertile, with ligules linear, very short (1–2 mm long), white; disk flowers perfect and fertile; disk corollas minute, whitish; achenes weakly 3–4-angled, 2–2.5 mm long; pappus absent or a minute crown of scales. Ditches, shorelines, stream banks; damp disturbed areas; throughout TX; e and s U.S.; Central and South America; introduced elsewhere. Jun–Nov. [*E. alba* (L.) Hassk., *Verbesina prostrata* L.] Gandhi and Thomas (1989) explained why the correct name is *E. prostrata*. This species has been introduced into the Old World and in India is used as a blackish dye for hair and tattooing (Mabberley 1997).

ELEPHANTOPUS L. ELEPHANT'S-FOOT

Perennial herbs, often rhizomatous or stoloniferous; leaves often forming basal rosettes, stem leaves alternate, simple, margins usually toothed; heads sessile, clustered in corymbose or paniculate arrays, clusters subtended by a few foliaceous bracts; phyllaries 8, the outer 4 ovate, the inner 4 lanceolate; receptacles naked; ray flowers lacking; disk flowers usually 4, perfect, fertile, corollas pink to purple or white, unevenly 5-lobed, sometimes simulating rays; achenes 10-ribbed; pappus of 5(-6) bristle-tipped scales.

☛A mainly tropical and warm-temperate genus of ca. 15 species; a few are weedy. (Greek: *elephantos*, elephant, and *pous*, foot; translation of aboriginal name, perhaps in reference to the large basal rosettes of some species) (tribe Vernoniaeae)

REFERENCES: Gleason 1906, 1922; Clonts & McDaniel 1978; Strother 2006l.

1. Basal leaves absent at flowering time, stem leaves well-developed **E. carolinianus**
 1. Basal leaves present at flowering time, stem leaves smaller or absent.
 2. Inner phyllaries 6–7.5 mm long; achenes 2.5–3 mm long; pappus 3–4.5 mm long **E. nudatus**
 2. Inner phyllaries 9–11+ mm long; achenes (3–)4–5 mm long; pappus 6–8 mm long **E. tomentosus**

Elephantopus carolinianus Raeusch., (of Carolina), CAROLINA ELEPHANT'S-FOOT, LEAFY ELEPHANTOPUS. Stems (10–)30–80(–120) cm tall; basal leaves absent at flowering time; stem leaves broadly elliptic to ovate or lanceolate, sparsely pilose to hirsute, bracts subtending clusters of heads rounded-deltate to lance-deltate; inner phyllaries 8–10 mm long, sparsely short-pubescent; achenes 2.5–4 mm long; pappus 4–5 mm long. Low wooded areas, moist sandy soils; se and e TX w to Grand Prairie; se U.S. from NJ s to FL and w to KS, OK, and TX. Aug–Oct. [*E. flexuosus* Raf.]

Elephantopus nudatus A. Gray, (naked, smooth), SMOOTH ELEPHANT'S-FOOT. Stems (10–)30–110+ cm tall; leaves mostly basal at flowering time, oblanceolate to spatulate or sometimes elliptic, sparsely pilose to hirsute; bracts subtending clusters of heads rounded-deltate to lance-deltate; inner phyllaries 6–7.5 mm long, sparsely short-pubescent; achenes 2.5–3 mm long; pappus 3–4.5 mm long. Pine forests, moist sandy soils; e and se TX in Hardin, Jefferson, Marion, Polk, and Tyler cos.; also Galveston Co.; se U.S. from DE s to FL and w to TX. Aug–Oct.

Elephantopus tomentosus L., (hairy, tomentose), DEVIL'S GRANDMOTHER, HAIRY ELEPHANT'S-FOOT. Stems (10–)30–60+ cm tall; leaves mostly basal at flowering time, obovate to oblanceolate or spatulate, densely pilose, at least beneath; bracts subtending clusters of heads rounded-cordate; inner phyllaries 9–11+ mm long, finely short-pubescent; achenes (3–)4–5 mm long; pappus 6–8 mm long. Low wooded areas, sandy soils; e 1/4 TX; se U.S. from MD s to FL and w to OK and TX; Mexico. Aug–Oct. [*E. carolinianus* Raeusch. var. *simplex* Nutt.]

EMILIA Cass. TASSEFLOWER

☛An Old World tropical genus of 50+ species; a few are cultivated; several are widespread weeds in warm regions of the world. (Presumably named for someone known to Cassini, the author) (tribe Senecioneae)

REFERENCES: Nicolson 1980; Williams 1994; Spencer & Williams 2005; Barkley 2006a.

Emilia fosbergii Nicolson, (for Francis Raymond Fosberg (1908–1993), a botanist at the Smithsonian Institution), FLORIDA TASSEFLOWER. Annual taprooted herbs; stems 20–100 cm tall; leaves alternate, sessile and auriculate to winged-petiolate and clasping, blades oblanceolate to pandurate, mostly 5–10 cm long, margins entire, lobed, or weakly toothed; heads in loose corymbose arrays; involucre 9–14 mm high; phyllaries 8 or 13, equal, reflexed in fruit; receptacles naked; ray flowers absent; disk flowers all perfect and fertile or central ones functionally staminate, corollas pinkish to reddish purple; achenes spindle-shaped, 5-ribbed; pappus of many white, minutely-barbed bristles. Disturbed areas, lawn weed, nursery escape; recorded from Harris Co. (Brown 14320 (SBSC)), Travis Co. (JK Williams s.n. (TEX)), and Walker Co. (Spencer 1 (SHST)); also s TX in Cameron and Hidalgo cos. (Richardson 2011); GA, FL, LA, and CA; introduced elsewhere. Oct–Mar, or perhaps year-round. Native of tropical Asia; the first records of this species in TX are discussed in Williams (1994) and Spencer & Williams (2005). *I*

ENGELMANNIA A. Gray ex Nutt. ENGELMANN'S DAISY, CUT-LEAF DAISY

☛A monotypic genus native to North America; sometimes cultivated as an ornamental. (Named for Dr. George Engelmann, 1809–1884, German-born botanist and physician of Saint Louis, MO) (tribe Heliantheae)

REFERENCES: Turner & Johnston 1956; Goodman & Lawson 1992; Keil 2006e.

Engelmannia peristenia (Raf.) Goodman & C.A. Lawson, (possibly from Greek: *perisso*, beyond the regular number or size, odd in number, and *tenia*, band, ribbon), ENGELMANN'S DAISY, CUT-LEAF DAISY. Hispid-pubescent perennials with woody taproots; stems spreading to erect, 20–100 cm tall; leaves alternate, blades 8–30 cm long, pinnately divided nearly to midrib, the lobes again lobed or toothed; inflorescences of several long-peduncled heads; involucre 6–10 mm high; phyllaries in 3–4 series, the outer with green, ciliate tips; receptacles chaffy; ray flowers 8–13, pistillate and fertile, ligules ca. 1 cm long, yellow, curling under during daytime, expanded from late afternoon to mid-morning; disk corollas numerous, functionally staminate, dark yellow; achenes 3–4 mm long, detaching with subtending phyllary; pappus of 2–4 minute scales. Clayey or occasionally sandy prairies and limestone outcrops, roadsides; nearly throughout TX but least frequent in Pineywoods; sc U.S. from SD sw to AZ and se to LA; n Mexico. Apr–Jul (rarely later). [*E. pinnatifida* Torr. & A. Gray] Goodman and Lawson (1992) documented that *E. peristenia* is an older name (published 1832) than the long established *E. pinnatifida* (published 1840). Farmers and ranchers refer to this as an “ice cream” plant because it is preferred by livestock; it is therefore now rarely seen except along roadsides or other areas inaccessible to grazing animals (J. Stanford, pers. comm.).

ERECHTITES Raf. BURNWEED, FIREWEED

☛A genus of 12 species native to the Americas and Australia; some species widely distributed as weeds; some contain alkaloids. (An ancient Greek name, *erechthites*, used by Dioscorides for some species of *Senecio*—groundsel) (tribe Senecioneae)

REFERENCES: Belcher 1956; Vuilleumier 1969a; Barkley & Cronquist 1978; Barkley 2006b.

Erechtites hieraciifolius (L.) Raf. ex DC. var. **heiraciifolius**, (with leaves like *Hieracium*—hawkweed), AMERICAN BURNWEED, FIREWEED. Annual herbs, glabrescent or with sparse, jointed hairs; stem 50–200 cm tall; leaves alternate, numerous, evenly distributed up stem, blades ovate-lanceolate to oblanceolate, 3–20 cm long, subtire to sharply doubly serrate and sometimes irregularly lobed, the uppermost reduced and clasping; heads few–many in corymbose arrays; involucre cylindrical; primary phyllaries ca. 20, in 1 series, ± equal, 9–17 mm long, subtended by a few, very small bracts; receptacles naked; heads of disk flowers only, peripheral flowers pistillate, with tubular-filiform corollas, central flowers perfect and fertile or functionally staminate, corollas whitish or greenish to yellowish cream or pinkish; achenes 10–12-nerved, columnar, 2.3–3 mm long; pappus of 60–120 capillary bristles, deciduous. Wet areas, open woods; throughout se and e TX, a few c TX records (Bell, Guadalupe, Gonzales cos.); e 1/2 North America and sporadically on the w coast; West Indies and Mexico. Aug–Nov. [*E. hieraciifolius* var. *intermedia* Fernald, *Senecio hieraciifolius* L.] The name *Erechtites* has been treated traditionally as grammatically feminine; the International Code of Botanical Nomenclature (Art. 62.4) states that generic names ending in “-ites” are to be treated as masculine, therefore the correct epithet for this species is *hieraciifolius* and not *heiraciifolia* as it is sometimes written.

ERIGERON L. FLEABANE, DAISY FLEABANE, DAISY

Ours annual or perennial herbs; leaves alternate, sessile or the lower ones petiolate, oblong or oblanceolate to lanceolate or linear, margins entire or toothed; heads solitary or in loose corymbose or paniculate arrays; phyllaries numerous, in 2–5 series; receptacles naked; ray flowers numerous, often 30–150, in 1(–2+) series, pistillate, fertile, ligules narrow, white or lavender-blue to pink, never yellow, often curling under at night or in age; disk flowers perfect and fertile, corollas yellow; achenes flattened, usually strongly 2+-ribbed; pappus various, of hair-like bristles (at least on disk achenes), sometimes with a second series of small bristles or scales.

☛A cosmopolitan genus (especially of North America) of ca. 390 species, closely related to *Conyza* and *Aphanostephus*; several are cultivated as ornamentals. *Erigeron* species are sometimes difficult to distinguish; complete basal plant parts are necessary to identify some species. Barkley (1986) indicated, “As with many widespread genera in the Asteraceae, the species boundaries are not always sharp, and morphological intermediates are to be expected.” Polyploidy is common in *Erigeron* (Nesom 2006l). (Greek: *eri*, early, or *erio*, woolly, and *geron*, old man; perhaps alluding to the gray pappus or woolly heads of some species) (tribe Astereae)

REFERENCES: Cronquist 1943, 1947; Shinnars 1947a; Van Vleet 1951; Nesom 1978, 1989a, 2004a, 2006l; Nesom & Noyes 1999.

1. Stems prostrate (= procumbent) and creeping along the ground, rooting at nodes; heads solitary, on naked peduncles mostly 10–20 cm long; most common in dune sands of Gulf Coast, uncommon inland in deep sands.....**E. procumbens**
1. Stems erect or variously sprawling but not prostrate/creeping nor rooting at nodes; heads few to many in corymbose or paniculate arrays, with peduncles usually < 10 cm long; plants of various habitats.

2. Inner (longer) pappus series bristles absent on ray achenes but present on disk achenes.
3. Annuals, usually 60–150 cm tall; lower stems sparsely pilose-hispid (hairs spreading); basal leaves usually withering by flowering; upper leaves not much reduced compared to midstem leaves; leaf blades lanceolate to oblong or ovate **E. annuus**
3. Annuals or biennials, usually 30–70 cm tall; lower stems strigose (hairs usually ascending and appressed, rarely spreading); basal leaves usually present at time of flowering; upper leaves gradually reduced compared to midstem leaves; leaf blades spatulate to oblanceolate or linear **E. strigosus**
2. Inner (longer) pappus series bristles present on both ray and disk achenes.
4. Plants with a distinct taproot (obviously larger/longer than lateral roots).
5. Annuals with slender taproots; lower stems herbaceous; leaf bases sometimes clasping to subclasping; inner series of pappus bristles 9–11; achenes 0.7–0.9 mm long; usually in sandy habitats **E. geiseri**
5. Perennials with thick, woody taproots; lower stems often woody and persistent; leaf bases not clasping nor subclasping; inner series of pappus bristles (5–)12–17; achenes 1.1–1.4 mm long; usually in calcareous habitats **E. modestus**
4. Plants with fibrous roots (primary taproot, if any, shortened in comparison to lateral roots).
6. Stem leaves with bases clasping or subclasping; involucre 4–7 mm high and 6–20 mm wide; ray ligules often white (sometimes pinkish), 5–10 mm long, sometimes coiling and recurving in age; inner series of pappus bristles 15–36.
7. Plants with slender, scale-leaved, herbaceous rhizomes; stems usually abruptly widened (dilated) below the heads; involucre 5–7 mm high; ray flowers 50–80(–100); inner series of pappus bristles (22–)28–36, outer (shorter) series sometimes absent; achenes 1.3–1.8 mm long **E. pulchellus**
7. Plants fibrous-rooted, lacking rhizomes; stems not abruptly widened below the heads; involucre 4–6 mm high; ray flowers 150–250(–400); inner series of pappus bristles 15–20(–30), outer series usually present; achenes 0.6–1.1 mm long **E. philadelphicus**
6. Stem leaves not clasping nor subclasping; involucre (2–)2.5–4 mm high and 5–10 mm wide; ray ligules often bluish or lavender (sometimes white), 3–5 mm long, not coiling nor recurving in age; inner series of pappus bristles 11–15 **E. tenuis**

Erigeron annuus (L.) Pers., (annual), ANNUAL FLEABANE, EASTERN DAISY FLEABANE. Taprooted or fibrous-rooted annuals, (10–)60–150 cm tall; lower stems sparsely pilose-hispid with spreading hairs; stem leaf blades lanceolate to oblong, the upper ones not much reduced; involucre 3–5 mm high and 6–12 mm wide; ray flowers 80–125, ligules white, 4–10 mm long, coiling under in age; achenes 0.8–1 mm long, 2-nerved; disk pappus with an outer minute crown and an inner series of 8–11 bristles; ray pappus lacking bristles. Prairies, disturbed areas, roadsides, various soils; mostly se TX; scattered in c and nc TX; throughout North America but most common in e 1/2; Mexico and Central America; introduced and weedy elsewhere. Apr–Jun. [*Aster annuus* L., *E. annuus* (L.) Pers. var. *discoideus* (Vict. & J. Rousseau) Cronquist]

Erigeron geiseri Shinnery, (for Samuel Wood Geiser, 1890–1983, professor at Southern Methodist Univ.), GEISER'S FLEABANE. Slenderly-taprooted annuals, 5–40 cm tall; lower stems sparsely villous with spreading or downward-pointing hairs; stem leaf blades lanceolate to lance-linear, subclasping, the upper ones gradually reduced; involucre 2.5–3.5 mm high and 5–7 mm wide; ray flowers 44–70, ligules white, drying white to pink, 3–6 mm long, not coiling nor reflexing; achenes 0.7–0.9 mm long, 2-nerved; pappus of an outer series of small scales and an inner series of 9–11 bristles. Sandy prairies, roadsides; mostly nc to sc TX, scattered in East TX; OK. Mar–May.

Erigeron modestus A. Gray, (modest), PLAINS FLEABANE. Thickly-taprooted perennials, 8–40 cm tall, often grayish-pubescent; taproot and caudex woody; branches increasing in number through the season; lower stems usually woody, loosely strigose to villous with hairs sometimes spreading; stem leaf blades oblanceolate to narrowly spatulate, the upper ones gradually reduced; peduncles decreasing in length through the season; involucre 3–4.5 mm high and 6–9(–12) mm wide (size decreasing through the season); ray flowers 24–65(–170), ligules white, often with a darker midstripe beneath, drying lilac, 4–7(–11) mm long, not coiling nor reflexing; achenes 1.1–1.4 mm long, 2-nerved; pappus of an outer series of short bristles and an inner series of (5–)12–17 bristles. Gravelly or rocky limestone, sandy clay soils, oak-juniper scrubland; w border of East TX from McLennan Co. s to Bexar Co.; mostly Edwards Plateau and Trans-Pecos, scattered in nc TX and Panhandle; KS, OK, AZ, and NM; Mexico. Apr–Jun(–Oct). [*E. lobatus* A. Nelson var. *warnockii* Shinnery, *E. plateauensis* Cronquist, *E. warnockii* (Shinnery) Shinnery]

Erigeron philadelphicus L. var. **philadelphicus**, (of the Philadelphia region), PHILADELPHIA FLEABANE. Fibrous-rooted perennials, 4–70 cm tall; lower stems hirsute-villous; stem leaf blades oblong-oblanceolate to lanceolate, clasping to auriculate-clasping, the upper ones gradually reduced; involucre 4–6 mm high and 6–15 mm wide; ray flowers 150–250(–400), ligules usually white, sometimes pinkish, 5–10 mm long, either not coiling or coiling in age; achenes 0.6–1.1 mm long, 2-nerved; pappus of an outer series of short bristles and an inner series of 15–20(–30) bristles. Low prairies and stream banks, roadsides, calcareous clays; se and e TX w to West Cross Timbers and Edwards Plateau; throughout North America;

introduced elsewhere. Mar–May. [*E. philadelphicus* L. var. *scaturicola* (Fernald) Fernald]

Erigeron procumbens (Houst. ex Mill.) G.L. Nesom, (prostrate), CORPUS CHRISTI FLEABANE. Taprooted perennials; stems prostrate, 5–40+ cm long, rooting at nodes; lower stems ± hirsute; stem leaf blades oblanceolate to spatulate or cuneate, the more distant ones not reduced; heads solitary on long peduncles; involucre 6–8 mm high and (8–)10–16 mm wide; ray flowers 225–350, ligules usually white, sometimes pinkish, 5–7 mm long, tightly coiling under in age; achenes 0.7–1 mm long, 2-nerved; disk pappus with an outer series of short bristles and an inner series of 12 (ray) or 16–23 (disk) bristles. Coastal flats and dunes, salt marshes, sandy roadsides; infrequent inland in se and sc TX; mostly Gulf Coast and s TX Plains; LA and MS; Mexico. All seasons, but mostly Mar–Jun. [*Aster procumbens* Houst. ex Mill., *E. myrionactis* Small]

Erigeron pulchellus Michx. var. **pulchellus**, (beautiful), HAIRY FLEABANE, ROBIN'S PLANTAIN. Fibrous-rooted, rhizomatous perennials, 15–60 cm tall; lower stems hirsute to villous; stem leaf blades oblanceolate to obovate or suborbiculate, clasping and slightly auriculate, the upper ones reduced; involucre 5–6 mm high and 6–20 mm wide; ray flowers 50–80(–100), ligules light blue to pinkish, 6–10 mm long, coiling under in age; achenes 1.3–1.8 mm long, 2(–4)-nerved; pappus of an outer series of short bristles (sometimes absent) and an inner series of 22–28(–36) bristles. Low prairies, creekbottoms, oak-pine forest; ne to se TX; e 1/2 North America. Mar–May.

Erigeron strigosus Muhl. ex Willd. var. **strigosus**, (strigose, with stiff bristles), COMMON EASTERN FLEABANE, PRAIRIE FLEABANE, WHITETOP. Fibrous-rooted annuals or biennials, 30–70 cm tall; lower stems strigose with hairs usually ascending; stem leaf blades spatulate to narrowly oblanceolate, the upper ones gradually reduced; involucre 4–5 mm high and 5–12 mm wide; ray flowers 50–100, ligules white, less commonly pinkish or bluish, 4–6 mm long, coiling under in age; achenes usually 0.9–1.2 mm long, 2-nerved; disk pappus with an outer minute crown and an inner series of 8–15 bristles; ray pappus lacking bristles. Prairies, open woods, pastures, roadsides; widespread in e 1/2 TX; throughout North America but most common in e 1/2; introduced and weedy elsewhere. Apr–Jun, sporadically to Oct. [*E. ramosus* (Walter) Britton, Sterns & Poggenb., *E. strigosus* Muhl. ex Willd. var. *beyrichii* (Fisch. & C.A. Mey.) Torr. & A. Gray ex A. Gray, *E. strigosus* Muhl. ex Willd. var. *traversii* (Shinners) Noyes, *E. traversii* Shinners]

Erigeron tenuis Torr. & A. Gray, (slender, thin), SLENDER FLEABANE, SLENDER-LEAF FLEABANE. Fibrous-rooted, short-lived perennials or biennials, 10–45 cm tall; lower stems strigose or rarely hirsute; stem leaf blades narrowly oblanceolate to obovate or spatulate, the upper ones abruptly reduced; involucre (2–)2.5–4 mm high and 5–10 mm wide; ray flowers 60–120, ligules pale blue to lavender or white, drying blue to purplish, 3–5 mm long, not coiling nor reflexing; achenes 1–1.2 mm long, 2(–4)-nerved; pappus of an outer series of short bristles and an inner series of 11–15 bristles. Sandy open woods, roadsides, pastures; mostly e 1/2 TX; Edwards Plateau and s TX Plains; se and sc U.S. from FL n to MO and w to KS and TX. Mar–May.

EUPATORIUM L. BONESET, THOROUGHWORT

Ours herbaceous perennials, 30–200 cm tall; stems stiffly erect, often puberulent or pubescent; lower leaves usually opposite, sometimes whorled, or upper leaves sometimes alternate; heads small, borne in corymbose or paniculate arrays; phyllaries in several series; receptacles naked; ray flowers absent; disk flowers usually white, rarely pinkish; achenes brownish to black, 5-ribbed; pappus of many persistent, minutely-barbed bristles.

•A genus of ca. 45 species of e North America, Europe, and e Asia; some are cultivated as ornamentals; several have a history of use in folk medicine and are under investigation for potential medicinal use (Sharma et al. 1998). *Eupatorium* in the traditional, broad sense (=sensu lato) was treated as including 1000+ species; more recent molecular analyses support its subsequent segregation into a number of smaller genera (King & Robinson 1987; Bremer et al. 1994; Schilling et al. 1999; Schmidt & Schilling 2000). The East TX species of *Eupatorium sensu lato* are now split into 6 different genera: *Ageratina*, *Chromolaena*, *Conoclinium*, *Eutrochium*, *Eupatorium (sensu stricto)*, and *Fleischmannia*. Hybridization and polyploidy complicate species identification (Siripun & Schilling 2006). The common name BONESET is apparently derived from the historic use in treating dengue fever, also known as break-bone fever (Tveten & Tveten 1993). (Named for Mithridates Eupator (132–63 B.C.), King of Pontus, who is said to have used a species of the genus in medicine or as an antidote for poison) (tribe Eupatorieae)

REFERENCES: King & Robinson 1970e, 1987; Sullivan 1975; McVaugh 1982; Robinson & King 1985; Bremer et al. 1994; Schilling et al. 1999; Schmidt & Schilling 2000; Siripun & Schilling 2006.

1. Main stem leaves pinnatifid, or pinnately or palmately lobed, lobes relatively narrow.

2. Leaves mostly palmately or 1–2-pinnately lobed; flowers 7–9 per head..... **E. × pinnatifidum**

2. Leaves usually pinnately or palmately lobed or pinnatifid; flowers usually 5 per head.
3. Leaf lobes thread-like, 0.2–0.5(–1) mm wide, margins strongly revolute; phyllaries usually glabrate or glabrous, not or only slightly gland-dotted; pappus bristles 2–2.5 mm long **E. capillifolium**
3. Leaf lobes broader, not thread-like, 0.5–2.5(–4) mm wide, margins not revolute; phyllaries usually puberulent (especially on midveins), usually gland-dotted; pappus bristles 3–3.5 mm long..... **E. compositifolium**
1. Main stem leaves unlobed, margins entire, crenate, or serrate to serrulate.
4. Leaves petiolate, petioles 10–30 mm long..... **E. serotinum**
4. Leaves sessile or subsessile, petioles absent or < 10 mm long.
5. Leaf bases connate-perfoliate (fused in pairs around the stem); flowers 7–11 per head **E. perfoliatum**
5. Leaf bases distinct, not connate-perfoliate; flowers (4–)5 per head.
6. Phyllary tips acuminate to attenuate, usually whitish.
7. Leaf blades 4–10 mm wide; phyllaries 8–10, narrowly elliptic; corollas 3–3.5 mm long; pappus bristles 4.5–5 mm long..... **E. leucolepis**
7. Leaf blades 10–25(–40) mm wide; phyllaries 9–15, linear; corollas 4–4.5 mm long; pappus bristles 3.5–4.5 mm long **E. album**
6. Phyllary tips acute, obtuse, or rounded, sometimes with narrow, whitish (hyaline) margins.
8. Leaf blades deltate to suborbiculate, sometimes ovate, usually widest below the middle (lengths mostly 1–2 times widths), bases broadly rounded to truncate **E. rotundifolium**
8. Leaf blades of various shapes but usually widest near or above the middle (lengths usually more than 2 times widths), bases ± cuneate.
9. Leaves strongly to obscurely 3-nerved from bases; IF lateral veins are obscure, THEN the leaves linear, 2–5 mm wide.
10. Stems (at least the lower portion) glabrous to glabrate (sometimes pilose); leaves 30–50 mm long, glabrous beneath; phyllaries 0.2–0.8 mm wide; corollas 2.5–3 mm long **E. lancifolium**
10. Stems pubescent throughout; leaves 20–60(–120) mm long, but the larger usually 50+ mm long, scabrous, puberulent, or villous beneath; phyllaries 0.5–1.5 mm wide; corollas 3–3.5 mm long.
11. Leaf blades 20–60 mm long and 2–5 mm wide, linear, margins entire or finely and obscurely serrate; plants of se TX..... **E. hyssopifolium**
11. Leaf blades 50–120 mm long and 5–20 mm wide, lance-elliptic to oblanceolate, margins entire in the lower portion and sharply serrate in the upper portion; plants of ne TX..... **E. altissimum**
9. Leaves 3-nerved but lateral nerves arising higher on the midrib, not at leaf base.
12. Leaves recurved, upper blade surface glabrous or glabrate; stems sometimes from tuberous-thickened rhizomes; phyllaries 0.2–0.5 mm wide; achenes 1–2 mm long..... **E. mohrii**
12. Leaves spreading, upper blade surface puberulent to villous; stems from short caudices or rhizomes; phyllaries 0.5–1 mm wide; achenes 1.5–3 mm long.
13. Stems densely branched in upper portion; leaf blades (30–)50–70 mm long, margins usually serrate; phyllaries elliptic (larger ones 2.5–3 mm long); corollas 2.5–3 mm long **E. semiserratum**
13. Stems usually branched at or near bases; leaf blades mostly 20–35(–45) mm long, margins weakly serrate to subentire; phyllaries lanceolate (larger ones usually 4–5 mm long); corollas 3–3.5 mm long..... **E. linearifolium**

Eupatorium album L. var. **album**, (white), WHITE EUPATORIUM, WHITE THOROUGHWORT. Plants with short caudices or stout rhizomes; leaves usually opposite (at least the lower ones), sessile, blades elliptic to oblanceolate, 3-nerved from above bases, pubescent, usually gland-dotted, bases narrowly cuneate, margins coarsely serrate; phyllaries pubescent and gland-dotted, tips acuminate to attenuate; flowers (4–)5; achenes 2.5–3.5 mm long; pappus 3.5–4.5 mm long. Sandy pinelands; rare in TX; in East TX reported from Anderson Co. (Singhurst et al. 1998); also Jefferson Co.; e and se U.S. from MA s to FL and w to IN and TX. Aug–Nov. [*E. album* L. var. *glandulosum* (Michx.) DC.]

Eupatorium altissimum L., (very tall), TALL EUPATORIUM, TALL THOROUGHWORT. Plants with short caudices or stout rhizomes; leaves usually opposite, sessile or nearly so, blades lance-elliptic to oblanceolate, strongly 3-nerved from bases, puberulent or villous, gland-dotted, bases ± cuneate, margins serrate in the upper portion; phyllaries pubescent, tips rounded to acute; flowers 5; achenes 2–3 mm long; pappus 3.5–4 mm long. Open pine-oak woodlands, thickets; ne TX near Red River drainage; nc TX; e U.S. from MA s to FL and w to MN, NE, and TX; Canada. Aug–Oct. *E. altissimum* hybridizes with *E. serotinum* (Siripun & Schilling 2006).

Eupatorium capillifolium (Lam.) Small, (hair-leaved), DOGFENNEL, DOGFENNEL EUPATORIUM, CYPRESSWEED. Plants with short caudices; leaves usually alternate (at least the upper ones), sessile, blades dissected and palmately lobed, lobes linear, glabrate, gland-dotted, bases ± cuneate, margins strongly revolute; phyllaries nearly glabrous, not or only minimally gland-dotted, tips acuminate and mucronate; flowers 5; achenes 1–1.7 mm long; pappus 2–2.5 mm long. Disturbed areas, sandy soils, old fields; East TX but most common in se TX; nc TX, Edwards Plateau, and s TX Plains; se U.S. from MA s to FL and w to MO and TX. Sep–Nov. A hybrid of *E. capillifolium* and *E. linearifolium* from Hardin Co. was described by Jordan

(1991).

Eupatorium compositifolium Walter, (compound-leaved), YANKEEWEEED. Plants with short caudices; leaves usually alternate (at least the upper ones), sessile, blades pinnately or palmately lobed, lobes linear, puberulent, gland-dotted, bases cuneate, margins entire; phyllaries puberulent, usually gland-dotted, tips acuminate and mucronate; flowers 5; achenes 1–1.7 mm long; pappus 3–3.5 mm long. Roadsides, disturbed areas, sand dunes; widespread across East TX to Gulf Coast and s TX Plains; se U.S. from NC s to FL and w to OK and TX. Oct–Nov. May hybridize with *E. serotinum* (Jordan 1991; Turner 2015).

Eupatorium hyssopifolium L. var. **hyssopifolium**, (with leaves resembling the genus *Hyssopus*), HYSSOP-LEAVED EUPATORIUM, HYSSOPLEAF THOROUGHWORT. Plants with short caudices or stout rhizomes; leaves usually opposite or whorled in 3s and 4s (at least the lower ones), sessile, blades linear, 3-nerved from bases (sometimes weakly), scabrous, bases cuneate, margins entire or obscurely and finely serrate; phyllaries pubescent, tips obtuse to acute; flowers 5; achenes 2–3 mm long; pappus 3.5–4 mm long. Disturbed sites, roadsides; uncommon in deep se TX; e U.S. from MA s to FL and w to WI, MO, and TX. Aug–Oct. [*E. hyssopifolium* L. var. *calcaratum* Fernald & B.G. Schub., *E. lecheifolium* Greene]

Eupatorium lancifolium (Torr. & A. Gray) Small, (lance-leaved), LANCE-LEAVED EUPATORIUM, LANCELEAF THOROUGHWORT. Plants with short rhizomes; leaves usually opposite (at least the lower ones), sessile or subsessile, blades lanceolate to lance-linear, 3-nerved from bases, glabrous above, sparsely pilose beneath, gland-dotted, bases narrowly cuneate, margins serrate; phyllaries pilose, gland-dotted, tips rounded; flowers 5; achenes 2.5–2.8 mm long; pappus 3.5–4 mm long. Dry clay soils, rolling terrain, pine and oak woods; se and sc TX; AL, MS, AR, and LA. Aug–Sep. [*E. parviflorum* Elliott var. *lancifolium* Torr. & A. Gray, *E. semiserratum* DC. var. *lancifolium* Torr. & A. Gray]

Eupatorium leucolepis (DC.) Torr. & A. Gray var. **leucolepis**, (white-scaled), JUSTICEWEED, WHITE-BRACTED THOROUGHWORT. Plants with short caudices or stout rhizomes; leaves usually opposite (at least the lower ones), sessile, blades lance-oblong to linear-oblong, pinnately nerved, strongly folded along the midribs, scabrous above, villous beneath, bases rounded to cuneate, margins entire or serrate; phyllaries puberulent, gland-dotted, tips acuminate to attenuate; flowers 5; achenes 2–3 mm long; pappus 4.5–5 mm long. Pine barrens, pond margins, moist sandy soils; deep se TX in Angelina, Hardin, Jasper, Newton, Orange, and Tyler cos.; e and se U.S. from NY s to FL and w to KY and TX. Aug–Oct.

Eupatorium linearifolium Walter, (linear-leaved), WAXY EUPATORIUM, WAXY THOROUGHWORT. Plants with short caudices; leaves usually opposite (at least the lower ones), sessile or subsessile, blades oblong to lance-oblong, 3-nerved from above bases, finely puberulent, gland-dotted, bases cuneate, margins entire or serrate in the upper portion; phyllaries puberulent, gland-dotted, tips rounded to acute; flowers 5; achenes 2.5–3 mm long; pappus 3–5 mm long. Dry sandy soils, pine and oak woods, old fields; se and sc TX to Gulf Coast and s TX Plains; se U.S. from VA s to FL and w to TX. Aug–Nov. [*E. cuneifolium* Willd., *E. cuneifolium* Willd., *E. tortifolium* Chapm.] A hybrid of *E. linearifolium* and *E. capillifolium* from Hardin Co. was described by Jordan (1991).

Eupatorium mohrii Greene, (for Charles Theodor Mohr (1924–1901), German-born pharmacist and botanist of the se U.S.), MOHR'S EUPATORIUM, MOHR'S THOROUGHWORT. Plants with tuberous rhizomes; leaves usually opposite (at least the lower ones), sessile or subsessile, blades oblanceolate, 3-nerved from above bases, nearly glabrous, gland-dotted, bases cuneate, margins serrate in the upper portion; phyllaries puberulent, gland-dotted, tips rounded; flowers 5; achenes 1–2 mm long; pappus 2.5–3 mm long. Moist sandy soils, pond margins; deep se TX; se U.S. from VA s to FL and w to TX. Aug–Sep. [*E. recurvans* Small] May hybridize with *E. serotinum* and *E. rotundifolium* (Siripun & Schilling 2006).

Eupatorium perfoliatum L., (perfoliate, with leaf bases surrounding the stem), BONESET, COMMON THOROUGHWORT, AGUEWEED. Plants with short caudices; leaves usually opposite (sometimes whorled), sessile, blades oblong, pinnately nerved, pilose, gland-dotted beneath, bases connate-perfoliate, margins serrate; phyllaries villous or puberulent, gland-dotted, tips acute to acuminate; flowers 7–11; achenes 1.5–2 mm long; pappus 3–3.5 mm long. Moist sandy soils, marshes, roadsides; e 1/3 TX; also Panhandle; e 1/2 North America. Aug–Oct. [*E. chapmanii* Small, *E. perfoliatum* L. var. *cuneatum* Engelm.] Hybridizes with *E. serotinum* and potentially other species of *Eupatorium* (Siripun & Schilling 2006). This species contains the glucoside eupatorin, and has been used in the traditional medicine of Native Americans; recent experiments indicate possible anti-inflammatory effects and activity against *Plasmodium falciparum*, the parasite that causes malaria (Duke 1985; Hensel et al. 2011).

Eupatorium rotundifolium L., (round-leaved), FALSE HOARHOUND, ROUND-LEAVED EUPATORIUM, ROUNDEAF THOROUGHWORT. Plants with short rhizomes; leaves usually opposite (at least the lower ones), sessile or subsessile, blades deltate to orbiculate,

sometimes ovate, 3-nerved, puberulent to villous, gland-dotted, bases rounded to truncate, margins crenate to serrate; phyllaries puberulent, gland-dotted, tips acute; flowers 5; achenes 2–3 mm long; pappus 3.5–4 mm long. Aug–Sep. Three varieties are recognized; 1 is common in East TX and 2 are to be expected. Siripun & Schilling (2006) separated the 3 intergrading varieties as follows:

1. Leaf blades 3-nerved from the base, margins crenate var. **rotundifolium**
 1. Leaf blades 3-nerved from above base, margins serrate.
 2. Leaf blades 30–70 mm long and 30–60 mm wide, broadest near middle var. **ovatum**
 2. Leaf blades 20–50 mm long and 15–30 mm wide, broadest near base var. **scabridum**

var. **ovatum** (Bigelow) Torr., (oval). Moist sandy soils, roadsides, low ground; *to be expected in East TX based on records from adjacent parishes in LA* (Beauregard, Caddo, Calcasieu, Sabine, and Vernon pars.); e and se U.S. from ME s to FL and w to AR and LA. [*E. ovatum* Bigelow, *E. pubescens* Muhl. ex Willd.] Potentially of hybrid origin.

var. **rotundifolium**, (round-leaved). Moist sandy soils, roadsides, pond margins; East TX; nc TX; e and se U.S. from NY s to FL and w to OK and TX. [*E. verbenifolium* Reichard]

var. **scabridum** (Elliott) A. Gray, (rough). Disturbed sites; *to be expected in East TX based on records from adjacent parishes in LA* (Beauregard, DeSoto, and Sabine pars.); se U.S. from SC s to FL and w to MO and LA. [*E. scabridum* Elliott] Potentially of hybrid origin.

Eupatorium semiserratum DC., (semi-serrate), SAW-LEAF EUPATORIUM, SMALLFLOWER THOROUGHWORT. Plants with short rhizomes; leaves usually opposite (at least the lower ones), sessile or subsessile, blades elliptic to lance-elliptic, 3-nerved from above bases, puberulent to villous, densely gland-dotted, bases narrowly cuneate, margins usually serrate; phyllaries puberulent, gland-dotted, tips rounded to acute; flowers 5; achenes 1.5–2 mm long; pappus 2.5–3 mm long. Moist sandy soils, bogs, swamp margins; se to sc TX; se U.S. from MD s to FL and w to MO and TX. Aug–Sep. [*E. cuneifolium* Willd. var. *semiserratum* (DC.) Fernald & Grisc.] May hybridize with *E. rotundifolium* and *E. hyssopifolium* (Siripun & Schilling 2006).

Eupatorium serotinum Michx., (late-flowering), LATE EUPATORIUM, LATE-FLOWERING THOROUGHWORT, FALL BONESET. Plants with short caudices; leaves usually opposite, long-petiolate, blades lanceolate, 3-nerved, puberulent, gland-dotted, bases rounded to slightly oblique, margins entire or serrate; phyllaries puberulent, gland-dotted, tips slightly rounded to acute; flowers 9–15; achenes 1–1.5 mm long; pappus 2–2.5 mm long. Open areas, disturbed sites, stream banks; se and e TX w to Rolling Plains and Edwards Plateau; e 1/2 North America. Aug–Oct. Hybridizes with *E. perfoliatum* (Siripun & Schilling 2006).

Eupatorium × **pinnatifidum** Elliott [*capillifolium* or *compositifolium* × *perfoliatum* or *serotinum*], (pinnatifid), THOROUGHWORT. This is the single formally-recognized hybrid name in the genus for our area, which apparently represents a series of recurrent hybrids according to Siripun & Schilling (2006), and tends to be intermediate to the parent species. Roadsides, open pine woods, pond banks; deep se TX; se U.S. from VA s to FL and w to TX. Aug–Oct. [*E. eugenei* Small, *E. pectinatum* Small]

Eupatorium pilosum Walter, (pilose), ROUGH BONESET, which would have keyed to *E. album* or *E. rotundifolium* here, can be distinguished by its leaves that are alternate and entire (on the upper stems), 3-nerved from above the bases, blade lengths that are 2–2.5 times the widths, rounded-cuneate bases, and lance-oblong phyllaries (larger ones 5–7 mm long). To be expected in East TX based on records from adjacent parishes in LA (Calcasieu and DeSoto pars.); e and se U.S. from MA s to FL and w to LA. Jul–Sep. [*Eupatorium rotundifolium* L. var. *saundersii* (Porter ex Britton) Cronquist, *E. verbenifolium* Michx.]

EURYBIA (Cass.) Cass. ASTER

☛A North American genus of 23 species; formerly included in *Aster*. (Greek: *eurys*, wide, and *baios*, few, perhaps alluding to the relatively few, broad ray ligules) (tribe Astereae)

REFERENCES: Jones 1980; Nesom 1994b; Brouillet 2006a.

Eurybia hemispherica (Alexander) G.L. Nesom, (for the hemispheric heads), SOUTHERN PRAIRIE ASTER, SINGLE-STEMMED BOG ASTER. Perennial herbs, 20–100 cm tall, forming clonal clumps from creeping rhizomes; stems erect or ascending, usually unbranched, often reddish; basal leaves withering by flowering time; stem leaves alternate, simple, sessile and subclasping,

blades lance-ovate or linear-lanceolate to linear, gradually reduced up the stem, margins usually entire; heads in elongate spicate or racemose arrays; involucre hemispheric, 8–12(–15) mm high; phyllaries in 4–6 series, unequal, the outer strongly reflexed; receptacles naked; ray flowers 15–30, pistillate, fertile, the ligules violet-purple (rarely white); disk flowers perfect, fertile, corollas pale yellow; achenes slightly flattened, ribbed, 2.6–3.7 mm long; pappus of tawny bristles 6–7.5 mm long, equalling the disk corollas. Sandy-loamy soils, open woods, prairies, bottomlands; e 1/3 TX; se U.S. from KY s to FL and w to KS and TX. Sep–Oct. [*Aster hemisphericus* Alexander, *A. paludosus* Aiton subsp. *hemisphericus* (Alexander) Cronquist, *Heleastrum hemisphericum* (Alexander) Shinnery]

EUTHAMIA Nutt. ex Cass. FLAT-TOPPED GOLDENROD, GOLDENTOP

Our herbaceous perennials; fibrous-rooted with creeping rhizomes; stems stiffly erect; basal and lower stem leaves sometimes early deciduous; leaves alternate, sessile, linear to lanceolate, ± uniform in shape along the stems, sparsely to densely gland-dotted, margins entire; heads clustered to produce flat-topped or slightly rounded corymbose arrays; phyllaries in 3–5 series, glabrous; receptacles naked; ray flowers pistillate and fertile, the corollas yellow; disk flowers perfect and fertile, usually fewer than the ray flowers, the corollas yellow; achenes oblong to ellipsoid, 2–4-nerved; strigose; pappus of 20–30 white, barbed bristles.

•A North American genus of 5 species; similar to and formerly lumped into *Solidago* as a section or subgenus. *Euthamia* is capable of “tremendous” morphological variation (Haines 2006). (Greek: *eu*, well, and *thama*, crowded, alluding to the dense inflorescences) (tribe Astereae)

REFERENCES: Sieren 1981; Taylor & Taylor 1983; Semple 1992; Haines 2006.

1. Disk corollas 2.5–3.3(–3.4) mm long; involucre 3–4.7(–5.3) mm high; rare in TX, known only from Gulf Coast prairies..... **E. caroliniana**
1. Disk corollas (3–)3.3–4.8 mm long; involucre 4–6.2 mm high; common plants of wider distribution in TX (including Gulf Coast prairies).
 2. Leaf blades linear to lanceolate, lengths 12–49 times widths, gradually reduced up the stem, prominently and abundantly gland-dotted (but not blistered or pustulate); flowering section of plant (from the top of the plant to the bottom of the lowest head-bearing branches) usually > 35% of plant height.....**E. gymnospermoides**
 2. Leaf blades lanceolate to narrowly lanceolate, lengths 8–18 times widths, abruptly reduced up the stem, sparingly and obscurely gland-dotted (sometimes blistered or pustulate); flowering section of plant (from the top of the plant to the bottom of the lowest head-bearing branches) usually < 35% of plant height..... **E. leptoccephala**

Euthamia caroliniana (L.) Greene ex Porter & Britton, (of the Carolinas), COASTAL PLAIN GOLDENTOP, SLENDER FLAT-TOPPED GOLDENROD. Plant 25–100 cm tall; stems ± glabrous; leaves linear, 1–3 mm wide, lengths 7–42.2 times widths, abruptly reduced up the stem, abundantly gland-dotted; involucre 3–4.7(–5.3) mm high; disk corollas 3.8–4.8 mm long. Moist sandy soils; in East TX recorded only from Harris Co. (J. Singhurst & W. Newman 17900 (BAYLU); Singhurst et al. 2014); first reported in TX from Chambers Co. (Singhurst et al. 2009); e U.S. from NY s to FL and w to MI, IL, and TX; Canada. Oct–Nov. [*E. microcephala* Greene, *E. remota* Greene, *Solidago lanceolata* L. var. *minor* Michx., *S. tenuifolia* Pursh var. *pycnocephala* Fernald]

Euthamia gymnospermoides Greene, (resembling the genus *Gymnosperma*), GREAT PLAINS GOLDENTOP, VISCID EUTHAMIA, FLAT-TOPPED GOLDENROD. Plant 40–150 cm tall; stems glabrous or with scabrous lines; leaves linear to lanceolate, 1.4–4(–8) mm wide, lengths 12–49 times widths, gradually reduced up the stem, abundantly gland-dotted; involucre (4–)4.5–6.2 mm high; disk corollas (3–)3.3–4.8 mm long. Open woods, prairies, sandy soils; se and e TX, nc TX; Plains Country and Gulf Coast; c U.S. from MI s to LA and w to ND, CO, and TX; Canada. Oct–Nov. [*E. camporum* Greene, *E. pulverulenta* Greene, *Solidago gymnospermoides* (Greene) Fernald, *S. graminifolia* (L.) Salisb. var. *gymnospermoides* (Greene) Croat, *S. texensis* Friesner]

Euthamia leptoccephala (Torr. & A. Gray) Greene ex Porter & Britton, (narrow-headed), MISSISSIPPI VALLEY GOLDENTOP, BUSHY FLAT-TOPPED GOLDENROD. Plant 30–100 cm tall; stems glabrous; leaves lanceolate to narrowly lanceolate, 3–6(–9) mm wide, lengths 8–18 times widths, abruptly reduced up the stem, obscurely or sparingly gland-dotted, sometimes with tiny blisters (= pustulate); involucre 4–6 mm high; disk corollas 3.3–4.4 mm long. Open woods, prairies, moist sandy soils; e and sc TX; se U.S. from IL s to GA and w to OK and TX. Sep–Nov. [*Solidago leptoccephala* Torr. & A. Gray]

Euthamia graminifolia (L.) Nutt., (grass-leaved), COMMON GOLDENTOP, FLAT-TOPPED-GOLDENROD, which would have keyed to *E. caroliniana* here, can be distinguished by its wider leaves (usually 3–12 mm wide vs. 1–3 mm wide) that are obscurely or sparingly gland-dotted. Excluded from TX by Haines (2006); potentially to be found in ne TX based on a record from adjacent Choctaw Co. in OK (Kartesz 2015); most common in the ne U.S. with scattered records w to WA and s to MS;

Canada; introduced in Europe and Asia. Sep–Oct. [*E. nuttallii* Greene, *Solidago graminifolia* (L.) Salisb.]

EUTROCHIUM Raf. JOEPEWEED

☛A genus of 5 species of North America; formerly included in *Eupatorium*. (Greek: *eu*, well or truly, and *trocho*, wheel-like, alluding to the whorled leaves) (tribe Eupatorieae)

REFERENCES: King & Robinson 1987; Lamont 1995, 2006.

Eutrochium fistulosum (Barratt) E.E. Lamont, (hollow, for the stems), HOLLOW JOEPEWEED, TRUMPETWEED. Herbaceous perennial, 60–350+ cm tall; stems erect, unbranched, usually purplish throughout, glaucous, hollow (at least in the lower stem); leaves whorled in 4s–6s(–7s), petiolate, blades narrowly to broadly lanceolate, margins finely serrate; heads in rounded, compound corymbose arrays; involucre 6.5–9 mm high, often purplish; phyllaries in 5–6 series, unequal; ray flowers absent; disk flowers (4–)5–7, corollas pale pinkish or purplish; achenes 5-angled, 3–4.5 mm long; pappus of numerous barbed bristles. Low woods, acidic sandy soils, along streams, bogs; se TX; e U.S. from NY s to FL and w to MI and TX. Jul–Aug. [*Eupatoriadelphus fistulosus* (Barratt) R.M. King & H. Rob., *Eupatorium fistulosum* Barratt]

Eutrochium purpureum (L.) E.E. Lamont, (purple), SWEETSCENTED JOEPEWEED, SWEET JOEPEWEED, can be distinguished by the usually solid (not hollow) stems that are purplish only at the nodes. Not yet reported in TX but included here based on records from adjacent counties in Oklahoma: McCurtain Co. (OKL) and Choctaw Co. (Kartesz 2015); e U.S. from NH s to FL and w to MN and OK. Late summer–early fall. [*Eupatoriadelphus purpureus* (L.) R.M. King & H. Rob., *Eupatorium purpureum* L.]

FACELIS Cass.

☛A South American genus of 3 or 4 species. (Greek: *phakelos*, a bundle) (tribe Inuleae)

REFERENCES: Anderberg 1991; Nesom 2006m.

Facelis retusa (Lam.) Sch.Bip., (retuse, notched slightly at a rounded apex, referring to the leaves), TRAMPWEED. Annual herb from a taproot; stems 3–20(–30) cm tall, erect or with decumbent branches, white-gray woolly; leaves alternate, simple, entire, linear-spatulate, 7–20(–30) mm long, 1.5–4 mm wide, ± sessile; heads in a terminal cluster; involucre 8–11 mm high; phyllaries mostly scarious or partly greenish, the inner often pigmented near tip; ray flowers absent; disk flowers of 2 types: the central ca. 3–5 perfect and fertile, with corollas 5-toothed, white; the peripheral 10–25 pistillate, with corollas white, filiform, truncate or obscurely toothed; achenes white-hairy, 1.6 mm long; pappus of numerous whitish, strongly plumose bristles 10–11 mm long, surpassing the corollas. Lawn weed, roadsides, sandy disturbed areas; East TX w to Edwards Plateau, se U.S. from VA s to FL and w to KS and TX; South America; introduced elsewhere. Apr–May. [*Gnaphalium retusum* Lam.] Native of South America. *I*

FLAVERIA Juss. YELLOWTOPS

☛A mostly Mexican genus of 21 species; a few are widespread weeds. (Latin: *flavus*, pure yellow) (tribe Heliantheae)

REFERENCES: Powell 1978; Yarborough & Powell 2006a.

Flaveria trinervia (Spreng.) C. Mohr, (3-nerved), CLUSTERED YELLOWTOPS. Annual glabrate herbs, to 200+ cm tall; stems much-branched, erect or decumbent; leaves opposite, petiolate or sessile, blades ± succulent, 3-nerved, lanceolate to elliptic or oblanceolate, to 150 mm long, margins serrate to spinulose; heads in compact, sessile, axillary clusters; involucre 3.8–4.8 mm high; phyllaries usually 2, oblong, clasping and falling with mature achenes; ray flowers absent or 1 (usually on peripheral heads in a cluster), pistillate, fertile, ligules yellow or whitish, inconspicuous, 0.5–1 mm long; disk flowers 0–1(–2), perfect, fertile, corollas yellow; achenes 10-ribbed, glabrous, 2–2.6 mm long (ray achenes longer); pappus absent. Moist saline areas, disturbed habitats; in East TX known only from Harris Co. from a 1922 collection (G.L. Fisher s.n. (TEX-LL)) and possibly not persisting as it is not included in Brown (2014); scattered in w 1/2 TX; scattered in mostly s and coastal U.S.; Mexico; introduced and weedy in many parts of the world. Mar–Dec. [*Oedera trinervia* Spreng.]

FLEISCHMANNIA Sch.Bip. THOROUGHWORT

☛A genus of ca. 80 species of the Americas; formerly included in *Eupatorium*. (Named for Gottfried F. Fleischmann (1777–1850), professor at Erlangen, Germany) (tribe Eupatorieae)

REFERENCES: King & Robinson 1970a, 1987; Wooten & Clewell 1971; Nesom 2006n.

Fleischmannia incarnata (Walter) R.M. King & H. Rob., (flesh-colored), PINK EUPATORIUM, PINK THOROUGHWORT. Perennial herb from fibrous-rooted crown; stems sprawling or scandent, to 200 cm long; leaves opposite, petiolate, blades deltoid, gland-dotted beneath, margins crenate to serrate; heads in loose corymbose arrays; involucre 4–5 mm high; phyllaries in 2–4 series, ± equal; ray flowers absent; disk flowers with corollas usually pink-purple or whitish with pink to lilac lobes, rarely all white; achenes 5-angled, 1.8–2.8 mm long; pappus of barbellate bristles. Bottomlands, moist woodlands, ditches; East TX and Cross Timbers to s TX Plains; se and sc U.S. from OH s to FL and w to MO and TX. Oct–Dec. [*Eupatorium incarnatum* Walter]

GAILLARDIA Foug. INDIAN-BLANKET, BLANKET-FLOWER

Our low annual or perennial herbs, taprooted or rhizomatous; leaves alternate, sometimes also forming a basal rosette, reduced upward, petiolate to ± clasping, blades linear to elliptic or oblong to spatulate, glabrous to scabrellous or villous, sometimes gland-dotted, margins entire or toothed to lobed or pinnatifid; heads large, showy, usually borne singly on long peduncles; phyllaries in 2–3+ series, subequal, herbaceous or with hardened bases, narrow, loose, reflexed in fruit; receptacles convex to hemispheric, often with bristles intermixed with disk flowers; ray flowers absent or 6–15, neuter or rarely pistillate and fertile or sterile, ligules widened and 3-toothed apically, yellow to dark orange or red to brownish purple or pinkish (rarely cream or white), sometimes bicolored; disk flowers perfect, fertile, corollas yellow to reddish purple or reddish brown, hairy, sometimes enlarged and ray-like peripherally in eligulate heads; achenes obpyramidal to club-shaped, ± 4-angled, ± hairy; pappus of 7–12 lanceolate to obovate, usually awn-tipped scales.

•A genus of ca. 17 species native to North America, Mexico, and temperate South America; includes several cultivated ornamentals. (Named for M. Gaillard de Merentonneau (or Charentonneau), 18th century French magistrate and patron of botany) (tribe Heliantheae)

REFERENCES: Biddulph 1944; Turner & Whalen 1975; Heywood & Levin 1984; Strother 2006m; Marlowe & Hufford 2007; Turner & Watson 2007.

1. Leaves all ± basal, blades glabrous or very sparsely villous, lacking glands; ray flowers absent or with ligules inconspicuous, 10–15 mm long **G. suavis**
1. Leaves conspicuously extending up the stem, alternate, blades scabrellous to villous, usually gland-dotted; ray flowers usually present (sometimes absent), ligules often showy, 13–30+ mm long.
 2. Receptacles lacking bristles, or with bristles < 1 mm long; lobes of disk corollas attenuate and conical, bearing jointed hairs to 0.3 mm long **G. aestivalis**
 2. Receptacles usually with bristles 0.3–3 mm long; lobes of disk corollas ovate to deltate, sometimes attenuate, bearing jointed hairs 0.3+ mm long.
 3. Ray corolla ligules usually uniformly red to purple, rarely yellow; disk corolla lobes 0.5–1 mm long; achenes dimorphic, the peripheral ones longer than the central ones and with shorter, awnless pappus scales **G. amblyodon**
 3. Ray corolla ligules usually bicolored (brownish purple to reddish, tipped with yellow or orange); disk corolla lobes 1–3+ mm long; achenes all alike **G. pulchella**

Gaillardia aestivalis (Walter) H. Rock, (summer), PRAIRIE GAILLARDIA, EASTERN GAILLARDIA, LANCELEAF BLANKET-FLOWER, YELLOW INDIAN-BLANKET. Perennials (sometimes flowering first year), 10–60+ cm tall, sometimes rhizomatous; leaf blades usually closely scabrellous, margins remotely toothed or entire; receptacle bristles absent or to 0.5+ mm long; ray flowers with ligules 13–25 mm long, pinkish to maroon-purple or yellow (to rarely cream or white), or ligules sometimes absent; disk corolla lobes attenuate and terete, 1.5–3 mm long; achenes 1.5–2 mm long; pappus scales awned, 5–7 mm long. Sandy open woods, sandy and calcareous prairies, disturbed areas; mostly e 1/2 TX; also c TX and Panhandle; se and sc U.S. from NC s to FL and w to KS and TX. May–Oct. [*G. aestivalis* (Walter) H. Rock var. *austrotexana* B.L. Turner, *G. aestivalis* (Walter) H. Rock var. *flavovirens* (C. Mohr) Cronquist, *G. aestivalis* (Walter) H. Rock var. *winkleri* (Cory) B.L. Turner, *G. fastigiata* Greene, *G. lanceolata* Michx., *G. lutea* Greene] We are following Strother (2006m) in not recognizing the numerous and often intergrading varieties that are sometimes recognized in this species.

Gaillardia amblyodon J. Gay, (blunt-tipped), MAROON BLANKET-FLOWER, TEXAS GAILLARDIA. Annuals, 20–45+ cm tall; leaf blades scabrellous and/or ± villous, margins usually entire or obscurely toothed, rarely lobed; receptacle bristles 2.5–3 mm long; ray flowers with ligules 15–25 mm long, mostly bright red to dark maroon-purple, rarely yellow; disk corolla lobes ovate-deltate, 0.5–1 mm long; achenes 2–4+ mm long, dimorphic, the peripheral ones longer and with awnless pappus scales, the central ones shorter and with pappus scales awned, 5–6 mm long. Open areas, deep sandy soils; se and sc TX; s TX Plains. Apr–Jul. Strother (2006m) notes this species may not prove to be distinct from *G. pulchella*. *ET*

Gaillardia pulchella Foug., (handsome), INDIAN-BLANKET, FIRE-WHEELS, ROSE-RING GAILLARDIA. State wildflower of Oklahoma (Tyril et al. 1994). Annuals (sometimes persisting), 5–35(–60+) cm tall; leaf blades strigillose to ± villous, margins usually entire, sometimes toothed or lobed; receptacle bristles 1.5–3 mm long; ray flowers with ligules 13–30+ mm long, usually bicolored (brownish purple to reddish, tipped with yellow or orange), rarely yellow, reddish, or purplish throughout, or ligules sometimes absent; disk corolla lobes deltate to ovate, often attenuate, 1–3+ mm long; achenes 2–2.5 mm long; pappus scales awned, 4–7 mm long. Prairies, disturbed areas, sandy or calcareous soils; throughout TX; across much of North America but concentrated in se U.S., s plains, and desert sw; populations beyond these areas are likely adventive (Kartesz 2015); Mexico. Apr–Jul, sporadically in other seasons. [*G. drummondii* (Hook.) DC., *G. neomexicana* A. Nelson, *G. pulchella* Foug. var. *australis* Turner & M.A. Whalen, *G. pulchella* Foug. var. *picta* (D. Don) A. Gray] We are following Strother (2006m) in not recognizing the numerous and often intergrading varieties that are sometimes recognized in this species. *G. pulchella* is showy and often abundant on roadsides, and is one of the most common wildflowers in TX. This species continues to spread as it is often included in wildflower seed mixes and heavily utilized in highway beautification programs; cultivars of this species (and its hybrids) are popular garden plants.

Gaillardia suavis (A. Gray & Engelm.) Britton & Rusby, (sweet), RAYLESS GAILLARDIA, FRAGRANT GAILLARDIA, GLOBE-FLOWER, PERFUME-BALLS. Perennials (sometimes flowering first year), 20–80+ cm tall; leaf blades glabrous or very sparsely villous, margins pinnatifid to toothed or entire; receptacle bristles absent or to 0.5+ mm long; ray flowers absent, or with ligules 10–15 mm long, maroon-purple to red-orange; disk corolla lobes narrowly triangular, 1–1.2 mm long; achenes 2 mm long; pappus scales awned, 6–9 mm long. Sandy or rocky prairies, juniper scrub, roadsides; mostly w 2/3 of TX, also Jefferson Co.; KS and OK; Mexico. Apr–Jun, sporadically later. [*Agassizia suavis* A. Gray & Engelm., *G. odorata* Lindh. ex A. Gray]

GAMOCHAETA Weddell CUDWEED, EVERLASTING

Ours annual or biennial herbs, whitish to grayish with felty or woolly pubescence; leaves alternate, sessile, blades linear to oblanceolate or spatulate, often white- or gray-tomentose beneath, margins entire or sometimes sinuate; heads small, nearly sessile, clustered in small groups in the upper axils, in spicate or sometimes paniculate arrays; phyllaries in 3–7 series, brownish to tan or sometimes purplish-tinged, tips chartaceous to scarious; ray flowers absent; disk flowers of two kinds, those at the periphery pistillate and fertile, those in the center fewer and perfect, corollas all yellowish cream or with purplish lobes; achenes small, oblong, pubescent; pappus of minutely barbed bristles, deciduous as a ring.

☛ A genus of ca. 50 species native to the Americas; most are South American, with 12 in North America; several are weedy and naturalized in other parts of the world. *Gamochaeta* was previously included in *Gnaphalium*. (Greek: *gamos*, union, and *chaete*, bristle, in allusion to the basally connate pappus bristles that fall together as a ring) (tribe Inuleae)

REFERENCES: Nesom 1990a, 2006o, 2007b; Anderberg 1991.

1. Leaves bicolor (with upper surfaces greenish and glabrous or sparsely arachnose, and lower surfaces white or gray with dense pubescence); achenes 0.5–0.7 mm long.
 2. Upper leaf surfaces glabrous or glabrate; involucre 2.5–3 mm high, bases glabrous; outer phyllary tips rounded to obtuse; perfect flowers 2–3 **G. coarctata**
 2. Upper leaf surfaces sparsely arachnose (use 10x lens); involucre 3–4.5 mm high, bases sparsely arachnose; outer phyllary tips acute to acuminate; perfect flowers 3–6.
 3. Stem leaves oblanceolate to spatulate; involucre 4–4.5 mm high; inner phyllary tips acute (not apiculate); perfect flowers 3–4; achenes 0.6–0.7 mm long **G. purpurea**
 3. Stem leaves oblanceolate to oblanceolate-oblong or oblanceolate-obovate; involucre 3–3.5 mm high; inner phyllary tips truncate-rounded and apiculate; perfect flowers 4–5(–6); achenes 0.5–0.6 mm long **G. argyrinea**
1. Leaves concolor to weakly bicolor (with both surfaces green to grayish green), any pubescence not thick enough to obscure leaf surface; achenes 0.4–0.5 mm long.
 4. Lower stem leaves 4–16 mm wide; bracts among heads spatulate to oblanceolate, at least the lower ones extending beyond the clusters of heads **G. pennsylvanica**
 4. Lower stem leaves 2–9 mm wide; bracts among heads linear to oblanceolate, extending beyond clusters of heads or not.
 5. Involucre 2.5–3 mm high, usually purplish, bases sparsely arachnose; phyllaries in 3–4(–5) series, the outer ones 1/2–2/3 as long as the inner, tips narrowly to broadly acute **G. antillana**
 5. Involucre 3–3.5 mm high, brownish (not purplish), bases glabrous or nearly so; phyllaries in 5–7 series, the outer ones 1/3–1/2 as long as the inner, tips acute-acuminate **G. calviceps**

Gamochaeta antillana (Urb.) Anderb., (of the Antilles), DELICATE EVERLASTING, ANTILLES CUDWEED. Taprooted annuals, 6–40 cm tall; basal leaves withering before flowering; stem leaves 2–3(–5) mm wide, concolor (with both sides green to grayish green) and loosely tomentose; heads initially in uninterrupted, cylindrical, spicate arrays, becoming interrupted in late

flowering, arrays leafy-bracted throughout; involucre 2.5–3 mm high, bases sparsely arachnose; phyllaries often purple-tinged. Sandy roadsides, disturbed areas, pond banks; throughout e 1/2 TX; s TX; se U.S. from VA s to FL and w to OK and TX; South America; introduced elsewhere. (Feb–)Mar–May. [*G. subfalcata* (Cabrera) Cabrera, *Gnaphalium antillanum* Urban, *Gnaphalium subfalcatum* Cabrera] *G. antillana* and *G. calviceps* have been previously combined in concept and often misidentified as *G. falcata*, a South American species that has not been recorded from North America (Nesom 2006a).

Gamochaeta argyrynea G.L. Nesom, (silvery), SILVERY CUDWEED, SILVERY EVERLASTING. Fibrous-rooted annuals (rarely taprooted), 12–40 cm tall; basal leaves present through flowering; stem leaves 5–12(–18) mm wide, bicolor with upper surfaces greenish and sparsely arachnose and lower surfaces white-woolly, heads initially in uninterrupted, cylindric, spicate arrays, sometimes becoming interrupted in late flowering; involucre 3–3.5 mm high, bases sparsely arachnose; phyllaries tawny or purple-tinged. Sandy or clayey roadsides, disturbed areas, lawns; throughout e 1/2 TX; e and se U.S. from PA s to FL and w to KS and TX; also CA; West Indies. Mar–Jun(–Oct). *G. argyrynea* specimens have often been misidentified as *G. purpurea*.

Gamochaeta calviceps (Fernald) Cabrera, (bald-headed), NARROWLEAF PURPLE EVERLASTING, SILKY CUDWEED. Taprooted or fibrous-rooted annuals, 8–45(–55) cm tall; basal leaves usually withering before flowering; stem leaves 2–9 mm wide, commonly folded along midveins, concolor (with both sides green to grayish green) or weakly bicolor with appressed woolly hairs; heads initially in continuous or interrupted spicate arrays, becoming paniculate in late flowering; involucre 3–3.5 mm high, bases glabrous or nearly so; phyllaries brownish (not purple). Sandy or clayey roadsides, disturbed areas, fields; scattered in e and se TX; nc TX and Edwards Plateau; se U.S. from VA s to FL and w to OK and TX; also CA; South America; introduced elsewhere. Apr–Jun. [*Gnaphalium calviceps* Fernald]

Gamochaeta coerctata (Willd.) Kerguelen, (crowded), ELEGANT CUDWEED, GRAY EVERLASTING. Fibrous-rooted annuals or biennials, 15–35(–50) cm tall; basal leaves present in rosettes through flowering; stem leaves 6–15(–22) mm wide, bicolor with upper surfaces greenish and nearly glabrous and lower surfaces white-woolly, heads initially in uninterrupted, dense, spicate arrays, sometimes becoming interrupted and branched in late flowering; involucre 2.5–3 mm high, bases glabrous; phyllaries rosy or purple-tinged. Shady moist sites, sidewalk cracks, ditches; scattered in e and se TX; nc TX; se U.S. from VA s to FL and w to TX; also CA; Mexico, Central and South America, and West Indies; introduced elsewhere. Apr–Jun. [*G. spicata* Cabrera, *Gnaphalium coerctatum* Willd., *Gnaphalium spicatum* Lam.] Native of South America, now a widespread weed. *I*

Gamochaeta pensylvanica (Willd.) Cabrera, (of Pennsylvania), PENNSYLVANIA CUDWEED, PENNSYLVANIA EVERLASTING. Taprooted annuals, 10–50 cm tall; basal leaves usually present at flowering; stem leaves 4–16 mm wide, concolor (with both sides green to grayish green) or weakly bicolor and loosely tomentose; heads in continuous or interrupted spicate arrays; involucre 3–3.5 mm high, bases sparsely arachnose; phyllaries often purple-tinged. Shady sites, disturbed areas, moist sandy soils; throughout most of TX with the exception of Plains Country and Trans-Pecos; e and se U.S. from PA and OH s to FL and w to OK and TX; also CA; Mexico, Central and South America; introduced elsewhere. Mar–Jun. [*Gnaphalium pensylvanicum* Willd., *Gnaphalium peregrinum* Fernald, *Gnaphalium spathulatum* Lam.] Despite the epithet, a native of South America, now a widespread weed. *I*

Gamochaeta purpurea (L.) Cabrera, (purple), PURPLE CUDWEED, SPOON-LEAF EVERLASTING. Fibrous-rooted or taprooted annuals, 10–40(–50) cm tall; basal leaves usually withering before flowering; stem leaves 5–14 mm wide, bicolor with upper surfaces greenish and glabrate to sparsely arachnose and lower surfaces white-woolly, heads initially in uninterrupted spicate arrays, becoming interrupted in late flowering; involucre 4–4.5 mm high, bases sparsely arachnose; phyllaries purple-tinged in bud and whitish or silvery at maturity. Sandy roadsides, open woods, disturbed sites; scattered in e 1/2 TX; e and se U.S. from ME s to FL and w to NE and TX; also AZ; Canada; Mexico, Central and South America, and West Indies; introduced and weedy elsewhere. Mar–Jun. [*Gnaphalium purpureum* L.]

GRINDELIA Willd. GUMWEED, TARWEED, ROSINWEED, GUMPLANT

Ours annual, biennial, or perennial taprooted herbs, usually gland-dotted and/or resinous; leaves alternate, simple, the lower petiolate and the upper sessile and usually clasping, margins usually serrate to spiny-toothed, sometimes entire; heads borne singly or in corymbose to paniculate arrays; phyllaries in several series, subequal or unequal, filiform to linear or lanceolate, glabrous and resinous, the tips of outer phyllaries often recurved; ray flowers 12–45 (or sometimes absent), pistillate, fertile, corollas yellow to orange-yellow; disk flowers perfect, the peripheral fertile, the central sometimes sterile, corollas yellow; achenes glabrous, dimorphic in some species, ± compressed, sometimes 3–4-angled; pappus of scales, awns, or bristles in 1

series, or in *G. ciliata*, an outer series of bristles and an inner series of bristle-like awns or scales.

• A genus of ca. 30 species of w North America, Mexico, and South America; some are cultivated as ornamentals and others are used as medicinal herbs. We are following Nesom et al. (1993) and Strother & Wetter (2006) in including *G. ciliata* here, which had previously been separated in the monotypic genus *Prionopsis*; other authors continue to segregate it based on its persistent, 2-seriate pappus (Lane & Hartman 1996; Bartoli & Tortosa 2012). (Named for professor David Hieronymus Grindel, 1776–1836, Latvian botanist) (tribe Astereae)

REFERENCES: Steyermark 1934; Suh & Simpson 1990; Nesom 1990c, 1992a; Nesom et al. 1993; Strother & Wetter 2006; Bartoli & Tortosa 2012.

1. Stem leaves with margins serrate to dentate or denticulate, toothed from base to tip or sometimes teeth crowded toward the tips, teeth fine and sharp; or leaves sometimes entire.
 2. Pappus bristles 30+ per achene, united in a ring at base, \pm persistent but upon full maturity falling as a unit or in groups **G. ciliata**
 2. Pappus bristles, awns, or scales only 2 per achene, not united at base, falling off at the slightest touch..... **G. lanceolata**
1. Stem leaves with margins usually crenate to serrate, usually toothed from base to tip, teeth obtuse or blunt and usually resin-tipped; or rarely some or all leaves entire.
 3. Biennials or short lived perennials; upper stems glabrous; pappus 2.5–4.5 mm long, shorter than disk corollas **G. squarrosa**
 3. Annuals; upper stems villous to hirtellous, sometimes with stalked glands; pappus 3.5–6 mm long, equalling or surpassing disk corollas.
 4. Leaf blades with stalked glands (glands sometimes sessile, rarely in pits); achene faces rugose and transversely fissured..... **G. pusilla**
 4. Leaf blades with pitted glands (glands sometimes sessile, rarely stalked); achene faces smooth or slightly rugose (little if at all transversely fissured).
 5. Plants 30–130 cm tall; stem leaves 15–60(–90) mm long, marginal teeth 8–14 per cm; involucre 8–12 mm high and 10–20 mm wide; pappus 5–6 mm long **G. adenodonta**
 5. Plants 15–40 cm tall; stem leaves 10–30(–45+) mm long, marginal teeth 6–8 per cm; involucre 6–9 mm high and 8–13 mm wide; pappus 3.5–5 mm long **G. microcephala**

Grindelia adenodonta (Steyerm.) G.L. Nesom, (sticky-toothed), GLAND-TOOTH GUMWEED, PRAIRIE GUMWEED. Annuals, 30–130 cm tall; upper stems \pm hirtellous to villous; stem leaves triangular to oblong or obovate, usually scabrous to hirtellous, usually with pitted glands, margins crenate, teeth blunt and resin-tipped; heads usually subtended by leaf-like bracts; mature achenes 3–4.5 mm long, faces of peripheral achenes rugose (not transversely fissured), faces of central achenes striate; pappus of 2 bristles or awns, 5–6 mm long, equalling or surpassing disk corollas. Clay soils, prairies, along streams; Blackland and Gulf Coast prairies of se and s TX; nc TX. Jun–Sep. [*G. microcephala* DC. var. *adenodonta* Steyerm.] *ET*

Grindelia ciliata (Nutt.) Spreng., (for its many-bristled pappus), SAW-LEAF DAISY, GOLDENWEED, SPANISH GOLD, GIANT GUMWEED. Annuals or biennials, 20–150+ cm tall; upper stems glabrous, usually unbranched except near top; stem leaves oblong to obovate, glabrous, scarcely or not gland-dotted, margins dentate, teeth fine and sharp; mature achenes 2–4 mm long, faces smooth or striate; pappus of an outer series of 25–40 barbellate bristles 3–7+ mm long, and inner series of 8–15+ awns or bristle-like scales 7–10 mm long, the longer ones surpassing disk corollas. Disturbed areas, prairies, roadsides; widespread in TX; mostly c U.S. from MI s to LA and w to CA; also MD. Aug–Oct. [*G. papposa* G.L. Nesom & Suh, *Haplopappus ciliatus* (Nutt.) DC., and previously recognized in the monotypic genus *Prionopsis* (as *P. ciliata* (Nutt.) Nutt.)] Avoided by grazing livestock.

Grindelia lanceolata Nutt., (lance-shaped), GULF GUMWEED, NARROWLEAF GUMWEED. Biennials or perennials, 30–150 cm tall; upper stems glabrous; stem leaves triangular, ovate, or oblong to lanceolate or linear, usually glabrate, scarcely or not gland-dotted, margins serrate to dentate, teeth fine and sharp; mature achenes 2–6 mm long, faces smooth or striate; pappus of 2 awns, 4–8 mm long, equalling or slightly surpassing disk corollas. Calcareous and sandy soils, rocky prairies; se and e TX w to Rolling Plains and Edwards Plateau; scattered in ne U.S., mostly in sc U.S. from IL s to AL and w to CO and NM. Jun–Oct. [*G. littoralis* Steyerm., *G. texana* Scheele] If varieties are recognized following Bartoli and Tortosa (2012), ours would be var. **texana** (Scheele) Shimmers.

Grindelia microcephala DC., (small-headed), LITTLE-HEAD GUMWEED. Annuals, 15–40 cm tall; upper stems villous and/or with stalked glands; stem leaves oblong or spatulate, usually hirtellous, usually with pitted glands, margins crenulate, teeth blunt and resin-tipped; heads usually subtended by leaf-like bracts; mature achenes 3.5–4 mm long, faces rugose (not or only slightly transversely fissured); pappus of 2–3 bristles or awns, 3.5–5 mm long, equalling or slightly surpassing disk corollas. Bottomlands, thickets, near streams; Bexar and Comal cos. (Bartoli & Tortosa 2012); s TX Plains. (Nov–)Mar–Jun(–Aug). [*G. inuloides* Willd. var. *microcephala* (DC.) A. Gray] *G. adenodonta* and *G. pusilla*, previously considered varieties of *G. microcephala*, were elevated to species by Nesom et al. (1993).*ET*

Grindelia pusilla (Steierm.) G.L. Nesom, (small), LITTLE GUMWEED. Annuals, 30–70 cm tall; upper stems minutely villous, with stalked glands; stem leaves spatulate or oblong to lanceolate, usually hirtellous, usually with stalked glands, margins crenate, teeth blunt and resin-tipped; heads usually subtended by leaf-like bracts; mature achenes 2.5–4 mm long, faces rugose (transversely fissured); pappus of 2–3 awns, 4.5–5 mm long, equalling or surpassing disk corollas. Disturbed areas, dry open sites; Bexar Co., and an apparent disjunct record from Tarrant Co. (S.D. Lusk s.n. (BRIT); Bartoli & Tortosa 2012); s TX Plains; Mexico. Mar–Jun. [*G. microcephala* DC. var. *pusilla* Steierm.] *ET*

Grindelia squarrosa (Pursh) Dunal, (with parts spreading or recurved), CURLY-CUP GUMWEED, RAYLESS GUMWEED. Biennials or short-lived perennials, (10–)40–100 cm tall; upper stems glabrous; stem leaves ovate, oblong, spatulate, or oblanceolate to lanceolate or linear, glabrous, strongly gland-dotted, margins usually crenate to serrate, teeth blunt and resin-tipped; ray flowers sometimes lacking (rayless plants were formerly treated as *G. nuda*); mature achenes 1.5–4.5 mm long, faces smooth, striate, or furrowed; pappus of 2–3(–8) scales or awns, 2.5–4.5 mm long, shorter than disk corollas. Open or disturbed areas, roadsides, along streams; w 3/4 TX; nearly throughout North America, but mostly in the w 1/2, and perhaps adventive in e U.S.; Mexico; introduced in Asia. Aug–Oct. [*G. nuda* Alph. Wood, *G. nuda* Alph. Wood var. *aphanactis* (Rydb.) G.L. Nesom, *G. squarrosa* (Pursh) Dunal var. *nuda* (Alph. Wood) A. Gray] Used medicinally by Native Americans and in folk remedies; however, it contains the carcinogen, safrole (Duke 1985). *X*

GUTIERREZIA Lag. BROOMWEED, SNAKEWEED

Ours herbaceous annuals or perennial subshrubs, often resinous or glutinous; stems often much-branched; leaves alternate, sessile or petiolate and decurrent, linear to lanceolate or spatulate, glabrous or minutely pubescent, gland-dotted, margins entire, basal and lower stem leaves usually absent at flowering; heads borne in loose or dense panicate or corymbose arrays; phyllaries in 2–4 series, unequal, usually green-tipped; receptacles naked; ray flowers pistillate, fertile, corollas yellow; disk flowers perfect, fertile or functionally staminate, corollas yellow; achenes club-shaped or cylindrical, 5–8-nerved, hairy; pappus of a low crown, or of 5–10 irregular, often rough-margined, whitish scales, or pappus absent.

☛A genus of 28 species of w North America and South America. The species treated here have been variously placed in *Amphiachyris*, *Gutierrezia*, and *Xanthocephalum*. The molecular analysis by Suh and Simpson (1990) indicated *Amphiachyris* (with 2 species) and *Thurovia* (a monotypic genus) form a sister group to *Gutierrezia*, and supported these as separate genera. *X* Several species are toxic to grazing livestock due to saponins or unknown toxins (Kingsbury 1964; James & Welsh 1992); plant populations increase under overgrazing. (Possibly named for Pedro Gutierrez, a 19th century Spanish nobleman, *botanist*, and apothecary at the *Madrid Botanical Garden*) (tribe Astereae)

REFERENCES: Shinnars 1951b; Solbrig 1960, 1961; Ruffin 1974; Lane 1980, 1982, 1985; Suh & Simpson 1990; Nesom 1991d, 2006p.

1. Plants annual herbs; stems glabrous, typically branching from ca. the middle upwards; heads in loose arrays; involucre 2–3 mm wide; ray flowers 5–23; achenes loosely strigose; pappus a minute crown < 1 mm high, or sometimes absent.....**G. texana**
1. Plants perennial subshrubs; stems minutely hispid, usually branching from the base upwards; heads in dense, flat-topped corymbose arrays; involucre 1.5–2(–3) mm wide; ray flowers (2–)3–8; achenes densely silky-strigose; pappus of small scales.....**G. sarothrae**

Gutierrezia sarothrae (Pursh) Britton & Rusby, (thought by Pursh to resemble *Hypericum sarothra* Michx.), broom snakeweed, perennial broomweed, matchweed, matchbrush, kindling-weed, turpentine-weed, yerba de vibora, escoba de la vibora. Woody-based subshrubs, 10–60(–100) cm tall; stems minutely hispid; leaves linear to lanceolate; involucre 1.5–2(–3) mm wide; ray flowers usually 3–8, corollas 3–5.5 mm long; achenes 0.8–1.6(–2.2) mm long, densely silky-strigose; pappus of small scales. Grasslands, open or disturbed sites, rocky calcareous slopes; Dallas, Travis, Grimes, and Harris cos.; mostly w 1/2 TX; w 1/2 of U.S.; adventive in NY; Mexico. Jul–Nov. [*Xanthocephalum sarothrae* (Pursh) Shinnars, *X. tenue* (Greene) Shinnars] This species is an indicator of overgrazing; a number of common names refer to the highly flammable nature of the dried stems which were used historically in starting fires (Ajilvsgi 1984). This species causes toxicity to livestock, as in *G. microcephala*, due to saponins or unknown toxins (Kingsbury 1964; James & Welsh 1992). It is reported to contain a protein with antitumor activity (Mabberley 1997). *X*

Gutierrezia texana (DC.) Torr. & A. Gray var. **texana**, (of Texas), TEXAS BROOMWEED, TEXAS SNAKEWEED, KINDLING-WEED. Annual herbs, 10–80(–100) cm tall; stems glabrous; leaves linear; involucre 2–3 mm wide; ray flowers usually 5–23, corollas 3–6 mm long; achenes 1.3–1.8 mm long, loosely strigose; pappus a minute crown < 1 mm long, or sometimes absent. Disturbed habitats, rocky prairies, roadsides; se and sc TX; nc TX, Rolling Plains, Edwards Plateau, and s TX; AR, LA,

and OK; apparently adventive in several states farther e (Kartesz 2015); Mexico. Jul–Nov. [*Xanthocephalum texanum* (DC.) Shinnery]

Gutierrezia microcephala (DC.) A. Gray, (small-headed), SMALL-HEAD SNAKEWEED, THREAD-LEAF SNAKEWEED, which would have keyed to *G. sarothrae* here, can be distinguished by the small heads (1–1.5 mm wide) and reduced number of ray flowers (1–2) and disk flowers (1–2). Grasslands, chaparral, usually over limestone or gypsum; USDA NRCS (2016) shows this species occurring in McLennan Co. (a significantly disjunct locality) based on Hannick et al. (2013), but Kartesz (2015) indicates this is a false occurrence record, presumably based on a specimen of *G. sarothrae*, included here based on a record just to the sw of East TX in Medina Co.; s TX, Edwards Plateau, and Trans-Pecos; sw U.S. from TX and NM n to CO and w to CA; Mexico. Jul–Dec. [*G. sarothrae* (Pursh) Britton & Rusby var. *microcephala* (DC.) L.D. Benson, *Xanthocephalum microcephalum* (DC.) Shinnery] This species causes poisoning and abortion in sheep and cattle, apparently due to the presence of saponins; this has resulted in significant economic losses in w TX (Kingsbury 1964); symptoms include loss of appetite, drooping of the head, and hematuria (Burlage 1968). This species is an indicator of overgrazed range conditions (Powell 1988). *X*

Gutierrezia sphaerocephala A. Gray, (spherical-headed), ROUND-HEAD BROOMWEED, ROUND-HEAD SNAKEWEED, which would have keyed to *G. texana* here, can be distinguished by the papillate-scabrous stems, slightly larger involucre (2.5–5 mm wide), larger number of disk flowers (18–37 vs. 7–13 in *G. texana*), achenes that are densely silky-strigose on ribs, and larger pappus of scales (0.2–1 mm long). Disturbed habitats, grasslands, oak-pine-juniper woodlands; included here based on a record just to the sw of East TX in Medina Co.; s TX, Edwards Plateau, and Trans-Pecos to Panhandle; NM and AZ; Mexico. May–Dec. [*G. eriocarpa* A. Gray, *Xanthocephalum sphaerocephalum* (A. Gray) Shinnery]

GYMNOSPERMA Less.

♣A monotypic genus of sw North America, Mexico, and Central America; closely related to *Amphiachyris*, *Gutierrezia*, and *Thurovia*. (Greek: *gymnos*, naked, and *sperma*, seed, referring to the absence of pappus) (tribe Astereae)

REFERENCES: Solbrig 1960; Ruffin 1974; Lane 1982; Suh & Simpson 1990; Nesom 1991d, 2006q.

Gymnosperma glutinosum (Spreng.) Less., (glutinous, sticky) GUMHEAD, TATALENCHO, STICKY SELLOA. Heavily resinous shrubs, 50–100(–200) cm tall, glabrous; stems erect; leaves alternate, sessile, bases decurrent, linear to narrowly lanceolate or oblanceolate to elliptic, gland-dotted, margins entire; heads borne in terminal, compact corymbose arrays; involucre cylindrical, 1.5–2 mm wide; phyllaries in 2–4 series, unequal, mostly whitish and hardened; receptacles naked; ray flowers 4–9, pistillate, fertile, corollas yellow, 2–3 mm long; disk flowers perfect, fertile or functionally staminate, corollas orange-yellow; achenes columnar or spindle-shaped, 1–1.4 mm long, white-strigillose; pappus absent, or a minute crown < 0.1 mm high. Rocky slopes, streambeds, creosote and juniper scrublands; Travis and Bexar cos.; mostly Trans-Pecos, Edwards Plateau, and s TX; Mexico and Guatemala. May–Nov. [*Selloa glutinosa* Spreng., *Xanthocephalum glutinosum* (Spreng.) Shinnery] This species has a history of herbal usage in Mexico and is under investigation for potential antibacterial and antifungal qualities. It is infrequently grazed by livestock.

HEDYPNOIS Mill.

♣A genus of 2 species native from Macaronesia to Iran. (Greek name used by Pliny for a kind of wild endive) (tribe Laticuceae)

REFERENCES: Sell 1976; Strother 2006n.

Hedypnois cretica (L.) Dum.Cours., (of Crete), CRETANWEED. Taprooted annual, ± hairy; stems spreading and ascending, 10–30 cm long, sparingly branched; leaves alternate; basal leaves pinnately lobed, usually with winged petioles; stem leaves few, reduced, sessile; heads solitary at the branch tips; involucre ca. 10 mm high; inner phyllaries scabrous-hispid, after flowering becoming conspicuously curved and boat-shaped (with a very rounded keel); outer phyllaries < 1/2 as long as inner; inner phyllaries strongly incurved in fruit; flowers perfect, mostly fertile; corollas all ligulate, yellow, often tipped with reddish purple; achenes ca. 5–7.5 mm long, ± cylindrical, beakless, the peripheral achenes incurved; pappus of peripheral achenes a crown to 1 mm long, that of central achenes of short outer scales plus several bristle-like scales 2–5 mm long. Sandy or rocky soils, roadsides; scattered primarily se to sc TX; sw U.S. from TX to CA; introduced elsewhere. Mar–Apr. Native of Mediterranean region, Canary Islands. *I*

HELENIUM L. SNEEZEWEED, BITTERWEED

Annual or perennial herbs, glabrous or pubescent; stems often winged by decurrent leaf bases; leaves alternate, entire to deeply and finely lobed, resin-dotted; heads terminal, solitary or in corymbose or paniculate arrays; phyllaries usually in 2 series, gland-dotted, herbaceous, usually reflexed in fruit; heads globose or hemispheric to ovoid, usually radiate; receptacles naked; ray flowers pistillate and fertile or neuter, with ligules widened and 3-toothed apically, yellow to reddish brown or purplish, often reflexed; disk flowers perfect, fertile, corollas yellow to reddish brown or purplish; achenes obpyramidal, 4–5-angled; pappus of 5–12 scales, variously entire, lacerate, and/or elongated into an awn-like tip.

☛ An American genus of ca. 32 species including some cultivated ornamentals. *X* Most species are poisonous and unpalatable to grazing animals (Barkley 1986); some contain sesquiterpene lactones (e.g., helenalin) or glycosides (Blackwell 1990; Hardin & Brownie 1993). (Greek: *helenion*, the name of a similar plant that, according to Gerard (1597), “took the name *Helenium* of Helena [of Troy], wife of Menelaus, who had her hands full of it when Paris stole her away into Phrygia.”) (tribe Heliantheae)

REFERENCES: Rock 1957; Bierner 1972, 1989, 2006b; Stanford & Turner 1988.

1. Leaves or leaf segments linear to thread-like, usually < 2 mm wide, the bases not extending down the stem, the stems thus unwinged **H. amarum**
1. Leaves of various shapes but usually > 2 mm wide, not thread-like, the bases decurrent (= leaf tissue extending down the stem), the stems thus winged.
 2. Annuals with a taproot; pappus of entire scales, neither lacerate nor awn-tipped.
 3. Upper stem leaves linear, reduced, entire; heads peduncled, held well above the foliage; heads globose, as wide as high or wider; ligules 5.5–11.5 mm long **H. elegans**
 3. Upper stem leaves ovate to oblong to obovate, little reduced, often with at least a few teeth; heads short-peduncled, barely held above the foliage; heads ovoid, higher than wide; ligules 2.6–4.8 mm long **H. microcephalum**
 2. Perennials with fibrous roots from subrhizomatous base; pappus scales entire and awn-tipped, OR deeply lacerate and lacking awned tips.
 4. Ray flowers pistillate and fertile; plants of c and w TX, usually along and w of a line drawn from Dallas through Austin to San Antonio **H. autumnale**
 4. Ray flowers neuter (lacking stamens or stigmas) and sterile, or absent; plants of East TX, usually well e of a line drawn from Dallas through Austin to San Antonio.
 5. Disk corolla lobes usually dark reddish purple or maroon; pappus scales entire and awn-tipped **H. flexuosum**
 5. Disk corolla lobes usually yellow; pappus scales deeply lacerate and lacking awned tips **H. drummondii**

Helenium amarum (Raf.) H. Rock, (bitter). Weedy annuals 10–100 cm tall; stems unwinged; leaves all linear or filiform except for lowest which are sometimes pinnatifid (these sometimes withered before flowering time); heads 5–9 mm high; ray flowers 8–10, pistillate, ligules yellow, 4.5–14 mm long; disk corollas yellow with lobes yellow to yellow-brown or reddish brown to purple; achenes 0.7–1.3 mm long; pappus of 6–8 entire, awn-tipped scales. Open woods, fields, pastures, and disturbed areas. The two varieties are both found in East TX and may intergrade.

1. Lower and basal leaves typically withered at flowering time; basal leaves entire to toothed to occasionally pinnatifid; disk corollas yellow with lobes yellow to yellow-brown var. **amarum**
1. Lower and basal leaves often present at flowering time; basal leaves pinnatifid; disk corollas yellow with lobes reddish brown to purple var. **badium**

var. **amarum**, BITTERWEED, SNEEZEWEED. Most common in e 1/2 TX, w to Rolling Plains and Edwards Plateau; e 1/2 U.S., adventive in CA and some eastern states. May–Nov. [*H. tenuifolium* Nutt.] The foliage is extremely bitter, largely avoided by livestock, and thus plants increase under conditions of overgrazing; conspicuously dominant on abused pastures. All parts of the plant contain the glycoside dugaldin and cause toxic symptoms in animals; cows that have eaten even small amounts of the plant produce extremely bitter milk; honey made from the flowers is also reportedly bitter (Correll & Johnston 1970; Stephens 1980; Ajilvsgi 1984). *X*

var. **badium** (A. Gray ex S. Watson) Waterfall, (reddish brown), BASIN SNEEZEWEED. Similar to variety *amarum* except for the characters in the key. W border of East TX from Dallas and Grayson cos. sw to Bastrop, Comal, and Travis cos., also apparently Brazos Co.; mostly w 1/2 of TX; OK and NM; Mexico. Apr–Jul, sporadically to Oct. [*H. badium* (A. Gray) Greene, *H. tenuifolium* Nutt. var. *badium* A. Gray ex S. Watson]

Helenium autumnale L., (of autumn), COMMON SNEEZEWEED, TALL SNEEZEWEED, STAGGERWORT, SWAMP-SUNFLOWER. Perennials 50–130 cm tall; stems strongly winged; leaves obovate to lanceolate, margins dentate or entire, lower leaves usually withered before flowering time; heads 8–20 mm high; ray flowers 8–21, pistillate, ligules yellow, 10–23 mm long; disk corollas yellow with lobes yellow to yellow-brown; achenes 1–2 mm long; pappus of 5–7 entire, awn-tipped scales. Low, moist, calcareous

soils, ditches, streambanks; sw border of East TX in Bell, Hays, Gonzales, and Travis cos.; Rolling Plains and Edwards Plateau; across North America. Aug–Oct. [*H. latifolium* Mill., *H. parviflorum* Nutt., *H. autumnale* L. var. *canaliculatum* (Lam.) Torr. & A. Gray] Poisonous to cattle and sheep; it is reported to cause “spewing sickness” with symptoms including weakness, depression, vomiting, excessive salivation, frothing, irregular pulse, and kidney and liver damage (Burlage 1968). *X*

Helenium drummondii H. Rock, (for Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), FRINGED SNEEZEWEED, DRUMMOND’S SNEEZEWEED. Perennials 20–60 cm tall; stems moderately to strongly winged; leaves lanceolate to lance-linear, margins entire; heads 10–18 mm high; ray flowers 13–30, neuter, ligules yellow, 14–25 mm long; disk corollas yellow; achenes 1.2–1.5 mm long; pappus of 5–12 deeply-lacerate scales, without awned tips. Low woods, ditches, bogs; deep se TX; LA. Apr–May. [*H. fimbriatum* auct. non (Michx.) Eaton]

Helenium elegans DC. var. ***elegans***, (elegant). PRETTY SNEEZEWEED. Annuals 20–120 cm tall; stems moderately to strongly winged; leaves lanceolate to narrowly elliptic to linear, margins usually entire; heads 5–8 mm high; ray flowers 10–14, pistillate, ligules yellow throughout or reddish brown at the base and yellow at the tips, 5.5–11.5 mm long; disk corollas yellow with lobes yellow to yellow-brown or reddish brown; achenes 0.6–0.9 mm long; pappus of 6–7 entire scales, without awned tips. Gravelly stream bottoms or seepy slopes on limestone; w and sw border of East TX, from Grayson and Dallas cos. s to Bexar Co. and e to Gonzales Co.; mostly Edwards Plateau and Cross Timbers; AR and OK. May–Aug.

Helenium flexuosum Raf., (flexuous), PURPLE-HEAD SNEEZEWEED. Perennials 30–100 cm tall; stems strongly winged; leaves oblanceolate to lance-linear, margins toothed or entire; heads 8–17 mm high; ray flowers 8–13 and neuter or sometimes 0, ligules yellow to reddish brown to maroon, 10–20 mm long; disk corollas purple or yellow with lobes purple; achenes 1–1.2 mm long; pappus of 5–6 entire, awn-tipped scales. Ditches, fields, along streams; e 1/4 TX; e 1/2 North America. May–Jul, sporadically all year. [*H. nudiflorum* Nutt.]

Helenium microcephalum DC. var. ***microcephalum***, (small-headed), SMALL-HEAD SNEEZEWEED, SMALL SNEEZEWEED. Annuals 30–120 cm tall; stems moderately to strongly winged; leaves narrowly elliptic to narrowly oblong-elliptic, margins serrate to undulate, lower leaves usually withered before flowering time; heads 4–8 mm high; ray flowers 7–13, pistillate, ligules usually yellow throughout, sometimes reddish at the bases, 2.6–4.8 mm long; disk corollas yellow to yellow-green with lobes reddish brown; achenes 0.7–1.4 mm long; pappus of 6 entire scales, without awned tips. Moist sandy or calcareous soils, dried-up ponds, ditches; w 3/4 TX; OK, CO, NM, and AZ; Mexico. Jun–Nov.

Helenium vernale Walt., (spring), SAVANNAH SNEEZEWEED, SPRING SNEEZEWEED, which would have keyed to *H. drummondii* here, can be distinguished by the perennial habit, weakly-winged stems, and pappus of 8 entire or lacerate scales without awned tips. To be expected in se TX based on records from adjacent parishes in LA (Calcasieu, Cameron, and Vernon pars.); se U.S. from NC s to FL and w to LA. Mar–May.

HELIANTHUS L. SUNFLOWER

Herbaceous annuals or perennials, to 3+ m tall; leaves sessile or petioled, alternate, opposite, or opposite below and alternate above, simple; heads relatively large, sessile or peduncled, borne singly or in various arrays; phyllaries in 2–3+ series, subequal to unequal, herbaceous; receptacles with persistent chaff (= pales); ray flowers neuter (not producing mature achenes), the corollas yellow; disk flowers perfect, fertile, the corolla lobes reddish purple or yellow; achenes obpyramidal, somewhat compressed laterally, often striped or mottled; pappus readily falling, of 2(–3) awn-like scales, plus 0–8 shorter scales.

•A North American genus of 52 species, including the widely-cultivated SUNFLOWER, *H. annuus*. Species identification is often difficult; taxonomic confusion in *Helianthus* can be blamed on notorious developmental and ecological plasticity, frequent interspecific hybridization, and polyploidy (Schilling 2006a). Collection of the entire plant, including below-ground parts, is recommended. While many putative or proven hybrids exist, there are little data on their distribution; notes on hybrids follow treatments of the species involved in the crosses. Some species of *Helianthus* could be confused with *Silphium*, however, in *Silphium* only the ray flowers produce mature achenes, which have thin, papery edges, while in *Helianthus* only the disk flowers produce mature achenes, and these are not thin-edged. (Greek: *helios*, the sun, and *anthos*, flower, presumably in reference to the turning of the inflorescences towards the sun) (tribe Heliantheae)

REFERENCES: Heiser 1954; R. Jackson 1963; Heiser et al. 1969; Rogers et al. 1982; Sims & Price 1985; Chandler et al. 1986; Rieseberg 1991; Schilling 2006a.

1. Annuals or short-lived perennials from taproots.
 2. Larger leaf blades 10–40 cm wide; phyllaries ovate to lance-ovate, the larger ones usually 5–8 mm wide, the tips abruptly narrowed; pales 9–11 mm long.
 3. Stems, leaves, and phyllaries usually green and hispid; leaf margins usually serrate; phyllaries usually with ciliate margins **H. annuus**
 3. Stems, leaves, and phyllaries white-silvery with dense cottony or silky pubescence; leaf margins usually entire, sometimes serrulate; phyllaries usually not marginally ciliate..... **H. argophyllus**
2. Larger leaf blades usually < 12 cm wide; phyllaries usually lanceolate to lance-ovate, the larger ones usually < 5 mm wide, the tips gradually narrowed; pales < 8 mm long.
 4. Leaves mostly opposite, petioles 5–9 cm long, blades sometimes constricted near the middle **H. praecox**
 4. Leaves mostly alternate, petioles 1–7 cm long, blades usually not constricted near the middle.
 5. Peduncles 20–50 cm long; pales 7.5–8 mm long; achenes 2.5–3.2 mm long, glabrous or sparsely hairy; plants of e, sc, and s TX **H. debilis**
 5. Peduncles 4–15(–40) cm long; pales 4.5–7.5 mm long; achenes 3–4.5 mm long, ± villous; plants of nc, nw, and w TX **H. petiolaris**
1. Perennials from crown buds or rhizomes.
 6. Plants 40–70 cm tall, with slender rhizomes or creeping roots, forming colonies; stems glabrous; stems and leaves blue-green glaucous; leaves almost all opposite, sessile, margins usually ciliate and undulate; ray ligules < 10 mm long **H. ciliaris**
 6. Plants usually much taller, and without the above combination of characters.
 7. Stems glabrous or glabrate, at least below the inflorescence arrays, sometimes also glaucous.
 8. Leaves sessile or subsessile, blades linear to lance-linear, 0.2–1.2 cm wide; disk corolla lobes reddish; longest pappus scales 3–3.6 mm long..... **H. salicifolius**
 8. Leaves with petioles 1+ cm long, blades lanceolate to lance-ovate or ovate, 1.2–10 cm wide; disk corolla lobes yellow; longest pappus scales 1–2.5 mm long.
 9. Pales 7–8 mm long; phyllaries 10–14 mm long, tips attenuate; ray ligules 23–40 mm long; achenes 3–4 mm long **H. grosseserratus**
 9. Pales 5.3–6.5 mm long; phyllaries 5.5–10 mm long, tips acute to acuminate; ray ligules 12–20(–30) mm long, achenes 4–5.5 mm long **H. strumosus**
 7. Stems pubescent ± throughout (scabrous, strigose, pilose, hispid, or villous), rarely glaucous.
 10. Lower stem leaves or basal leaves (if present) with petioles 2–10 cm long.
 11. Leaves mostly basal, greatly reduced up the stem, the few stem leaves opposite; petioles unwinged; pales 5–7 mm long; phyllaries not gland-dotted; achenes 3–4(–5) mm long **H. occidentalis**
 11. Leaves evenly distributed up the stem, not much reduced in size, upper leaves alternate; petioles often winged; pales 8–9 mm long; phyllaries gland-dotted; achenes 5–7 mm long..... **H. tuberosus**
 10. Lower stem leaves or basal leaves (if present) sessile or short-petiolate, any petioles < 2 cm long.
 12. Leaves narrowly lanceolate to linear, margins entire or subentire, revolute (sometimes strongly so); pales 5.5–6.5 mm long; achenes 2–3 mm long; longest pappus scales < 2.5 mm long.
 13. Plants 50–150+ cm tall, rhizomes absent or poorly-developed; leaves sessile or subsessile, blades 0.15–0.5(–1) cm wide; phyllaries 4–9 mm long; ray ligules 10–20 mm long **H. angustifolius**
 13. Plants 150–260 cm tall, rhizomes well-developed; leaves with petioles 0.5–1 cm long, blades 0.7–4 cm wide; phyllaries 6–17 mm long; ray ligules 16–40 mm long **H. simulans**
 12. Leaves broadly lanceolate to lance-ovate or oblong-lanceolate, margins entire or serrulate to serrate, flat (not revolute); pales 7–11 mm long; achenes 3–4.5 mm long; longest pappus scales > 2.5 mm long.
 14. Leaves all or mostly opposite, sessile, velvety hispid-tomentose, gray-green, bases mostly cordate-clasping; achenes villous..... **H. mollis**
 14. Leaves opposite or alternate, sessile or short-petiolate, scabrous to hispid (but not velvety), gray-green or green, bases cuneate to rounded or truncate (not cordate-clasping); achenes glabrate to puberulent.
 15. Lower leaf surfaces sparsely, if at all, gland-dotted; phyllaries ovate; disk corolla lobes usually reddish, sometimes yellow; achenes 5–6 mm long; longest pappus scales 4.5–5 mm long **H. pauciflorus**
 15. Lower leaf surfaces gland-dotted; phyllaries lanceolate; disk corolla lobes yellow; achenes 3–4.5 mm long; longest pappus scales 2.8–4.1 mm long.
 16. Stems hirsute; leaves 3-nerved from the base, usually not folded lengthwise; heads usually 3–15 per main stem, in racemose or spicate arrays; phyllaries not gland-dotted; ray ligules 15–20 mm long..... **H. hirsutus**
 16. Stems scabrous-hispid; leaves 1-nerved from the base, often folded lengthwise; heads 1–7 per main stem, in cymose or paniculate arrays; phyllaries gland-dotted; ray ligules (15–)25–40 mm long..... **H. maximiliani**

Helianthus angustifolius L., (narrow-leaved), SWAMP SUNFLOWER. Perennials from crown buds, rhizomes absent or poorly-developed; stems usually ± hairy; leaves opposite or alternate, sessile or subsessile, blades narrowly lanceolate to linear, 3-nerved from near the base, strigose to hispid or hirsute beneath, bases cuneate, margins entire and usually strongly revolute; involucre 10–20 mm wide; phyllaries loose, lanceolate, usually gland-dotted, scabrous or rarely glabrous, tips acute to slightly acuminate; ray flowers 10–20, ligules 10–20 mm long; disk corolla lobes yellow; achenes 2–3 mm long, glabrate. Open to shaded, usually moist places; widespread in e 1/3 TX; e and se U.S. from NY s to FL and w to IL, OK, and TX. Jul–Oct. [*H. angustifolius* L. var. *planifolius* Fernald]

Helianthus annuus L., (annual), COMMON SUNFLOWER, MIRASOL. Annuals, extremely variable in size; stems usually hispid; leaves mostly alternate, petiolate, blades ovate to lance-ovate, usually hispid beneath, bases cuneate to cordate, margins serrate; involucre 15–40(–200+) mm wide; phyllaries ovate to lance-ovate, usually gland-dotted, hirsute to hispid or rarely glabrous, margins usually ciliate, tips long-acuminate; ray flowers (13–)17–30 (to 100+ in cultivars), ligules 25–50 mm long (in colors other than yellow in some planted or escaped cultivars); disk corolla lobes usually reddish, sometimes yellow; achenes (3–)4–5 mm long (to 15 mm long in cultivars), glabrate. Open areas, fencerows, disturbed areas; throughout TX; throughout North America but introduced and adventive in most e states; Mexico; introduced nearly worldwide. Apr–Oct. [*H. aridus* Rydb., *H. annuus* subsp. *lenticularis* (Douglas ex Lindl.) Cockerell, *H. annuus* subsp. *texanus* Heiser, *H. jaegeri* Heiser] The cultivated SUNFLOWER, widely grown for the seeds, for oil, and as an ornamental, is derived from *H. annuus*; it is one of the world's most important oil crops (Mabberley 1987; Rieseberg & Seiler 1990). Achenes of *H. annuus* were gathered as food by Native Americans of the w U.S. (Heiser 1951) and the species was being cultivated in parts of North America when Europeans arrived (Heiser 1993); it is one of the few agricultural crops to originate in North America north of Mexico (Nabhan 1979). *H. annuus* forms hybrids with other annual *Helianthus* species. Because it easily invades annual crop fields, it is considered a noxious weed in a few states.

Helianthus argophyllus Torr. & A. Gray, (silvery-leaved), SILVERLEAF SUNFLOWER. Annuals; stems usually tomentose or cottony, appearing silvery-white; leaves mostly alternate, petiolate, blades ovate to lance-ovate, often silvery, cottony or silky pubescent beneath, bases truncate to subcordate, margins entire or serrulate; involucre 20–30 mm wide; phyllaries ovate to lance-ovate, gland-dotted, usually densely white-villous, tips long-attenuate; ray flowers 15–20, ligules 20–30 mm long; disk corolla lobes reddish; achenes 4–6 mm long, glabrate. Sandy soils, open areas; sc TX in Dewitt, Goliad, Gonzales, Guadalupe, Jackson, and Wilson cos.; also introduced and spreading in Harris Co. (Brown 2014); Gulf Coast and s TX; introduced and adventive in NC and FL; introduced in South America, Africa, and Australia. Jun–Oct. Hybridizes with *H. annuus*.

Helianthus ciliaris DC., (ciliate, fringed with hairs), BLUE-WEED SUNFLOWER, BLUEWEED, TEXAS BLUEWEED. Perennials from rhizomes or creeping roots, often forming extensive colonies; stems glabrous or glabrate, glaucous; leaves mostly opposite, sessile, blades linear to lanceolate, 1- or 3-nerved, often bluish green, glabrous to hispid, bases ± cuneate, margins entire or toothed/lobed, usually ciliate and undulate; involucre 12–25 mm wide; phyllaries ovate to lance-ovate, not gland-dotted, glabrate to strigose, margins ciliate, tips obtuse to acute; ray flowers 10–18, ligules 8–9 mm long; disk corolla lobes reddish; achenes 3–3.5 mm long, glabrous. Sandy or sandy clay soils, cultivated fields, drainage areas; Denton Co.; w 2/3 of TX, sw U.S. from KS s to TX and w to WA and CA; Mexico. Jun–Oct. Spreads aggressively in cultivated fields and considered a noxious weed in some states.

Helianthus debilis Nutt., (weak, frail), WEAK SUNFLOWER, BEACH SUNFLOWER. Annuals or perennials from taproots; stems glabrate to hispid; leaves mostly alternate, petiolate, blades deltate-ovate or lance-ovate to ovate, glabrate to hispid beneath, bases cordate to truncate or broadly cuneate, margins usually serrate; involucre 16–20 mm wide; phyllaries lanceolate, not gland-dotted, glabrous to hispid, tips acute to long-attenuate; ray flowers 11–20, ligules 15–30 mm long; disk corolla lobes usually reddish, sometimes yellow; achenes 2.5–3.2 mm long, glabrous or sparsely hairy. Schilling (2006a) described the two intergrading subspecies in East TX, either of which may hybridize with *H. annuus*:

1. Leaves 4–9 cm long; peduncles to 50 cm long, not notably slender; involucre 16–18(–20) mm wide.....subsp. **cucumerifolius**
1. Leaves (6–)8–14 cm long; peduncles to 40 cm long, relatively slender; involucre 14–15(–16) mm wide.....subsp. **silvestris**

subsp. **cucumerifolius** (Torr. & A. Gray) Heiser, (with leaves like *Cucumis*—cucumber), CUCUMBER-LEAF SUNFLOWER. Open areas, sandy soils; McLennan Co. and sc TX; s TX Plains and Gulf Coast; also scattered records in se TX; native to se U.S. from FL to TX; adventive in e coast states from ME to GA, and also MI. Apr–Aug. [*H. debilis* Nutt. var. *cucumerifolius* (Torr. & A. Gray) A. Gray, *H. cucumerifolius* Torr. & A. Gray]

subsp. **silvestris** Heiser, (of the forest), FOREST SUNFLOWER. Sandy soils, pine and oak woods; e, se, and sc TX; Jun–Nov. *EET*

Helianthus grosseserratus M. Martens, (large-toothed), SAWTOOTH SUNFLOWER. Rhizomatous perennials; stems glabrous below and glabrate to strigillose above, glaucous; leaves mostly alternate (often opposite on lower stem), petiolate, blades lanceolate to lance-ovate, 3-nerved from above the base, puberulent to tomentose beneath, bases cuneate, margins usually coarsely to shallowly serrate; involucre 15–25 mm wide; phyllaries loose, spreading, lance-linear, not gland-dotted, glabrous or puberulent, margins ± ciliate, tips attenuate; ray flowers 14–20, ligules 23–40 mm long; disk corolla lobes

yellow; achenes 3–4 mm long, glabrate. Wooded stream bottoms, persistently wet areas; nc and ne TX, sc TX to Edwards Plateau; Panhandle; native to c U.S. from OH w to ND and s to TX; adventive in e and se U.S. and also WA; Canada. Aug–Oct. [*H. instabilis* E.E. Watson] Hybrids with *H. maximiliani* are known as *H. × intermedius* R.W. Long; hybrids with *H. mollis* are known as *H. × brevifolius* E.E. Watson.

Helianthus hirsutus Raf., (hairy), HAIRY SUNFLOWER, STIFF-HAIR SUNFLOWER. Rhizomatous perennials; stems hirsute; leaves mostly opposite, short-petiolate, blades lanceolate to ovate, 3-nerved from the base, hirsute beneath, bases truncate or broadly rounded to cuneate, margins subentire to serrate, flat (not revolute); involucre 10–25 mm wide; phyllaries loose, spreading, lanceolate, not gland-dotted, margins ciliate, tips acute to short-acuminate; ray flowers 10–15, ligules 15–20 mm long; disk corolla lobes yellow; achenes 4–4.5 mm long, glabrate or puberulent. Sandy open woods, forest margins, roadsides; se and e TX; nc TX to Edwards Plateau; e 1/2 U.S.; Canada. Jul–Oct. [*H. hirsutus* Raf. var. *trachyphyllus* Torr. & A. Gray, *H. stenophyllus* (Torr. & A. Gray) E.E. Watson]

Helianthus maximiliani Schrad., (for its discoverer, Prince Maximilian von Wied-Neuwied (1782–1867), German botanist and traveler in Brazil and North America), MAXIMILIAN SUNFLOWER, MICHAELMAS DAISY. Rhizomatous perennials, sometimes forming extensive colonies; stems scabrous to minutely hispid; leaves mostly alternate, sessile or short-petiolate, blades lanceolate, 1-nerved and often folded lengthwise (sickle-shaped), light green to gray-green, scabrous to hispid, bases cuneate, margins usually entire or sometimes serrulate; involucre 13–28 mm wide; phyllaries lanceolate, gland-dotted, gray-pubescent, margins ciliate, tips acute to attenuate; ray flowers 10–25, ligules (15–)25–40 mm long; disk corolla lobes yellow; achenes 3–4 mm long, glabrate. Low moist areas, roadsides, prairies; widespread in TX; native to c U.S. Great Plains; adventive farther e and w; Canada and Mexico. Sep–Oct. [*H. dalyi* Britton] Gaining popularity in horticulture despite its tendency to spread aggressively if given any encouragement. Hybrids with *H. grosseserratus* are known as *H. × intermedius* R.W. Long.

Helianthus mollis Lam., (softly hairy), ASHY SUNFLOWER, HAIRY SUNFLOWER, DOWNY SUNFLOWER. Rhizomatous perennials; stems hirsute to villous; leaves mostly opposite (sometimes alternate among heads), sessile, blades lanceolate to broadly ovate, 3-nerved from above the base, grayish green, hispid to tomentose beneath, bases cordate-clasping, margins entire or serrulate; involucre 12–25 mm wide; phyllaries lanceolate, densely gland-dotted, densely hispid to tomentose, tips usually acute or sometimes acuminate; ray flowers 17–22, ligules 25–30 mm long; disk corolla lobes yellow; achenes 3.5–4 mm long, villous on the upper portion. Sandy soils, roadsides, prairies; e, se, and sc TX to nc TX; native to e and c U.S. from OH s to AL and w to WI, SD, and TX; adventive farther e; Canada. Jul–Sep. [*H. mollis* Lam. var. *cordatus* S. Watson] Hybrids with *H. grosseserratus* are known as *H. × brevifolius* E.E. Watson.

Helianthus occidentalis Riddell subsp. **plantagineus** (Torr. & A. Gray) Shinnars, (sp.: western; subsp.: resembling *Plantago*—plantain), SHINNERS'S SUNFLOWER, WESTERN SUNFLOWER, FEW-LEAF SUNFLOWER. Rhizomatous perennials, sometimes stoloniferous as well; stems pilose to appressed-hairy, often reddish; leaves mostly basal, opposite, petiolate, blades oblong-lanceolate or elliptic to ovate, strigose or glabrous, bases cuneate, margins usually serrate; involucre 9–14 mm wide; phyllaries lanceolate, not gland-dotted, glabrate to sparsely pilose, margins usually ciliate, tips acute to short-acuminate; ray flowers 8–14, ligules 18–22 mm long; disk corolla lobes yellow; achenes 3–4 (–5) mm long, glabrate or sparsely villous. Dry open areas, fields; mostly sc TX, e to Harris Co. (Brown 2014), also Newton and Wood cos.; s TX; AR and LA. Jul–Sep. [*H. occidentalis* Riddell var. *plantagineus* Torr. & A. Gray] Potentially of conservation concern for its somewhat restricted range (Poole et al. 2010). *!*

Helianthus pauciflorus Nutt. subsp. **pauciflorus**, (few-flowered), STIFF SUNFLOWER. Rhizomatous perennials; stems scabrous-hispid; leaves mostly basal, leaves opposite on lower stem, alternate above, sessile or short-petiolate, blades oblong-lanceolate to lance-ovate, sparsely hispid beneath, bases cuneate, margins serrate to subentire; involucre 15–23 mm wide; phyllaries ovate, glabrate to hispid, margins ciliate, tips acute; ray flowers 10–20, ligules 20–35 mm long; disk corolla lobes usually reddish, sometimes yellow; achenes 5–6 mm long, glabrate. Prairies, open woods, sandy soils; Hunt and Lamar cos. and Harris Co. (Brown 2014); nc TX and disjunct records on se TX Gulf Coast; native to c U.S. from MI s to AR and w to MT, SD, and TX; introduced and adventive in a few e states; Canada. Aug–Oct. [*H. laetiflorus* Pers. var. *rigidus* (Cass.) Fernald; *H. rigidus* (Cass.) Desf.] Hybrids with *H. tuberosus* are known as *H. × laetiflorus* Pers., which is frequently cultivated.

Helianthus petiolaris Nutt. subsp. **petiolaris**, (with a petiole or leaf stalk), PLAINS SUNFLOWER, PRAIRIE SUNFLOWER. Annuals; stems hispid to strigose, rarely hirsute or glabrate; leaves mostly alternate, petiolate, blades lanceolate to deltate-ovate, often bluish green, strigose beneath, bases subcordate or truncate to cuneate, margins entire or serrate; involucre 10–24 mm

wide; phyllaries lance-linear to lance-ovate, glabrate or minutely hispid to sparsely hirsute, margins sometimes ciliate, tips short-attenuate; ray flowers 10–30, ligules 15–20 mm long; disk corolla lobes usually reddish, rarely yellow; achenes 3–4.5 mm long, ± villous. Sandy or rocky prairies; Dallas and McLennan cos. and Denton Co. (Kartesz 2015); s and w to w TX; native to c U.S. Great Plains; adventive further e and w; Canada. May–Oct. [*H. couplandii* B. Boivin] Known to hybridize with *H. annuus* and *H. debilis*.

Helianthus praecox Engelm. & A. Gray, (early or precocious, for the flowering time), TEXAS SUNFLOWER. Annuals; stems hispid to hirsute; leaves mostly opposite, petiolate, blades deltate to ovate, sometimes constricted near middles, hirsute to hispid beneath, bases cordate to truncate or cuneate, margins serrate to serrulate; involucre 13–18 mm wide; phyllaries lanceolate, minutely hispid to hirsute, tips short-attenuate or short-acuminate; ray flowers 11–15, ligules 16–26 mm long; disk corolla lobes reddish; achenes 2.5–3.3 mm long, ± villous. Jun–Nov. Schilling (2006a) described the two subspecies potentially in East TX:

1. Branches horizontal; leaves sometimes constricted near middles; phyllary tips short-acuminate; middle teeth of pales puberulent; ray flowers 14–15; plants of the se TX Gulf Coast..... subsp. **praecox**
1. Branches erect; leaves usually not constricted near middles; phyllary tips short-attenuate; middle teeth of pales white-villous-bearded; ray flowers 11–13(–14); plants of sc TX Gulf Coast and s TX subsp. **runyonii**

subsp. **praecox**. Deep sands, coastal dunes; Jefferson Co. (Kartesz 2015); se TX coast in Brazoria, Chambers, and Galveston cos. [*H. debilis* Nutt. subsp. *praecox* (Engelm. & A. Gray) Heiser] Potentially of conservation concern due to its restricted range (Schilling 2006a). *ET* *!*

subsp. **runyonii** (Heiser) Heiser, (for Robert Runyon (1881–1968), photographer, botanist, and mayor of Brownsville, TX), RUNYON'S SUNFLOWER. Coastal prairies, sandy plains; *not yet recorded in East TX, but potentially in sc TX based on records from several cos. just sw of our area in Atacosa, Bee, and Refugio cos.*; s TX. [*H. debilis* Nutt. subsp. *runyonii* Heiser, *H. praecox* Engelm. & A. Gray var. *runyonii* (Heiser) B.L. Turner] *ET*

Helianthus salicifolius A. Dietr., (with leaves like *Salix*—willow), WILLOW-LEAF SUNFLOWER. Rhizomatous perennials; stems glabrous, glaucous; leaves alternate, sessile or subsessile, blades linear to lance-linear, glabrate beneath, bases ± attenuate, margins serrulate to subentire, flat (not revolute); involucre 10–18 mm wide; phyllaries linear to lance-linear, not gland-dotted, glabrous or glabrate, margins ciliate, tips long-attenuate; ray flowers 10–20, ligules 28–35 mm long; disk corolla lobes reddish; achenes 4–6 mm long, glabrous. Calcareous soils, prairies; Dallas, Grayson, and Hill cos.; ne TX; KS, OK, and MO; introduced and adventive in some ne states. Aug–Sep. [*H. filiformis* Small] Sometimes cultivated and occasionally escaping.

Helianthus simulans E.E. Watson, (resembling), MUCK SUNFLOWER. Rhizomatous perennials; stems strigose to hirsute; leaves opposite or alternate, short-petiolate, blades linear-lanceolate to lanceolate, 3-nerved from above the base, minutely hispid-tomentose beneath, bases cuneate, margins entire or subentire, usually slightly revolute; involucre 13–18 mm wide; phyllaries loose, linear to lanceolate, gland-dotted, glabrate to sparsely strigose, tips acuminate; ray flowers 12–23, ligules 16–40 mm long; disk corolla lobes yellow or reddish; achenes 2.5–3 mm long, glabrous. Wet soils, ditches, roadsides; although Schilling (2006a) concedes only that this species “may be present” in TX, it was first reported in 1971 in Robertson Co. (Lonard & Waller 1971) and there are numerous recently published records from se TX: Harris Co. (Harcombe et al. 2007), Liberty Co. (Brown 2014), Polk Co. (Brown et al. 2006a), San Jacinto Co. (Kartesz 2015), and Walker Co. (Nesom & Brown 1998); native to AR, LA, and MA; adventive in se U.S. This species is becoming popular as a garden plant and this may increase the occurrence of hybrids with *H. angustifolius*.

Helianthus strumosus L., (with swellings, alluding to the rhizomes), ROUGH SUNFLOWER, PALE-LEAF WOODLAND SUNFLOWER. Rhizomatous perennials; stems glabrous or glabrate; leaves mostly opposite or the upper ones alternate, short-petiolate, blades lanceolate to lance-ovate or ovate, 3-nerved from above the base, glabrous or minutely tomentose beneath, bases subcordate to cuneate, margins entire or serrate; involucre 8–20 mm wide; phyllaries squarrose or erect, sometimes loose, lanceolate, usually not gland-dotted, glabrous to minutely hispid, tips acute to acuminate; ray flowers 10–20, ligules 12–20(–30) mm long; disk corolla lobes yellow; achenes 4–5.5 mm long, glabrate. Woods, roadsides, prairies; ne TX in Gregg, Harrison, Panola, and Upshur cos. (Kartesz 2015); e 1/2 North America. Jul–Oct. [*H. montanus* E.E. Watson, *H. saxicola* Small] A variable species that may hybridize with *H. hirsutus* and *H. tuberosus*.

Helianthus tuberosus L., (tuberous), JERUSALEM-ARTICHOKE, GIRASOLE. Rhizomatous perennials, producing tubers late in the season; stems scabrous-hispid to hirsute, sometimes glaucous; leaves mostly alternate, petiolate, petioles often ± winged,

blades lanceolate to ovate, 3-nerved from near the base, puberulent to slightly hirsute-tomentose beneath, bases cuneate, margins entire or serrate, flat (not revolute); involucre 8–12 mm wide; phyllaries spreading or reflexed, lanceolate, gland-dotted, puberulent to minutely hispid, margins ciliate, tips acuminate; ray flowers 10–20, ligules 25–40 mm long; disk corolla lobes yellow; achenes 5–7 mm long, glabrous or hairy in the upper portion. Wooded areas, roadsides, fields; Dallas and Grayson cos. and Gregg Co. (Kartesz 2015); native to c U.S. Midwest and Great Plains; adventive farther e and w; Canada; cultivated and adventive in Europe. Aug–Oct. [*H. tomentosus* Michx., *H. tuberosus* L. var. *subcanescens* A. Gray] Cultivated for the edible, starchy-sweet tubers, which were used as a food by Native Americans (Mabberley 1997). Hybrids with *H. pauciflorus* are known as *H. × laetiflorus* Pers.

Helianthus divaricatus L., (diverging), WOODLAND SUNFLOWER, which would key to *H. salicifolius* here, can be distinguished by its lanceolate to lance-ovate leaves that are wider (1–5 cm wide), yellow disk corolla lobes, and shorter pappus awns (2.2–2.5 mm long). To be expected in ne TX based on records from adjacent DeSoto Par. (VSC) and Caddo Par., LA; e U.S. from ME s to FL and w to WI, IA, and OK; Canada. Jul–Sep. [*H. divaricatus* var. *angustifolius* Kuntze]

Helianthus floridanus A. Gray ex Chapm., (of Florida), FLORIDA SUNFLOWER, which would key to *H. simulans* here, can be distinguished by its shorter leaves (4–15 cm long vs. 9–22 cm long) with undulate margins, and obtuse outer phyllary tips. To be expected in East TX based on records from adjacent Sabine Par., LA; se U.S. from NC s to FL and w to LA. Aug–Oct.

Helianthus silphioides Nutt., (resembling *Silphium*—rosinweed or compass-plant), ROSINWEED SUNFLOWER, OZARK SUNFLOWER, which would key to *H. occidentalis* or *H. pauciflorus* here, can be distinguished from the former by its leaves that are not gland-dotted beneath and longer pales (9–10 mm long); it can be distinguished from the latter by its shorter achenes (3–4 mm long) and shorter pappus awns (2.5–2.7 mm long). To be expected in ne TX based on records from adjacent McCurtain Co., OK (OKL); se U.S. from KY s to AL and w to IL, OK, and LA. Aug–Oct. [*H. kentuckiensis* McFarland & W.A. Anderson]

HELIOPSIS Pers. OXEYE, SUNFLOWER EVERLASTING

Ours perennial herbs; leaves opposite, petiolate, ± 3-nerved; heads borne singly; phyllaries in 2–3 series, subequal, the outer often longer and more foliaceous; ray flowers pistillate, fertile; corollas yellow to orange, the ligules sessile and persistent on the achenes, becoming papery; disk flowers perfect, fertile, corollas yellow to brownish purple; achenes 3–4-angled; pappus absent, or a crown plus 1–3 tooth-like scales.

• A genus of ca. 18 species of North America, Mexico, and Central and South America. (Greek: *helios*, sun, and *-opsis*, likeness) (tribe Heliantheae)

REFERENCES: Fisher 1957, 1958; Turner 1988a; Smith 2006a.

1. Heads 1–3(–5) per stem, 7–15 mm in diameter; ray flowers 6–8(–13), ligules 10–22 mm long and 4–8 mm wide; plants of se TX **H. gracilis**

1. Heads 1–15+ per stem, 12–25 mm in diameter; ray flowers 10–18, ligules 20–40 mm long and 6–13 mm wide; plants of ne TX **H. helianthoides**

Helianthus gracilis Nutt., (graceful, slender), SMOOTH OXEYE, PINEWOODS OXEYE. Plants 30–40(–80) cm tall; stems glabrous, from creeping rhizomes 4–10+ cm long and 1–2 mm wide; leaf blades glabrous or nearly so, ovate-lanceolate to lanceolate, margins regularly dentate to nearly entire; heads 1–3(–5) per stem, 7–15 mm in diameter; ray flowers 6–8(–13), corollas golden yellow, ligules 10–22 mm long and 4–8 mm wide; disk flowers pale brown-yellow; achenes 4–5 mm long; pappus a crown plus 1–3 tooth-like scales. Sandy slopes, open pine woods; Harris Co. (Brown 2014); Chambers Co.; se U.S. from SC s to FL and w to TX. Spring-summer. [*H. helianthoides* (L.) Sweet var. *gracilis* (Nutt.) Gandhi & R.D. Thomas, *H. laevis* Pers. var. *minor* Hook.]

Helianthus helianthoides (L.) Sweet var. **scabra** (Dunal) Fernald, (resembling a sunflower, *Helianthus*), FALSE SUNFLOWER, ROUGH OXEYE. Plants (40–)80–150 cm tall; stems glabrous or hairy, from creeping rhizomes to 4 cm long and 2–6 mm wide; leaf blades ± scabrous, deltate to narrowly ovate-lanceolate, margins coarsely dentate; heads 1–15+ per stem, 12–25 mm in diameter; ray flowers 10–18, corollas golden yellow, ligules 20–40 mm long and 6–13 mm wide; disk flowers yellow to brownish yellow; achenes 4–5 mm long; pappus absent, or of 2–4 minute, tooth-like scales. Sandy soils, open woods, prairies, roadbanks; ne TX in Bowie, Harrison, Morris, Red River, Smith, and Titus cos.; apparently reports from Harris Co. were in error (Brown 2014); c U.S. from MI s to LA and w to ND, CO, and NM; Canada. Apr–Jul. [*H. scabra* Dunal]

HETEROTHECA Cass. GOLDENASTER, GOLD-ASTER, CAMPHORWEED

Annual or perennial herbs, often aromatic, strigose to hispid or pilose; leaves alternate, simple; heads solitary or in corymbose or paniculate arrays; phyllaries in 3–5 series, usually strongly unequal, 1-nerved, lanceolate to linear-lanceolate; ray flowers pistillate, fertile, ligules yellow, curling under in age; disk flowers perfect, fertile, corollas yellow; achenes sometimes dimorphic; pappus of an outer series of inconspicuous, short, narrow scales, and an inner series of long, barbellate bristles, or pappus absent from ray flowers.

☛ A North American genus of ca. 30 species; some taxa have been treated under *Chrysopsis* and *Pityopsis*. *Heterotheca* is taxonomically complex, fraught with hybridization, polyploidy, and environmentally-induced plasticity, and subsequently has been often-revised; our understanding of this group is still in flux. Here we attempt to reconcile differing opinions of circumscription by Semple (2006d) and Nesom (2006b, 2007a). (Greek: *heteros*, different, and *thece*, container, alluding to the dissimilar ray and disk achenes—this translates well to the modern difficulty in circumscription) (tribe Astereae)

REFERENCES: Shinnars 1951a; Wagenknecht 1960; Harms 1965, 1968; Vernon 1965; Semple et al. 1980; Nesom 1991c, 2006b, 2007a; Semple 1996, 2006d.

1. Plants annual or biennial from taproots; usually with one or a few stems from base; blades of upper and middle stem leaves not much narrowed at base, sessile and slightly clasping; pappus of ray flowers absent **H. subaxillaris**
1. Plants perennial from tough woody bases, often rhizomatous; stems usually several-many; blades of upper and middle stem leaves tapered to slender, petiole-like bases, not clasping; pappus of ray flowers present.
 2. Leaf blades conspicuously silvery-gray in appearance, softly and densely pubescent, the hairs usually without swollen bases; leaves lacking resin glands **H. canescens**
 2. Leaf blades distinctly green, bristly pubescent, the hairs usually with swollen bases (use lens); foliage with abundant resin glands (use lens) **H. stenophylla**

Heterotheca canescens (DC.) Shinnars, (grayish white), HOARY GOLDENASTER, GRAY GOLD-ASTER. Perennials, 15–40(–65) cm tall, frequently rhizomatous; stems eglandular; leaves rather numerous and crowded, ascending, petiolate below and sessile above, linear-oblongate, densely strigose-canescens (appearing silvery-gray), eglandular, margins entire and ciliate; uppermost leaves not much reduced; phyllaries moderately strigose, eglandular; ray flower ligules 5–9(–10.5) mm long; achenes 1.2–3.1 mm long, 6–10-ribbed; pappus monomorphic. Sandy or gravelly prairies, rock outcrops, roadsides; w and sw border of East TX, from Dallas Co. s to Bexar Co. and e to DeWitt Co.; mostly w 2/3 TX; sc U.S. in KS, OK, TX and NM. Jul–Oct. [*Chrysopsis berlandieri* Greene, *C. canescens* (DC.) Torr. & A. Gray, *C. villosa* (Pursh) Nutt. ex DC. var. *canescens* (DC.) A. Gray]

Heterotheca stenophylla (A. Gray) Shinnars, (narrow-leaved), STIFF-LEAF GOLDENASTER, NARROW-LEAF GOLD-ASTER. Perennials, 18–46(–65) cm tall, sometimes rhizomatous; stems glandular; leaves rather numerous and crowded, ascending, petiolate below and sessile above, linear-oblongate to narrowly oblongate, sparsely hispid-strigose (appearing bright green to dark green), with glands, margins entire and ciliate; uppermost leaves not much reduced; phyllaries usually sparsely strigose, eglandular or with glands; ray flower ligules (5–)7–11.5(–16.5) mm long; achenes usually 1.5–2.5 mm long, 6–10-ribbed; pappus monomorphic. Sandy prairies, rocky hills; w edge of East TX in McLennan, Travis, and Hays cos.; mostly c TX and Panhandle; c U.S. from IA and SD s to TX and NM. Jun–Oct. [*Chrysopsis hispida* (Hook.) DC. var. *stenophylla* A. Gray, *C. scabrifolia* A. Nelson, *C. stenophylla* (A. Gray) Greene, *C. villosa* (Pursh) Nutt. ex DC. var. *stenophylla* (A. Gray) A. Gray] We are treating this taxon following Nesom (2006b, 2007a); according to Semple (2006d) this would be *H. stenophylla* (A. Gray) Shinnars var. *stenophylla*.

Heterotheca subaxillaris (Lam.) Britton & Rusby, (subaxillary), CAMPHORWEED, GOLDEN-ASTER, CAMPHOR DAISY. Aromatic annuals or biennials, 10–200 cm tall, taprooted; stems glandular; leaves ovate-lanceolate to elliptic, hispid-strigose, glandular, margins coarsely serrate to entire; lower leaves petiolate, petiole bases auriculate-clasping, usually withering by flowering; upper leaves reduced, sessile, becoming cordate and subclasping; phyllaries sometimes sparsely strigose-ciliate, glandular; ray flower ligules 3–7(–9) mm long; achenes dimorphic, 2–3-ribbed, ray achenes triangular in cross-section, 1.5–2.5 mm long, disk achenes flattened, 2–4 mm long; pappus of ray flowers absent. Sandy or rocky ground, open woods, fields, roadsides; common throughout TX; s 1/2 U.S.; Mexico. Apr–Dec(–Feb). [*H. latifolia* Buckley, *H. subaxillaris* var. *latifolia* (Buckley) Gandhi & R.D. Thomas] If subspecies are recognized, ours would be subsp. *latifolia*. The foliage has a strong camphor-like odor and the plants are avoided by livestock (Ajilvsgi 1984).

HIERACIUM L. HAWKWEED

Ours perennial herbs, strikingly pilose in the field; sap milky; leaves alternate, in basal rosettes and on lower stem, much

reduced or absent on upper stem; heads in corymbose or paniculate arrays; phyllaries in 2+ series, subequal to unequal, lanceolate to linear, reflexed in fruit; disk flowers absent; ray flowers perfect, fertile; corollas yellow, ligules mostly 4–5-cleft at the tips; achenes cylindrical, usually 10-ribbed; pappus of many minutely-barbed, straw-colored bristles.

☛A taxonomically complicated temperate and tropical montane genus of 250+ species (with possibly ca. 1000 asexually-reproducing microspecies), most speciose in Eurasia. Our species are sometimes treated in the genus *Pilosella*. (Greek: *herax*, a hawk; the ancients, as recorded by Pliny and others, supposing that hawks ate these or similar plants to improve their eyesight) (tribe Cichorieae)

REFERENCES: Fernald 1943, 1950; Vuilleumier 1973; Beaman 1990; Strother 2006o.

1. Midstem hairs mostly < 6 mm long; midstem leaves with lengths 2–4+ times widths; corollas 8–9+ mm long..... **H. gronovii**
 1. Midstem hairs 6–15+ mm long; midstem leaves with lengths 4–7+ times widths; corollas ca. 7 mm long **H. longipilum**

Hieracium gronovii L., (for Jan Friedrich Gronovius 1690–1762, Dutch botanist at Leiden), GRONOVII'S HAWKWEED, QUEEN-DEVIL. Plants 30–45(–80) cm tall; lower stems pilose-hirsute and sometimes also stellate-pubescent; leaves oblanceolate to obovate or elliptic, pilose with long tawny hairs; heads 7–10 mm high; phyllaries glabrous or stellate-pubescent, sometimes with stalked glands; corollas 8–9+ mm long; achenes 3.5–4.5+ mm long; pappus bristles ca. 5 mm long. Sandy soils, openings in pine-oak woods, bogs; e 1/3 TX; e U.S. from MA s to FL and w to MI, KS, and TX; Canada. May–Jun(–fall).

Hieracium longipilum Torr., (long-haired), HAIRY HAWKWEED. Plants 30–75(–200) cm tall; lower stems pilose-hirsute and sometimes also stellate-pubescent; leaves oblanceolate, pilose with long tawny hairs; heads 6–8(–10) mm high; phyllaries stellate-pubescent, with stalked glands; corollas ca. 7 mm long; achenes 3–4+ mm long; pappus bristles 5.5–6.5 mm long. Sandy soils, prairies, fields, roadsides; in TX recorded only from San Jacinto Co. and Lamar Co. (*W.R. Carr 13133* (TEX)); e U.S. from MI s to LA and w to MN, NE, and TX; Canada. Sep–Oct.

HYMENOPAPPUS L'Hér. WOOLLY-WHITE, OLD PLAINSMAN

Ours taprooted biennial herbs; leaves basal (rosette) and cauline, alternate, petiolate, the blades often pinnatifid, usually glandular-punctate, often conspicuously white-hairy on lower surface; heads in corymbose arrays; phyllaries in 2 or 3 series, subequal, petaloid apically, herbaceous basally; ray flowers (in our species) absent; disk flowers perfect, fertile; corollas whitish or purplish, the lobes becoming reflexed; anther column long-exserted; achenes obpyramidal, 4(–5)-angled, hirtellous to villous; pappus of 14–20 ovate to spatulate scales.

☛A s North American (including Mexico) genus of 12 species; some were used medicinally by Native Americans. (Greek: *hymen*, membrane, and *pappus*, down, fuzz, pappus) (tribe Heliantheae)

REFERENCES: Turner 1956; Strother 2006p.

1. Basal leaves twice-pinnate, with ultimate segments to 1.5 mm wide, elongate and linear to filiform.
 2. Stems equally leafy throughout, the leaves not much reduced upwards; corollas 3–4 mm long (to tips of corolla lobes), the throats ± funnelliform..... **H. carrizoanus**
 2. Stems mostly leafy below, the leaves much reduced upwards; corollas 2.5–3 mm long (to tips of corolla lobes), the throats ± campanulate..... **H. tenuifolius**
 1. Basal leaves entire to once- or twice-pinnate, with ultimate segments mostly 2–30 mm wide, variously shaped but wider than linear to filiform.
 2. Basal leaves simple to coarsely once-pinnate (rarely bipinnate); corollas whitish to pinkish or purplish (rarely completely white); usually on sandy soils **H. artemisiifolius**
 2. Basal leaves finely once- to twice-pinnate; corollas white to cream; usually on clay or limestone soils..... **H. scabiosaeus**

Hymenopappus artemisiifolius DC. var. **artemisiifolius**, (with leaves like *Artemisia*—sagebrush or wormwood), RAGWEED WOOLLY-WHITE, WOOLLY-WHITE, WILD CAULIFLOWER. Plants 40–100 cm tall; leaves entire to once-pinnate, densely white-tomentose beneath; phyllaries 5–12 mm long, 2–7 mm wide, white or red-tinged; corollas whitish to pinkish or purplish, 3.5–5 mm long; achenes 3.5–4 mm long; pappus scales 0.3–1(–1.5) mm long. Sandy soils, open woods, fields, disturbed areas; common across East TX, w to nc TX and s to Edwards Plateau and South TX Plains; AR and LA. Mar–May. [*H. scabiosaeus* L'Hér. var. *artemisiifolius* (DC.) Gandhi & R.D. Thomas]

Hymenopappus carrizoanus B.L. Turner, (of the Carrizo Sands), CARRIZO SANDS WOOLLY-WHITE. Plants 45–150 cm tall; leaves twice-pinnate, the divisions linear, nearly glabrous beneath; phyllaries (3.5–)5–6 mm long, (1.5–)2–5 mm wide, gray-green; corollas white (drying pinkish), 3–4 mm long; achenes ca. 4 mm long; pappus scales 1–1.5 mm long. Deep sands,

grasslands, open post oak woodlands; in East TX restricted to a line of counties corresponding to the Carrizo Sands formation: Anderson, Bastrop, Bexar, Caldwell, Guadalupe, Leon, and Robertson; several more TX counties to the sw. Apr–Jun. Lacking state or federal status, but a species of conservation concern because of its restricted range and habitat loss, as discussed in Poole et al. (2007). *ET* *!*

Hymenopappus scabiosaeus L'Hér. var. **corymbosus** (Torr. & A. Gray) B.L. Turner, (sp.: from Latin: *scabies*, itch; var.: with flowers in corymbs), OLD-PLAINSMAN. Plants 40–150 cm tall; leaves mostly twice-pinnate, densely white-tomentose beneath; phyllaries 5–9 mm long, 2–4 mm wide, white to yellowish; corollas white to cream, 3–5.5 mm long; achenes 3–5 mm long; pappus scales 0.1–1 mm long. Calcareous soils and clays, prairies, open woods, roadsides; widespread from nc to sc TX, less common far e and w TX; sc U.S. from NE s to TX; Mexico. Mar–Jul. [*H. corymbosus* Torr. & A. Gray] The other variety of this species, var. *scabiosaeus*, is not recorded from TX but may be expected based on records from adjacent counties in OK (Choctaw and McCurtain cos., OK (OKL)). It differs from var. *corymbosus* in having peduncles subtended by 5–14 membranous bracts, and larger phyllaries (7–15 mm long and 4–8 mm wide).

Hymenopappus tenuifolius Pursh, (slender-leaved), CHALKHILL WOOLLY-WHITE, WOOLLY-WHITE, OLD-PLAINSMAN. Plants 40–150 cm tall; leaves twice-pinnate, the divisions linear, densely white-tomentose beneath; phyllaries 5–8 mm long, 2–4 mm wide, white to yellowish; corollas white to cream, 2.5–3 mm long; achenes 3.5–4.5 mm long; pappus scales 1–1.5(–2) mm long. Gravelly prairies, limestone outcrops, sandy soils; w margin of East TX from Lamar and Red River cos. s to Travis and Hays cos.; mostly c TX and Panhandle. May–Aug.

HYMENOXYSS Cass. PRAIRIE DAWN, BITTERWEED, RUBBERWEED

Ours annual herbs; leaves alternate, ± gland-dotted; heads solitary or borne in loose panicate arrays; phyllaries in 2 series, unequal or subequal; ray flowers pistillate, fertile, corollas usually yellow; disk flowers perfect, fertile; corollas yellow to yellow-brown; achenes obpyramidal; pappus of scales, usually awn-tipped.

☛A genus of ca. 26 species depending on circumscription, native from s North America to Argentina; sometimes treated broadly to include *Tetaneuris*. A molecular study by Bierner and Jansen (1998) supported the recognition of *Tetaneuris* as a separate genus. *X* Some species contain sesquiterpene lactones toxic to sheep and goats; other species were formerly used as chewing gum by Native Americans. *!* Two of the species treated here are of conservation concern. (Greek: *hymeno*, membrane, and *oxys*, sharp, alluding to the awned pappus scales) (tribe Heliantheae)

REFERENCES: Mahler 1983; Bierner & Jansen 1998; Bierner 2006c; Mink et al. 2012; Singhurst et al. 2014.

1. Robust plants 10–80 cm tall; ray flowers 8–13, conspicuous and extending well beyond the phyllaries, corollas 8.5–11 mm long **H. odorata**
1. Delicate plants 5–10(–15) cm tall; ray flowers 6–8, inconspicuous and usually not much surpassing the phyllaries, corollas 2–3 mm long.
 2. Basal rosettes 1.3–2.4 cm in diameter, withering at or before time of flowering; disk flowers 17–32; rare endemic of ne TX **H. perpygmaea**
 2. Basal rosettes 4–7+ cm in diameter, persistent, usually present at time of flowering; disk flowers 40–75+; rare endemic of se TX **H. texana**

Hymenoxys odorata DC., (fragrant), POISON BITTERWEED, WESTERN BITTERWEED, BITTER RUBBERWEED. Robust taprooted annuals, 10–80 cm tall, inconspicuously pubescent, becoming bushy-branched when not crowded, forming rounded mounds; foliage aromatic when crushed; leaves simple or pinnately divided into 5–11 linear-filiform segments, minutely gland-dotted; heads terminal, solitary or corymbose; ray flowers 8–13, the ligules conspicuous, golden yellow, 8.5–11 mm long, extending well beyond the phyllaries, widened and toothed apically; disk flowers 50–150+, corollas yellow-orange; achenes 1.7–2.5 mm long; pappus of 5–6 obovate, awn-tipped scales 1.6–2.3 mm long. Disturbed sites, roadsides, ditches, becoming abundant in overgrazed areas; Hill Co., also possibly Burlison Co. (Turner et al. 2003); mostly w 1/2 TX; sw U.S. from KS s to TX and w to CA; Mexico. Apr–Jun. Poisonous to livestock, especially to sheep under starvation conditions; the sesquiterpenes cause gastrointestinal irritation resulting in a wasting condition after short periods of grazing; POISON BITTERWEED causes considerable loss of livestock and has been one of the main causes of the decline of sheep ranching in the sw U.S. (Kingsbury 1964; James & Welsh 1992). *X*

Hymenoxys perpygmaea W.C. Holmes, Singhurst, & Mink, (very small), PYGMY PRAIRIE DAWN. Delicate, ephemeral, taprooted annuals, 5–6.9 cm tall, glabrous; basal rosette leaves elliptic to obovate, withering at or before time of flowering, the rosettes 1.3–2.4 cm in diameter; stem leaves simple or irregularly toothed, minutely gland-dotted, margins entire; heads terminal, solitary, 1–4 per plant; ray flowers ca. 7, the ligules inconspicuous, yellowish, not much surpassing the phyllaries,

ca. 2.8 mm long, widened and toothed apically; disk flowers 17–32, corollas yellow; achenes ca. 2 mm long; pappus of ovate, awn-tipped scales ca. 2.5 mm long. Saline prairie barrens in the presence of mima mounds (pimple mounds); an extremely rare endemic apparently restricted to Lamar Co. Apr–May. This species, described in 2012, currently lacks state or federal protection, but should be considered critically imperiled due to its extremely restricted range and highly specialized habitat (Mink et al. 2012). *I* *EET*

Hymenoxys texana (J.M. Coult. & Rose) Cockerell, (of Texas), PRAIRIE DAWN, TEXAS PRAIRIE DAWN. Delicate taprooted annuals, 5–10(–15) cm tall, glabrous or inconspicuously pubescent; leaves in a persistent basal rosette, obovate or spatulate, present at time of flowering, the rosettes 4–7+ cm in diameter; stem leaves simple or 3–5-lobed, minutely gland-dotted, margins entire or pinnately toothed; heads terminal, solitary or corymbose; ray flowers 6–8, the ligules inconspicuous, whitish or pale yellow, not much surpassing the phyllaries, 2–3 mm long, widened and toothed apically; disk flowers 40–75+, corollas pale yellow to deep yellow; achenes 1.5–1.8 mm long; pappus of 5 obovate, awn-tipped scales 1.4–1.8 mm long. Saline prairie barrens, often in the presence of mima mounds (pimple mounds); a rare endemic restricted to the TX Gulf Coastal Plain, known from only 3 counties: Harris and Trinity cos.; Fort Bend Co. Mar–Apr. [*Actinella texana* J.M. Coult. & Rose] This species is listed as endangered at the state and federal level due to its restricted range and highly specialized habitat, both threatened by urban development around Houston (Poole et al. 2007; Singhurst et al. 2014). *I* *ET*

HYPOCHAERIS L. CAT’S-EAR

Annual, biennial, or perennial herbs with milky sap; leaves mostly basal or flowering stems with a few ± well-developed leaves, at least toward the base; leaves alternate, entire to dentate or pinnatifid; heads borne singly or in loose, few-flowered arrays; phyllaries in 3–4 series, unequal, linear-lanceolate; flowers all ligulate, corollas yellow or in one species white; achenes cylindrical or spindle-shaped, ribbed, all alike and beaked, or of two kinds, the peripheral achenes beakless and the central ones beaked; pappus of 1 or 2 series of white or tan bristles, the single or inner series plumose, the outer, when present, shorter and barbellate.

•A genus of ca. 60+ species native to Europe, Asia, n Africa, and especially South America; including some weeds and cultivated ornamentals. The generic name has sometimes been spelled *Hypochoeris* (e.g., Shinnars 1966; Tomb 1974; DeFilippis 1976), probably based on the spelling by Linnaeus (1754) in *Genera Plantarum*. However, the accepted spelling is *Hypochoeris* (Greuter et al. 1993), based on Linnaeus’s (1753) original spelling in *Species Plantarum*. (According to Quattrocchi (2000), Greek: *hypochoiris*, used by Theophrastus for some plant, and also mentioned by Pliny as *hypochoeris*, perhaps derived from *hypo*, beneath or under, and *choiros*, pig, the animals being fond of its roots) (tribe Cichorieae)

REFERENCES: Shinnars 1966; Vuilleumier 1973; Tomb 1974; Cronquist 1980; Diggs et al. 1997b; Bogler 2006b.

1. Leaves all or mostly basal (at most with reduced leafy bracts abruptly much smaller than the numerous basal rosette leaves); pappus bristles in 2 series: an outer series of short, merely barbellate bristles and an inner series of much longer, plumose bristles.
 2. Plants annual, essentially glabrous; heads not very showy, the ligules about equaling the phyllaries; peripheral achenes usually beakless, only the inner achenes beaked**H. glabra**
 2. Plants perennial, with hispid leaves; heads showy, the ligules surpassing the phyllaries; all achenes usually with well-developed beak.....**H. radicata**
1. Flowering stems with a few ± well-developed leaves, at least toward the base; pappus bristles in 1 series, of long plumose bristles.
 3. Heads relatively broad, the involucre campanulate; phyllaries hirsute; corollas yellow; achenes 4–5-nerved**H. chillensis**
 3. Heads narrow, the involucre cylindric; phyllaries glabrous or sparsely tomentose; corollas white; achenes 10-nerved....**H. microcephala**

Hypochoeris chillensis (Kunth) Britton, (of Chile), BRAZILIAN CAT’S-EAR. Taprooted biennial or perennial; stems 30–70 cm tall, glabrous to pilose; leaves basal and on lower stems, blades elliptic to oblanceolate, coarsely and sharply toothed to pinnatifid; heads 10–20 mm high; corollas yellow, 5–7 mm long, equalling phyllaries at flowering; achenes all beaked, 4–5-nerved; pappus bristles in 1 series, 6–8 mm long. Waste areas, sandy soils, roadsides, lawns; first reported for TX in Anderson Co. by Tomb (1974), also reported from McLennan Co. by Hannick et al. (2013); se U.S. from NC w to TX; South America. Apr. [*H. brasiliensis* (Less.) Griseb. var. *tweedyi* (Hook. & Arn.) Baker, *H. tweedyi* Hook. & Arn.] Native of South America. *I*

Hypochoeris glabra L., (smooth, hairless), SMOOTH CAT’S-EAR. Taprooted annual; stems 10–50 cm tall, glabrous, leafless or minutely bracteate; leaves basal, blades oblanceolate to oblong, nearly entire to toothed or pinnatifid; heads 8–16 mm high; corollas yellow or rarely whitish, 5–8 mm long, equalling phyllaries at flowering; achenes of two types, the peripheral

achenes stout and beakless, the central achenes with well-developed beaks, 10-nerved; pappus bristles in 2 series, the longest 9–10 mm. Sandy soils, disturbed areas, roadsides; scattered in e and se TX; first reported for TX in Williamson Co. by Diggs et al. (1997b); reported in Harris, Leon, and Waller cos. by Brown & Elsik (2002) and in Brazos and Burleson cos. by M. Reed (pers. comm. 2009); 8 more counties in East TX have been vouchered at TEX-LL since 1992; scattered across North America, mostly se U.S. and w coast; Europe; introduced elsewhere. Feb–Jun. Native of Europe; apparently on its way to becoming a common weed in East TX. *I*

Hypochaeris microcephala (Sch.Bip.) Cabrera var. **albiflora** (Kuntze) Cabrera, (sp.: small-headed; var.: white-flowered), SMALL-HEAD CAT'S-EAR. Taprooted perennial; stems 10–60 cm tall, glabrous to sparsely hairy; leaves basal and on lower stems, blades oblanceolate, entire to sharply toothed or deeply pinnatifid; heads 8–15(–18) mm high; corollas white, 5–7 mm long, not surpassing phyllaries at flowering; achenes all beaked, 10-nerved; pappus bristles in 1 series, 7–8 mm long. Grazed woodlands, ditches, sandy soils; mostly se TX, w to Williamson Co.; se U.S. from GA w to TX; South America. May–Jun. [*H. albiflora* (Kuntze) Azevdo-Gon. & Matzenb., *H. brasiliensis* (Less.) Griseb. var. *albiflora* Kuntze] Native of South America. *I*

Hypochaeris radicata L., (having conspicuous roots), HAIRY CAT'S-EAR. Taprooted perennial; stems 10–60 cm tall, glabrous to coarsely hirsute, leafless or sparsely bracteate; leaves basal, ± hirsute, blades oblanceolate, lyrate, coarsely toothed to pinnatifid; heads 10–25 mm high; corollas yellow, sometimes striped grayish green or reddish beneath, 10–15 mm long, surpassing phyllaries at flowering; achenes all beaked, 10–12-nerved; pappus bristles in 2 series, the longest 10–12 mm. Oak-pine forest, dry fields, ditches, lawns; recorded from Brazos, Harrison, and Newton cos.; scattered across most of North America; Europe and Asia; widely introduced elsewhere. May–Jun. Native of Europe. *I*

IONACTIS Greene ANKLE-ASTER

A genus of 6 species native to North America. The genus has often been included in *Aster*; Nesom and Leary (1992) resurrected the genus. (Greek: *ion*, violet, and *aktis*, rays, alluding to the color of the ligules) (tribe Astereae)

REFERENCES: Nesom & Leary 1992; Nesom 1992b, 1994b, 2006r.

Ionactis linariifolia (L.) Greene, (leaves like flax, *Linum*), FLAX-LEAF ANKLE-ASTER, FLAX-LEAF WHITETOP, NARROW-LEAF IONACTIS. Herbaceous or slightly woody perennial, 10–50(–70) cm tall; leaves alternate, sessile, blades linear to narrowly oblong or lanceolate, 12–40 mm long, glabrous, entire; heads borne singly or in loose corymbose arrays; heads 6–9 mm high; phyllaries appressed, linear-lanceolate, unequal; ray flowers pistillate, fertile, corollas violet to bluish or rarely white; disk flowers perfect, fertile, corollas yellow; achenes flattened, (2.5–)3.5–4 mm long; pappus of 2 series, the outer of short bristles, the inner of barbellate bristles. Sandy habitats, seeps or other moist sites, longleaf pine woods; restricted to deep se TX in Jasper and Newton cos., and Sabine Co. (Phillips et al. 2007); e U.S. from ME s to FL and w to WI, OK, and TX. Sep–Nov. [*Aster linariifolius* L.]

ISOCOMA Nutt. GOLDENBUSH, JIMMYWEED

Perennial subshrubs, bases often woody; stems usually erect, few-branched, usually glandular; leaves alternate, sessile, blades 1-nerved, usually gland-dotted; heads borne in compact, corymbose arrays; phyllaries in (3–)4–6 series, unequal; ray flowers absent; disk flowers perfect, fertile; corollas yellow with dark orange veins, goblet-shaped, the tubes elongating at maturity; achenes obpyramidal, sericeous, 5–11-ribbed; pappus of many thick, unequal, barbellate bristles.

•A genus of 16 species native to the sw U.S. and n Mexico; it has been included by many authors in *Haplopappus*. (Greek: *isos*, equal, and *kome*, hair of the head, “so called from its equal flowers,” according to the original generic description) (tribe Astereae)

REFERENCES: Lane & Hartman 1996; Nesom 1991a, 2006s.

1. Heads 2.5–4 mm wide; phyllary tips green to greenish yellow to yellowish, slightly gland-dotted if at all; flowers 12–15 per head **I. coronopifolia**
 1. Heads 4.5–5.5(–7) mm wide; phyllary tips usually green, usually strongly gland-dotted; flowers (18–)22–34 per head **I. drummondii**

Isocoma coronopifolia (A. Gray) Greene, (presumably, with leaves like *Coronopus* (now *Lepidium*)—swinecress—Turner 2016), COMMON JIMMYWEED, COMMON GOLDENBUSH. Plants glabrous; leaves resinous, blades oblanceolate, margins usually pinnatifid (or sometimes entire), segments spine-tipped; heads 5–6(–7) mm tall and 2.5–4 mm wide; phyllary tips green to greenish yellow to yellowish, slightly gland-dotted if at all; flowers 12–15 per head. Alkaline soils, sandy flats, shrublands;

Bexar and Wilson cos.; South TX Plains and Rio Grande Valley; Mexico. May–Oct. [*I. coronopifolia* (A. Gray) Greene var. *pedicellata* (Greene) G.L. Nesom, *I. pedicellata* Greene] *ET*

Isocoma drummondii (Torr. & A. Gray) Greene, (for Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S JIMMYWEED, DRUMMOND'S GOLDENBUSH. Plants glabrous; leaves not resinous, blades narrowly oblong to oblanceolate-oblong, margins usually entire (sometimes toothed in the upper portion); heads (5.5–)6.5–8 mm tall and 4.5–5.5(–7) mm wide; phyllary tips usually green, usually strongly gland-dotted; flowers (18–)22–34 per head. Sandy soils, brushy prairies, mesquite scrub, coastal dunes; DeWitt Co.; s coastal TX; Mexico. Mar–Jul. [*Haplopappus drummondii* (Torr. & A. Gray) S.F. Blake, *I. megalantha* Shinnery] *ET*

IVA L. SUMPWEED, MARSH-ELDER

Annual or perennial herbs, subshrubs, or shrubs; leaves opposite or sometimes alternate above, entire to toothed, often aromatic and gland-dotted; inflorescences spicate or racemose in paniculate arrangements; heads small, inconspicuous (plants wind pollinated), sessile or subsessile in the axils of bracts; phyllaries in 1–3+ series, distinct or united; ray flowers lacking or ± vestigial; heads with flowers of two kinds, the peripheral disk or disk-like flowers pistillate and fertile, the central disk flowers functionally staminate; corollas inconspicuous; achenes obovate to pear-shaped, 2–3 mm long, usually gland-dotted; pappus none.

☛ A genus of ca. 11 species native from North America to the West Indies; pollen from some species causes hay fever. (Latin name from the mint *Ajuga iva* Schreb., with similar odor) (tribe Heliantheae)

REFERENCES: Rydberg 1922; Jackson 1960; Bolick 1985; Strother 2006q; Turner 2009a, 2009b.

1. Midstem leaves sessile or nearly so, blades linear to lance-linear, usually 1–4 mm wide, outer phyllaries united **I. asperifolia**
1. Midstem leaves with petioles 5+ mm long, blades variously shaped but broader than lance-linear, usually 5–45 mm wide, outer phyllaries distinct.
 2. Plants shrubby or subshrubby perennials (lower stems woody); peduncles 1–3+ mm long; restricted to moist, brackish sites of the Gulf Coast **I. frutescens**
 2. Plants herbaceous annuals or perennials; peduncles 0–1 mm long; of various habitats in e and c TX.
 3. Plants herbaceous annuals, usually less than 100 cm tall; heads about as wide as high; pales (chaff) of the receptacle linear; central functionally staminate flowers 8–12+; widespread in e and c TX **I. annua**
 3. Plants herbaceous perennials, to 200+ cm tall; heads wider than high; pales of the receptacle oblanceolate-ovoid; central functionally staminate flowers 5–10; known only from Travis Co. **I. corbinii**

Iva annua L., (annual), ANNUAL MARSH-ELDER, SHARP-BRACT SUMPWEED, PELOCOTE. Annual herbs, (10–)50–100(–150+) cm tall; leaves petiolate, blades deltate to lanceolate or ovate-elliptic, usually 30–100 mm long and 8–45 mm wide, margins ± toothed; heads sessile; outer 3–5 phyllaries distinct, herbaceous. Low moist areas, calcareous or sandy soils, disturbed sites, sometimes forming extensive stands; widespread, but mainly e and c TX; se and sc U.S., becoming adventive in ne states; Mexico. Aug–Sep. [*I. annua* L. var. *caudata* (Small) R.C. Jacks, *I. caudata* Small, *I. ciliata* Willd.] The wind-borne pollen is a cause of hay fever (Jackson 1960); the achenes were formerly eaten by Native Americans who domesticated this species (Heiser 1990; Mabberley 1997).

Iva asperifolia Less., (rough-leaved). Annual or perennial herbs, 20–60(–100+) cm tall; leaves sessile or nearly so, blades lance-linear to linear, usually 12–25 mm long and 1–4 mm wide, margins entire; heads sessile or nearly so; outer 3–5 phyllaries united, ± herbaceous. Turner (2009a) moved the formerly recognized *I. angustifolia* into synonymy under *I. asperifolia*, and described the two intergrading varieties in East TX:

1. Plants annual, usually 75 cm tall or less; widespread in e 1/2 of TX var. **angustifolia**
1. Plants perennial, to 150 cm tall; restricted to Gulf Coast and South TX Plains var. **latior**

var. **angustifolia** (Nutt. ex DC.) B.L. Turner, (narrow-leaved), NARROW-LEAF SUMPWEED, NARROW-LEAF MARSH-ELDER. Annual herbs, to 75 cm tall. Low moist areas, prairies, and post oak woodlands; widespread in e 1/2 of TX; KS, OK, AR, and LA. Jul–Oct. [*I. angustifolia* Nutt. ex DC. var. *angustifolia*]

var. **latior** (Shinnery) B.L. Turner, (broad), TEXAS SUMPWEED, TEXAS MARSH-ELDER, PELOCOTE. Perennial herbs, to 150 cm tall. 8–40 cm tall. Sandy soils, dunes; sw border of East TX in Bexar, Goliad, and Gonzales cos. (Turner 2009a); mostly c and s TX Gulf Coast; Mexico. All seasons. [*I. angustifolia* Nutt. ex DC. var. *latior* Shinnery, *I. texensis* R.C. Jacks.]

Iva corbinii B.L. Turner, (for Robert Corbin, naturalist of Austin, TX, and first collector), CORBIN'S SUMPWEED. Perennial tap-rooted herbs, 200+ cm tall; leaves petiolate, blades ovate to deltoid, margins entire or toothed; heads sessile or nearly so;

outer 3–5 phyllaries distinct, herbaceous. Moist silty-clay; first described in 2009 from small islands/sandbars in the Colorado River in Travis Co. (Turner 2009b). Jul–Aug? *!*? *EET*?

Iva frutescens L., (shrubby), MARSH-ELDER, JESUIT'S BARK. Perennial shrubs or subshrubs, 50–350 cm tall; leaves petiolate, blades ovate to elliptic to lanceolate, usually 30–60 mm long and 5–30 mm wide, margins usually toothed; heads subsessile; outer 5 phyllaries distinct, herbaceous. Moist brackish areas, saline marshes, beaches; Harris, Jackson, Jefferson, and Orange cos.; TX Gulf Coast; Atlantic and Gulf coasts from NJ s to FL and w to TX. Jul–Oct. [*I. frutescens* L. subsp. *oraria* (Bartlett) R.C. Jacks.]

KRIGIA Schreb. DWARF-DANDELION

Small, ± glabrous annual or perennial herbs; sap milky; leaves basal or alternate; leaf blades oblanceolate or oblong-lanceolate to linear, entire or unevenly toothed or lobed; heads generally small, usually solitary and terminal or few together; phyllaries nearly equal; flowers all ligulate; corollas yellow or yellow-orange, open during morning hours in sunny weather; achenes columnar, fusiform, or obconic, ribbed, not beaked; pappus none or single or double, of scales or an inner ring of bristles and an outer ring of scales.

☛A North American genus of 7 species. The 5 species treated here all differ in chromosome number (Kim & Turner 1992). (Named for David Krig or Krieg, died 1713, a German or Hungarian physician, who was among the first to collect plants in Maryland) (tribe Cichorieae)

REFERENCES: Shinnars 1947b; Vuilleumier 1973; Kim & Mabry 1991; Kim & Turner 1992; Kim et al. 1992a, 1992b; Chambers 2004; Chambers & O'Kennon 2006.

1. Phyllaries 4–8 times as long as wide, linear-lanceolate to oblong-lanceolate, numerous (8–16), becoming shrivelled or reflexed in age, never keeled; inner pappus of bristles 4–8 mm long, outer of as many or fewer short scales less than 1/4 as long; stems leafless.
 2. Plants perennials with a small tuber a few cm below ground, developing slender, whitish rhizomes; involucre 10–15 mm high; corollas 15–17 mm long; pappus with numerous bristles and numerous short scales **K. dandelion**
 2. Plants annuals with a taproot, lacking tubers; involucre 4–6.5 mm high (to 9 mm in age); corollas 5–12 mm long; pappus with 5 bristles and 5 scales..... **K. virginica**
1. Phyllaries 1.5–3 times as long as wide, lanceolate to ovate, few (4–10), remaining erect in age; pappus absent OR of short scales or bristles up to 2 mm long; stems leafless or leafy.
 3. Stems leafless, unbranched (but robust plants or stems buried by loose soil may develop short, basal internodes); pappus of 5 well-developed short scales or both 5 well-developed short scales and short bristles **K. occidentalis**
 3. Stems leafy, branched (but beginning to flower with leaves crowded at base and branches scarcely developed); pappus absent OR of much reduced scales and bristles.
 4. Pappus of much reduced scales and bristles (use hand lens or scope) **K. wrightii**
 4. Pappus absent **K. cespitosa**

Krigia cespitosa (Raf.) K.L. Chambers, (growing in tufts). Variable taprooted annual; stems leafy, branched; phyllary midveins evident but not prominent nor forming curved keels; achenes 1.4–1.7 mm long; pappus absent. Shinnars (1947b) treated the following 2 taxa as separate species, Kim and Turner (1992) treated them as formae of *K. cespitosa*, and Chambers (2004) elevated them to varieties; they may occasionally hybridize (Chambers & O'Kennon 2006).

1. Corollas 2–6 mm long; involucre 2–4.5 mm high in flower, 3.5–5 mm high in age; heads 3–6 mm in diam.....var. **cespitosa**
1. Corollas 6.5–11 mm long; involucre 4.5–7 mm high in flower, 5.5–8.5 mm high in age; heads 6–9 mm in diam.var. **gracilis**

var. **cespitosa**, WEEDY DWARF-DANDELION. Plant 35–40 cm tall; phyllaries 5–8. Stream banks, damp woods, roadsides, and disturbed areas, especially on sandy soils; widespread in e 1/2 of TX; se and sc U.S. from VA s to FL and w to NE and TX; Mexico. Mar–May. [*K. oppositifolia* Raf., *Serenia cespitosa* (Raf.) Kuntze]

var. **gracilis** (DC.) K.L. Chambers, (graceful, slender). Plant 8–40 cm tall; phyllaries 8–10. Low spots in prairies, or borders of woods, disturbed areas, chiefly calcareous clay, less often sandy soils; Post Oak Savannah and Blackland Prairie w to West Cross Timbers and Edwards Plateau; OK and LA. Apr–May. [*K. gracilis* (DC.) Shinnars]

Krigia dandelion (L.) Nutt., (from its resemblance to *Taraxacum*—dandelion), TUBER DWARF-DANDELION, POTATO-DANDELION. Scapiform tuberous perennial 10–45 cm tall; leaves all basal; heads large and showy; phyllaries ca. 15, reflexed in age; corollas 15–17 mm long; achenes 2.5 mm long; pappus of numerous bristles 5–8 mm long and 10 small scales. Sandy open woods, roadsides, and lawns; widespread in e 1/3 of TX; se and c U.S. from NJ s to FL and w to IA and TX. Apr–May. [*Cynthia dandelion* (L.) DC.]

Krigia occidentalis Nutt., (western), WESTERN DWARF-DANDELION. Scapose taprooted annual 4–16 cm tall; leaves mostly basal; phyllaries 4–7, their midveins becoming prominent and forming curved keels in age; corollas 5–9 mm long; achenes 1.2–1.8 mm long; pappus usually of 5 bristles 1.2–2 mm long and 5 small scales. Sandy open woods, fields, and roadsides; widespread in e 1/2 of TX; sc U.S. from MO and KS s to TX and LA. Mar–May. [*Cymbia occidentalis* (Nutt.) Standl.]

Krigia virginica (L.) Willd., (of Virginia), CAROLINA DWARF-DANDELION. Taprooted annual 4–30 cm tall; ± scapose; phyllaries ca. 10, reflexed in age; corollas 5–12 mm long; achenes 1.5–2.3 mm long; pappus of 5 bristles 4–6 mm long and 5 small scales. Sandy open woods, fields, and roadsides; scattered throughout e 1/2 of TX; e U.S. from ME s to FL and w to WI and TX. Mar–Apr, rarely repeating as late as Oct. [*Hyoseris virginica* L.]

Krigia wrightii (A. Gray) K.L. Chambers ex K.J. Kim, (for Charles Wright, 1811–1885, TX collector). Taprooted annual 4–25 cm tall; stems leafy, branched; phyllaries 5–9, their midveins becoming prominent and forming curved keels in age; corollas 4–7 mm long; achenes 1.3–1.6 mm long; pappus of minute scales and bristles. Roadsides, weedy areas, low spots, often in sandy soils; scattered throughout e 1/2 of TX; OK, AR, and LA. [*Apogon wrightii* A. Gray] Extremely similar to the dwarf form of *K. cespitosa* and the taller individuals of *K. occidentalis*; chromosomal and molecular data (Kim & Turner 1992) indicate the species is more distinctive than morphology would suggest.

LACTUCA L. LETTUCE

Coarse annual or biennial taprooted herbs; sap milky or brownish; stems usually 1, erect; leaves alternate; heads small, in terminal paniculate arrays (these at first dense and spicate); involucre narrow; phyllaries in ± 2 series, subequal to equal; flowers all ligulate; corollas yellow, bluish, or whitish, sometimes reddish-tinged, open during the morning, withering greenish or bluish; achenes elliptic to oblong, often somewhat flattened, ribbed, beaks stout or filiform; pappus of numerous hair-like, smooth or barbellate bristles.

♣A genus of ca. 75 species; cosmopolitan but especially n temperate. Young (pre-flowering) plants of *Lactuca sativa* L., the cultivated LETTUCE or GARDEN LETTUCE, lack the bitter sesquiterpene lactones omnipresent in wild species. (The ancient name of the lettuce, *L. sativa*; from Latin: *lac*, milk, in allusion to the white sap) (tribe Cichorieae)

REFERENCES: Stebbins 1937; Vuilleumier 1973; Strother 2006r.

1. Corollas usually bluish or white; beak of achenes stout, 0.1–0.5(–1) mm long **L. floridana**
1. Corollas usually yellow, sometimes bluish or purplish, sometimes reddish-tinged; beak of achenes filiform (thread-like), > 1 mm long.
 2. Faces of achene 1(–3)-nerved.
 3. Heads usually 10–12 mm high, achene bodies 2.5–3.5 mm long (not including beak) **L. canadensis**
 3. Heads usually 12–20 mm high; achene bodies 4.5–6 mm long (not including beak).
 4. Lower stem leaves usually undivided, blades spatulate to lance-linear; corollas bluish to purplish **L. graminifolia**
 4. Lower stem leaves usually pinnatifid or deeply runcinate, blades ovate or oblanceolate to spatulate; corollas usually yellow, sometimes red- or orange-tinted, rarely bluish.
 5. Leaf margins entire or denticulate, seldom prickly; flowers 12–24+ per head **L. hirsuta**
 5. Leaf margins often toothed and prickly; flowers 20–50+ per head **L. ludoviciana**
 2. Faces of achene (3–)5–9-nerved.
 6. Lower stem leaves with margins entire to denticulate but not prickly; upper stem leaves lanceolate to linear or filiform, phyllaries usually erect in fruit; achenes without bristles at the base of the beak **L. saligna**
 6. Lower stem leaves with margins denticulate-toothed and prickly; upper stem leaves oblong to obovate or lanceolate, phyllaries usually reflexed in fruit; achenes with conspicuous bristles at the base of the beak **L. serriola**

Lactuca canadensis L., (of Canada), WILD LETTUCE. Biennial; stems (15–)40–200(–450+) cm tall; leaf blades deeply pinnatifid on the lower stem, oblong to obovate, upper stem leaves undivided, lanceolate to lance-linear, narrowed to nonclasping base or saggitate and clasping, margins entire to denticulate, midribs sometimes sparsely pilose; heads 10–12+ mm high; phyllaries usually reflexed in fruit; corollas yellow or sometimes bluish; achenes ± flattened, somewhat winged, bodies 2.5–3.5 mm long, the beak filiform, 1–3 mm long; pappus 5–6 mm long. Sandy soils, roadsides, thickets; se and ne TX w to nc TX; across North America but more common in e 1/2; Mexico and Central America; Eurasia. Jun–Sep. [*L. canadensis* L. var. *latifolia* Kuntze, *L. canadensis* L. var. *longifolia* (Michx.) Farw., *L. canadensis* L. var. *obovata* Wiegand, *L. sagittifolia* Elliott] In some cases *L. canadensis* and *L. ludoviciana* are difficult to distinguish; according to Correll and Johnston (1970), in TX the two intergrade and introgressive hybridization has possibly occurred.

Lactuca floridana (L.) Gaertn., (of Florida), WOODLAND LETTUCE, FLORIDA LETTUCE, BLUE-FLOWERED LETTUCE. Annual or

biennial; stems 25–50(–200+) cm tall; leaf blades often deeply runcinate-pinnatifid on the lower stem, the terminal portion large, triangular, the lateral lobes large, 1 or 2 per side, upper stem leaves undivided, oblong to elliptic, margins entire to denticulate, midribs sometimes sparsely pilose; heads (8–)10–12+ mm high; phyllaries usually reflexed in fruit; corollas light blue or sometimes whitish; achenes somewhat flattened or rounded, unwinged, bodies 4–5 mm long, the beak stout, 0.1–0.5(–1) mm long; pappus 4–5 mm long. Disturbed moist areas, margins of thickets and woods; East TX w to West Cross Timbers and Edwards Plateau; e 1/2 U.S. Jun–Sep. [*L. floridana* var. *villosa* (Jacq.) Cronquist]

Lactuca graminifolia Michx., (grass-leaved), GRASSLEAF LETTUCE, NARROW-LEAF LETTUCE. Biennial; stems 25–90(–150+) cm tall; leaf blades usually undivided, rarely dissected, spatulate to lance-linear, reduced up the stem, margins entire to denticulate, midribs sometimes with stiff bristles; heads 10–20+ mm high; phyllaries usually reflexed in fruit; corollas bluish to purplish; achenes ± flattened, somewhat winged, bodies 5–6 mm long, the beak filiform, 2–4 mm long; pappus 5–9 mm long. Sandy ridges, pine forests; reported from deep sands in Angelina Co. (Brown et al. 2007); Trans-Pecos; mostly coastal/southern states from SC s to FL and w to AZ; Mexico and Central America. Jun–Sep.

Lactuca hirsuta Muhl. ex Nutt., (hairy), HAIRY LETTUCE, REDDISH-FLOWERED LETTUCE. Biennial; stems 15–80(–120) cm tall; leaf blades often deeply runcinate-pinnatifid on the lower stem, sometimes hairy, upper stem leaves undivided, ovate, margins denticulate, midribs usually pilose-spiny; heads 12–18+ mm high; phyllaries usually reflexed in fruit; corollas usually yellow, sometimes red- or orange-tinted; achenes ± flattened, winged, bodies 4.5–5+ mm long, the beak ± filiform, 2.5–3.5 mm long; pappus 6–8 (–10+) mm long. Sandy soils, openings in woods; e and se TX; e U.S. from ME s to GA and w to MI, OK, and TX. Jun–Sep. [*L. hirsuta* Muhl. ex Nutt. var. *albiflora* (Torr. & A. Gray) Shinnery, *L. hirsuta* Muhl. ex Nutt. var. *sanguinea* (Bigelow) Fernald]

Lactuca ludoviciana (Nutt.) Riddell, (of Louisiana), WESTERN WILD LETTUCE. Biennial; stems 15–150 cm tall; leaf blades pinnately lobed on the lower stem, upper leaves undivided, auriculate-clasping, obovate to spatulate, margins denticulate-ciliate or toothed and prickly, midribs usually pilose-spiny; heads 12–15+ mm high; phyllaries usually reflexed in fruit; corollas usually yellow or rarely bluish; achenes ± flattened, somewhat winged, bodies 4.5–5+ mm long, the beak ± filiform, 2.5–4.5 mm long; pappus 5–7(–11) mm long. Usually in calcareous soils, prairies, openings in woods; scattered across e and c TX w to Edwards Plateau and Panhandle; c and w North America. Jun–Sep. [*L. campestris* Greene]

Lactuca saligna L., *Lactuca saligna* L., (resembling *Salix*—Willow), WILLOW-LEAF LETTUCE. Annual; stems 15–70(–100+) cm tall; leaf blades pinnatifid on lower stem, saggitate or auriculate, upper leaves undivided, linear to filiform, margins entire to denticulate, midribs sometimes prickly; heads 6–9(–13+) mm high; phyllaries usually erect in fruit; corollas yellow, sometimes bluish or pinkish beneath; achenes ± flattened, unwinged, bodies 2.5–3.5 mm long, the beak ± filiform, (2–)5–6 mm long; pappus 5–6 mm long. Disturbed sites; Nacogdoches and Denton cos.; first reported in TX in Tarrant Co. by O’Kennon et al. (1998); ec and w U.S.; introduced elsewhere. Aug–Sep. Native of Eurasia; it is not clear whether it will become an established member of the TX flora. *I*

Lactuca serriola L., (possibly from Latin: *serrula*, a small saw, referring to the toothed leaves, or a corruption of *scariola*, an old name for wild lettuce), PRICKLY LETTUCE. Annual; stems 30–70(–100+) cm tall; leaf blades often deeply pinnatifid on lower stem, saggitate or auricled and clasping, upper leaves undivided, clasping, oblong to obovate or lanceolate, margins denticulate and usually prickly, midribs usually prickly-spiny; heads 9–10(–12) mm high; phyllaries usually reflexed in fruit; corollas yellow; achenes somewhat flattened, unwinged, bodies 2.5–3.5 mm long, the beak filiform, 2.5–4 mm long, beak bases hispid; pappus (3–)4–5 mm long. Disturbed sites, roadsides; scattered in se and ne TX; mainly w 1/2 TX; common across North America; introduced and weedy nearly worldwide. May–Sep. Native of Eurasia; name often but not originally written *scariola*. The widely cultivated GARDEN LETTUCE, *L. sativa*, is thought to be derived from *L. serriola* (Moore et al. 1976). Cattle have been poisoned by eating large quantities of the young growth (Kingsbury 1964). *X* *I*

LEONTODON L. HAWKBIT

☛A genus of ca. 50 species native to Europe, w Asia, and n Africa; some are now widely distributed as weeds. (Greek: *leon*, lion, and *odons*, tooth, alluding to the deeply toothed leaves) (tribe Cichorieae)

REFERENCE: Bogler 2006c.

Leontodon hispidus L., (bristly), BRISTLY HAWKBIT. Herbaceous perennials with milky sap; stems 10–60 cm tall, usually unbranched, from a basal rosette; leaves oblanceolate, usually hispid or hirsute, margins coarsely dentate to deeply lobed; heads borne singly; phyllaries subequal, linear-lanceolate; disk flowers absent; ray flowers 30–50+, the ligules bright yellow,

the peripheral ones sometimes tinged orange or reddish, 12–15 mm long; achenes cylindric, ± beaked, 6–12 mm long; pappus brown, the outer series of bristle-like scales, the inner series of plumose bristles. Lawns, roadsides; recorded only from Harrison Co. (*R.J. Fleetwood 6* (TEX); Turner 2016); infrequently recorded in c and ne North America; Europe; introduced elsewhere. Mar–Sep. [*L. hastilis* L.] *I*

LEUCANTHEMUM Mill. OX-EYE DAISY

•A genus of ca. 30 species of Europe and n Asia including a number of cultivated ornamentals; previously treated in *Chrysanthemum*. The widely cultivated CHRYSANTHEMUMS or MUMS are now treated in the segregate genus *Dendranthema*. Another segregate of *Chrysanthemum*, *Tanacetum*, includes the European *T. cinerariifolium* (Trevir.) Sch.Bip. [*Pyrethrum cinerariifolium* Trevir.] (PYRETHRUM, DALMATIAN INSECT-FLOWER), the flower heads of which yield the monoterpene pyrethrum, used since ancient times as an insecticide and now widely used by organic gardeners (Fuller & McClintock 1986). *X* The leaves and flowers of some species can cause contact dermatitis in sensitive individuals (Spoerke & Smolinske 1990). (Greek: *leucos*, white, and *antheon*, flower) (tribe Anthemideae)

REFERENCES: Arriagada & Miller 1997; Strother 2006s.

Leucanthemum vulgare Lam., (common), OX-EYE DAISY, WHITE DAISY, WHITEWEED, MOON DAISY, DOG DAISY, MARGUERITE. Perennial; stems glabrous, 0.3–1 m tall; leaves mostly basal, on slender petioles, the blades spatulate-obovate; stem leaves alternate, the blades serrate to pectinate to pinnately lobed, attenuate basally; heads solitary on long peduncles; receptacles naked; phyllaries in 3–4 series, unequal, margins and apices scarios; ray flowers pistillate, fertile, the ligules 3-toothed at apex, white, 12–20(–30+) mm long, 2–10 mm wide; disk flowers perfect, fertile, the corollas yellow; achenes 1.5–2 mm long; pappus a very short crown. Open grassy areas, spreading in native prairie from “wildflower seed” plantings; nc TX in Grayson and Denton cos.; se-c TX in Robertson and Brazos cos. s to Harris Co.; escaping more commonly in the e U.S.; recorded throughout North America. May–Jul(–fall). Native of Europe and Asia. [*Chrysanthemum leucanthemum* L., *C. leucanthemum* var. *pinnatifidum* Lecoq & Lemotte, *Leucanthemum leucanthemum* Rydb.]

LIATRIS Gaertn. ex Schreb. BLAZINGSTAR, GAYFEATHER, BUTTON-SNAKEROOT

Herbaceous perennials from swollen, underground corms; stems erect; stem leaves alternate, simple, ± sessile, the blades entire, essentially linear, usually punctate with resinous dots; heads usually in spicate or racemose arrays; phyllaries in (2–)3–7 series, usually unequal, sometimes toothed or ciliate, sometimes resinous-dotted, sometimes petaloid, green to purplish, pink, or white; ray flowers absent; disk flowers perfect, fertile, corollas pink to purplish lavender or rarely white; achenes ± cylindrical, 8–11-ribbed, usually gland-dotted; pappus of 12–40 barbellate or plumose bristles, usually ± equalling corollas.

•A e and c North American (including ne Mexico) genus of 37 species including some cultivated as ornamentals. Hybridization has been recorded between numerous species, sometimes causing morphological characters to intergrade where ranges overlap. The common name BUTTON SNAKEROOT is derived from the folk-medicinal use of the corms in treating snake bites (Ajilvsgi 1984; Kindscher 1992). (Derivation of generic name unknown) (tribe Eupatorieae)

REFERENCES: Gaiser 1946; Shinnars 1959; Nesom & O’Kennon 2001; Nesom 2005a, 2006t.

1. Pappus bristles merely barbellate, the side hairs < 0.5 mm long, inconspicuous even with a lens.
 2. Lower stem leaves usually 1-nerved (sometimes 3-nerved); heads in loose spicate or racemose arrays, the central axis easily visible; flowers 10+ per head.
 3. Phyllaries usually reflexed, strongly puckered at the delimitation of the broadly hyaline, lacerate margin, the tips rounded or flattened..... **L. aspera**
 3. Phyllaries erect to spreading or reflexed but not puckered, margins not (or only weakly) hyaline, entire or ciliate but not lacerate, the tips acuminate to rounded.
 4. Heads (6–)8–15 mm high; corolla tubes pilose inside..... **L. squarrosula**
 4. Heads 5–6(–7) mm high; corolla tubes glabrous inside..... **L. tenuis**
 2. Lower stem leaves 3–5 nerved; heads in dense spicate arrays, the central axis obscured; flowers < 10 per head.
 5. Phyllary tips erect and ± appressed, acuminate to acute; flowers (2–)3–4(–5) per head..... **L. acidota** (in part)
 5. Phyllary tips reflexed to spreading, acute to acuminate or sometimes enlarged and ± petaloid; flowers (4–)5–8 per head..... **L. pycnostachya**
1. Pappus bristles feathery, plumose or subplumose, the side hairs > 0.5 mm long and usually conspicuous with a lens and often even with the naked eye.
 6. Inner phyllaries petaloid (with prolonged petal-like tips), conspicuously longer than the corollas or pappus, the tips whitish, yellowish, or pink..... **L. elegans**
 6. Inner phyllaries not usually petaloid, the tips green or purplish and not exceeding the corollas or pappus.
 7. Stems and leaves with stalked glands..... **L. glandulosa**

7. Stems and leaves without stalked glands (but may be gland-dotted).
8. Heads in open, branched arrays; peduncles 20+ mm long **L. cymosa**
8. Heads in unbranched racemose or spicate arrays; peduncles either absent or < 10 mm long.
9. Lower stem leaves 1-nerved.
10. Heads in loose spicate arrays, the central axis easily visible; flowers 8–14(–16) per head..... **L. bracteata**
10. Heads in dense spicate arrays, the central axis obscured; flowers 3–8 per head.
11. Phyllaries in 2–3 series, weakly graduate in length, the outermost 1/2+ the length of the inner; lateral veins on phyllaries usually continuing to the tip; heads 3.5–5 mm wide; flowering mostly July–August **L. aestivalis**
11. Phyllaries in 3–6 series, strongly graduate in length, the outermost 1/3 the length of the inner or less; lateral veins on phyllaries usually not evident on the upper 1/3; heads (4–)5–7 mm wide; flowering mostly September–October **L. punctata**
9. Lower stem leaves 3–5 nerved.
12. Heads < 10 mm high; flowers < 10 per head..... **L. acidota** (in part)
12. Heads > 10 mm high; flowers 10+ per head.
13. Phyllaries ± equal (outer usually as long as inner); achenes 4–5.5 mm long..... **L. squarrosa**
13. Phyllaries ± unequal (outer shorter than inner); achenes 5.5–6.5 mm long **L. hirsuta**

Liatris acidota (Engelm. & A. Gray) Kuntze, (possibly from Latin: *acidus*, sour, sharp, for the phyllary tips), GULF COAST GAYFEATHER, SHARP GAYFEATHER. Stems 20–90(–130) cm tall; stems and leaves glabrous; lower stem leaves 3–5-nerved; heads in dense spicate arrays, the central axis usually obscured; heads 6–7(–10) mm high; phyllaries glabrous, often purple, margins hyaline, the tips erect to appressed, acuminate to acute; flowers (2–)3–4(–5); achenes 4–4.5 mm long; pappus bristles barbellate to subplumose. Damp acidic soils, coastal prairies, oak-pine savannas; se TX; LA. Jul–Oct.

Liatris aestivalis G.L. Nesom & R. O’Kennon, (summer), SUMMER GAYFEATHER. Stems 20–65 cm tall; glabrous; leaves glabrous, margins sometimes sparsely ciliate, lower stem leaves 1-nerved; heads in dense, cylindrical spicate arrays, the central axis obscured; heads 9–12 mm high; phyllaries glabrous, often dark purple, margins not hyaline, the tips usually acute to acute-attenuate; flowers 3–4(–5); achenes 4.5–6 mm long; pappus bristles plumose. Shallow soils over limestone outcrops, sandy slopes; concentrated in nc TX; also Anderson, Hays, and Travis cos.; OK. Jul–Aug(–Sep).

Liatris aspera Michx., (rough), TALL GAYFEATHER, ROUGH GAYFEATHER. Stems 30–180 cm tall, hispidulous-puberulent; leaves glabrous or hispidulous-puberulent, often gland-dotted, lower stem leaves 1-nerved; heads in loose spicate arrays, the central axis usually easily visible; heads 9–10(–16) mm high; phyllaries glabrous, usually reflexed, strongly puckered at the delimitation of the broadly hyaline lacerate margin, the tips rounded or flattened; flowers (14–)18–24(–30); achenes usually 4.5–6 mm long; pappus bristles barbellate. Sandy soils, prairies, old fields; e and se TX; e and nc U.S. Aug–Oct. [*L. aspera* Michx. var. *salutans* (Lunell) Shinnery]

Liatris bracteata Gaiser, (with bracts), SOUTH TEXAS GAYFEATHER, COASTAL GAYFEATHER. Stems 25–75 cm tall, glabrous; leaves glabrous, gland-dotted, lower stem leaves 1-nerved; heads in loose spicate arrays, the central axis usually easily visible; heads 11–12(–15) mm high; phyllaries glabrous, erect to spreading, margins not hyaline, the upper margins sharply inrolled, forming a point at the tip; flowers 8–14(–16); achenes 6–9 mm long; pappus bristles plumose. Coastal prairies; Colorado and Harris cos., and Waller Co. (Poole et al. 2007); Gulf Coast of c TX. Sep–Nov. Lacking state or federal status, but a species of conservation concern because of its restricted habitat and range, as discussed in Poole et al. (2007) *ET* *!*

Liatris cymosa (H. Ness) K. Schum., (for the branched inflorescence), AGGIELAND GAYFEATHER, BRANCHED GAYFEATHER. Stems 20–75 cm tall, strigose-puberulent; leaves glabrous, may be ciliate-margined, lower stem leaves 1-nerved; heads in open, branched arrays; heads 14–17 mm high; phyllaries glabrous, sparsely short-pilose, margins ciliate, not hyaline, the tips rounded, sometimes with a small terminal point; flowers 20–25; achenes 6–7 mm long; pappus bristles plumose. Post oak woodlands, clay slopes, fencerows; endemic to a small region in ec TX in Brazos, Burleson, Grimes, Lee, Madison, Walker, and Washington cos., and San Jacinto Co. (Kartesz 2015). Jul–Oct. Lacking state or federal status, but a species of conservation concern because of its restricted habitat and range, as discussed in Poole et al. (2007) *EET* *!*

Liatris elegans (Walter) Michx., (elegant), PINK-SCALE GAYFEATHER, HANDSOME BLAZINGSTAR. Stems 30–120 cm tall, puberulent to hirsute; leaves glabrous or sparsely pubescent, gland-dotted, lower stem leaves 1-nerved; heads in dense spicate arrays, the central axis sometimes visible; heads 12–20 mm high; phyllaries strigose, erect to spreading, margins hyaline, the inner phyllaries elongated and petaloid, white to yellow or pinkish to light purple; flowers 4–5, corollas white; achenes usually 3.5–5 mm long; pappus bristles plumose. Nesom 2006t recognized 3 varieties in East TX that may intergrade morphologically:

1. Phyllary tips usually yellowish to creamy white..... var. **bridgesii**

1. Phyllary tips usually pink, lavender-blue, or magenta-purple.

2. Corms broadly club-shaped in outline, 2–4 times as long as wide.....var. **carizzana**

2. Corms mostly spherical in outline, ca. as long as wide var. **elegans**

var. **bridgesii** Mayfield (named for Edwin L. Bridges (1957–), noted plant collector of the se U.S.). Corms depressed-globose; phyllary tips usually yellowish to creamy white, rarely pale lavender. Post oak savannas, fields, sandy roadsides; ec TX from Wood Co. sw to Williamson and Bastrop cos. and se to Angelina Co. Jul–Nov. *EET*

var. **carizzana** Gaiser, (of the Carrizo Sands). Corms elongate and tapering, or sometimes ± globose; phyllary tips usually pink, lavender-blue, or magenta-purple. Deep sandy soils, dunes, live oak savannas, roadsides; sc TX from Bastrop and Fayette cos. sw to Bexar Co. and se to Goliad and Victoria cos.; s coastal TX plains. Jul–Oct. *ET*

var. **elegans**. Corms depressed-globose; phyllary tips usually pink, lavender-blue, or magenta-purple. Sandy clay soils, oak-pine savannas; Widespread in East TX; se U.S. from SC to TX. Aug–Oct. [*Liatris elegans* (Walter) Michx. var. *flabellata* (Small) Gaiser] A hybrid of *L. elegans* var. *elegans* and *L. tenuis* from Angelina and Newton cos. (*L. x orzellii* G.L. Nesom) was described in White & Nesom (2012).

Liatris glandulosa G.L. Nesom & R. O’Kennon, (for the glandular pubescence), STICKY GAYFEATHER. Stems 30–60 cm tall; stems and leaves with stalked glands; lower stem leaves 1-nerved; heads in dense, cylindrical spicate arrays, the central axis obscured; heads 8–12 mm high; phyllaries densely glandular, green or rarely purplish, margins not hyaline, the tips acute to acuminate, sometimes with a small terminal point; flowers 3–4(–5); achenes 5–6 mm long; pappus bristles plumose. Limestone outcrops, shallow gravelly soils; Dallas, McLennan, and Travis cos.; Bosque Co. Aug–Oct. *ET*

Liatris hirsuta Rydb., (hairy), HAIRY GAYFEATHER. Stems 20–70 cm tall; stems and leaves pilose-hirsute; lower stem leaves 3–5-nerved; heads in loose racemose or spicate arrays, the central axis easily visible; heads 11–17 mm high; phyllaries spreading to reflexed, usually sparsely hirsute, margins not hyaline, the tips acute-acuminate; flowers 15–30; achenes 5.5–6.5 mm long; pappus bristles plumose. Prairies, pine-oak woods, rocky slopes, roadsides; Harrison, Polk, and Smith cos. (Kartesz 2015); c U.S. from IA and NE s to TX and GA. Jul–Sep. [*L. squarrosa* (L.) Michx. var. *hirsuta* (Rydb.) Gaiser]

Liatris punctata Hook. (gland-dotted), PLAINS GAYFEATHER, DOTTED GAYFEATHER. Stems 15–85 cm tall, glabrous; leaves glabrous or sparsely pilose-hirsute, gland-dotted, margins sometimes ciliate, lower stem leaves 1-nerved; heads in dense spicate arrays, the central axis usually obscured; heads 7–14 mm high; phyllaries erect to slightly spreading, glabrous, margins not hyaline, sometimes ciliate, the tips acute-acuminate to rounded-truncate, often with a small terminal point; flowers 3–8; achenes usually 6–8.5 mm long; pappus bristles plumose. Nesom 2006t recognized 2 varieties in East TX, which may intergrade morphologically:

1. Corms spherical; heads 7–9(–12) mm highvar. **mucronata**

1. Corms elongate and branched, or large and obovate, not spherical; heads 10–14 mm high.....var. **punctata**

var. **mucronata** (DC.) B.L. Turner, (mucronate, pointed). Corms spherical; heads 7–9(–12) mm high; phyllaries in (4–)5–6 series; flowers (3–)4–5(–6). Prairies, mesquite grasslands, silty clay soils; e to nc and sc TX; sc U.S. from MO s to LA and w to KS and TX. Jul–Nov. [*Liatris mucronata* DC.]

var. **punctata**. Corms elongate and branched, or large and obovate, not spherical; heads 10–14 mm high; phyllaries in 4(–5) series; flowers 4–8. Sagebrush prairies, gravelly slopes, calcareous soils; se TX; mostly w 1/2 TX; plains of c North America. Jul–Nov.

Liatris pycnostachya Michx., (thick-spiked), KANSAS GAYFEATHER, PRAIRIE GAYFEATHER, HAIRY BUTTON-SNAKEROOT. Stems (40–)60–120(–180) cm tall; stems and leaves glabrous to densely pilose-puberulent; leaves weakly gland-dotted, lower stem leaves 3–5-nerved; heads in dense spicate arrays, the central axis obscured; heads 7–9(–10) mm high; phyllaries spreading to reflexed, glabrous to pilose, margins hyaline, sometimes ciliate, the tips acute-acuminate or sometimes petaloid; flowers (4–)5–8; achenes usually 3.8–4.5 mm long; pappus bristles barbellate. At one time, a poultice of the roots was used in treating snakebite, leading to the common name (Tveten & Tveten 1993). Nesom 2006t recognized 2 varieties in East TX, which may intergrade morphologically:

1. Corms globose to elongate; lower stems moderately to densely pilose-puberulent; leaves moderately to densely pilose-

puberulent to nearly glabrous; typically flowering from June–Julyvar. **lasiophylla**

1. Corms globose; lower stems usually glabrous or sparsely pilose; leaves glabrous; typically flowering from late July onwardvar. **pycnostachya**

var. **lasiophylla** Shinnery, (downy- or woolly-leaved). Corms globose to elongate; lower stems moderately to densely pilose-

puberulent; leaves moderately to densely pilose-puberulent to nearly glabrous. Sandy woods, bogs, pine savannas; scattered from ne to se TX; MS and LA. Jul–Nov. [*L. serotina* (Greene) K. Schum.]

var. **pyncnostachya**. Corms globose; lower stems usually glabrous or sparsely pilose; leaves glabrous. Prairies, rocky ridges, sandy woods, roadsides; se TX; c U.S. from WI s to MS and w to ND and TX. Jun–Jul. [*L. bebbiana* Rydb.] Frequently grown as an ornamental. A hybrid of *L. pyncnostachya* and *L. squarrosa* var. *glabrata* from Lamar Co. (*L.* × *johnsonii* M. White) was described in White and Nesom (2012).

Liatris squarrosa (L.) Michx., (with parts spreading or recurved), LOOSESCALE GAYFEATHER, COLICROOT. Stems 30–80 cm tall; stems and leaves glabrous to pilose, puberulent-strigose, or villous; leaves weakly gland-dotted, lower stem leaves 3–5-nerved; heads in loose racemose or spicate arrays, the central axis easily visible; heads 12–20(–25) mm high; phyllaries erect to spreading-reflexed at tips, glabrous or pubescent, margins sometimes ciliate, not hyaline, the tips acute to acuminate; flowers (10–)23–45(–60); achenes 4–5.5 mm long; pappus bristles plumose. Nesom 2006t recognized 2 varieties in East TX, which may intergrade morphologically:

1. Stems, leaves, and outer phyllaries glabrous; widespread in East TX.....var. **glabrata**
 1. Stems usually puberulent-strigose or villous; leaves pilose to nearly glabrous; phyllaries glabrous or pubescent, the margins usually ciliate; in East TX usually restricted to counties near the Red River.....var. **squarrosa**

var. **glabrata** (Rydb.) Gaiser, (somewhat glabrous, becoming glabrous), SMOOTH GAYFEATHER. Stems, leaves, and outer phyllaries glabrous. Prairies, sandy and gravelly soils, roadsides; near the Red River in ne TX in Denton, Fannin, Grayson, Hunt, Lamar, and Red River cos.; Cross Timbers and Panhandle; c U.S. from MN s to AR and w to SD, CO, and TX. Jul–Aug. [*Liatris glabrata* Rydb.] A hybrid of *L. squarrosa* var. *glabrata* and *L. pyncnostachya* from Lamar Co. (*L.* × *johnsonii* M. White) was described in White and Nesom (2012).

var. **squarrosa**. Stems usually puberulent-strigose or villous, the hairs soft, upturned, or appressed; leaves pilose to nearly glabrous; phyllaries glabrous or pubescent, the margins usually ciliate. Sandy-loam soils, oak-pine woods, fencerows; mainly se and e TX; e U.S. from MD s to FL and w to MI, MO, and TX. Jun–Sep. [*L. glabrata* Rydb. var. *alabamensis* (Alexander) Shinnery, *L. squarrosa* (L.) Michx. var. *gracilentata* Gaiser]

Liatris squarrolosa Michx., (with parts slightly spreading or recurved at the ends), SOUTHERN GAYFEATHER, APPALACHIAN BLAZINGSTAR. Stems 25–80(–130) cm tall; stems puberulent; leaves glabrous to puberulent, weakly gland-dotted, if at all, lower stem leaves 1-nerved; heads in loose to dense racemose or spicate arrays, the central axis usually visible; heads (6–)8–12 mm high; phyllaries erect to spreading-reflexed at tips, glabrous or pubescent, margins sometimes weakly hyaline, the tips acute to obtuse to rounded; flowers 11–26(–28); achenes usually 3.5–5.5 mm long; pappus bristles barbellate. Rocky ridges, oak-hickory-pine woods, prairies, fencerows; recorded from Harris, Sabine, and Walker cos. (Kartesz 2015); e U.S. from VA s to GA and w to IL, OK, and TX. Aug–Nov.

Liatris tenuis Shinnery, (slender), SHINNER'S GAYFEATHER, SLENDER GAYFEATHER. Stems 30–55 cm tall; stems strigose-puberulent; leaves sparsely pilose, gland-dotted; lower stem leaves 1(–3)-nerved; heads in loose spicate arrays, the central axis easily visible; heads 10–13 mm high; phyllaries nearly glabrous or sparsely pilose, margins not hyaline, the tips loose and spreading, acute to acuminate, innermost sometimes obtuse; flowers 10–12; achenes 4.2–4.5 mm long; pappus bristles barbellate or plumose near the bases. Sandy soils of fire-maintained upland longleaf pine savannas; deep se TX in Angelina, Jasper, Newton, Sabine, San Augustine, and Tyler cos.; LA. Jun–Sep. Lacking state or federal status, but a species of conservation concern because of its restricted range and habitat loss, as discussed in Poole et al. (2007). A hybrid of *L. tenuis* and *L. elegans* var. *elegans* from Angelina and Newton cos. (*L.* × *orzellii* G.L. Nesom) was described in White & Nesom (2012). *!*

Liatris spicata (L.) Willd. var. *spicata*, (spiked), which would not have keyed to any other species satisfactorily here, can be distinguished by the 3–5-nerved lower leaves, heads in dense spicate arrays, heads 7–11 mm high, phyllaries erect to appressed with tips rounded to obtuse, flowers (4–)5–8(–14) per head, and barbellate pappus bristles. To be expected in se TX based on records from adjacent areas of LA (Beauregard, Calcasieu, and Vernon pars.); e 1/2 North America. Jul–Sep.

LINDHEIMERA A. Gray & Engelm. TEXAS-STAR, STAR DAISY

☛A monotypic genus native to the sw U.S. and n Mexico. (Named for Ferdinand Jacob Lindheimer, 1801–1879, German-born collector of TX plants and correspondent of Asa Gray and George Engelmann, resided in New Braunfels—Geiser 1948) (tribe Heliantheae)

REFERENCES: Turner & Johnston 1956; Turner & Woodruff 1993; Strother 2006t.

Lindheimera texana Engelm. & A. Gray, (of Texas), TEXAS-STAR, YELLOW TEXAS-STAR, LINDHEIMER'S DAISY. Hispid-pubescent taprooted annual 10–30(–65) cm tall; leaves alternate and subopposite or the uppermost opposite; leaf blades oblanceolate to rhombic- or ovate-lanceolate, entire or coarsely toothed, sessile or short-petioled; heads usually solitary or few and corymbose, on peduncles 1–3(–6) cm long; involucre 10–15 mm tall, the phyllaries in 2 series, the outer series narrower, longer, and more acute than the conspicuous inner; ray flowers usually 5, pistillate and fertile, the ligules ca. 1 cm long, yellow or orange-yellow, 2-toothed at apex; disk flowers few, functionally staminate, dull yellow; achenes 4.5–6 mm long, flattened, each shed with its subtending phyllary; pappus absent, shoulders of achene wings projecting and sometimes interpreted as 2 stout awns. Clayey or occasionally sandy prairies, roadsides; common from nc to sc TX; Post Oak Savannah and Blackland Prairie w to Rolling Plains and Edwards Plateau; OK and LA; n Mexico. Mar–May.

LYGODESMIA D. Don SKELETON-WEED, SKELETON-PLANT

☛A genus of ca. 8 species of the Americas, especially w North America. (Greek: *lygos*, a plant twig, and *desme*, a bundle, from clustered stick-like or twiggy stems) (tribe Cichorieae)

REFERENCES: Vuilleumier 1973; Tomb 1980; Bogler 2006d.

Lygodesmia texana (Torr. & A. Gray) Greene, (of Texas), TEXAS SKELETON-PLANT, RUSH-PINK, ROSE-RUSH, RUSHWEED, PURPLE-DANDELION, FLOWERING-STRAW, MILK-PINK. Glabrous and glaucous perennial with deep, thick, woody root producing in age numerous vertical to oblique rhizomes, terminating in above-ground stems, forming clumps; sap milky; stems 20–65 cm tall, with few reduced leaves or bracts, openly and stiffly branched toward summit; leaf blades mostly basal, linear to lanceolate, entire or usually deeply pinnately lobed; heads large; involucre subcylindrical, 18–25 mm high; phyllaries in one row, linear, equal in length, margins scarios; flowers all ligulate, with heavy sweet scent; corollas purple to pale lavender (rarely white), open during morning hours; achenes 13–17 mm long; pappus of hair-like bristles, 10–15 mm long. Limestone outcrops and rocky calcareous soils; widespread in TX except the extreme e part of the state; OK and NM; n Mexico. May–Sep. [*L. aphylla* (Nutt.) DC. var. *texana* Torr. & A. Gray]

MARSHALLIA Schreb. BARBARA'S BUTTONS

Herbaceous perennials, usually 20–80 cm tall; leaves in a basal rosette, alternate on the stems, entire, glabrous; heads 20–32 mm wide; phyllaries in ± 2 series, subequal, herbaceous; ray flowers absent; disk flowers sweet-scented, corollas pale lavender, purple, pink, or white, usually hairy, lobes long and often contorted; achenes 5-angled, 10-ribbed; pappus of 5(–6) scales.

☛A genus of 7 species native to the e U.S. Watson and Estes (1990) indicated that morphological variation is continuous among the species and that there are few abrupt boundaries. (Named for Dr. Moses Marshall, 1785–1813, nephew of the better-known early American pioneer Humphrey Marshall) (tribe Heliantheae)

REFERENCES: Channell 1957; Watson & Estes 1990; Watson 2006c.

1. Corollas usually white, sometimes pale lavender; phyllaries 9–12 mm long; flowering Apr–Jun **M. caespitosa**
 1. Corollas usually pale lavender to purple, rarely white; phyllaries 4–9.5 mm long; flowering Jul–Oct **M. graminifolia**

Marshallia caespitosa Nutt. ex DC., (growing in tufts), PUFFBALLS, BARBARA'S BUTTONS. Aerial stems unbranched, usually clustered; basal leaves linear, linear-elliptic, or linear-oblanceolate; heads borne singly; phyllaries 9–12 mm long; corollas usually white, sometimes pale lavender. Clay prairies, limestone outcrops, sandy soils; East TX w to nc TX, e Rolling Plains, Edwards Plateau, and sc TX; sc U.S. from MO s to LA and w to KS and TX. Apr–Jun. [*M. caespitosa* Nutt. ex DC. var. *signata* Beadle & F.E. Boynt.] We are following Watson (2006c) in not recognizing varieties.

Marshallia graminifolia Walter (Small), (grass-leaved), GRASS-LEAVED BARBARA'S BUTTONS. Aerial stems simple, or branched in the lower portion; basal leaves oblanceolate; heads borne singly or in open, long-pedunculate, corymbose arrays; phyllaries 4–9.5 mm long; corollas usually pale lavender to purple, rarely white. Wet soils, pine savannas, pitcher plant bogs; se TX; se U.S. from NC s to FL and w to TX. Jul–Oct. [*M. graminifolia* (Walter) Small subsp. *tenuifolia* (Raf.) L. Watson, *M. tenuifolia* Raf.] If varieties are recognized, ours would be var. *cynanthera* (Elliott) Beadle & F.E. Boynt.

Marshallia trinervia (Walter) Trel., (3-nerved), BROAD-LEAVED BARBARA'S BUTTONS, which would key to *M. caespitosa* here (but would more likely be mistaken for *Monarda fistulosa*—wild bergamot or lavender beebalm, in the Lamiaceae), can be

distinguished by its ovate leaves, which are not reduced up the stem, and its pink corollas. To be expected in East TX based on records from adjacent Vernon Par., LA; se U.S. from NC s to GA and w to LA. May–Jun.

MATRICARIA L. MAYWEED, GERMAN CHAMOMILE

Taprooted annuals; often aromatic; to 80 cm tall (but usually much smaller); leaves alternate, usually 2–3-pinnately lobed, the bases sheathing or clasping, ultimate margins entire; phyllaries in several series, subequal, margins and tips scarious; ray flowers pistillate and fertile or absent, corollas white (when present); disk flowers perfect and fertile, corollas yellow to greenish yellow; achenes ribbed, glabrous, usually asymmetric; pappus of a small crown, or auricles (on ray achenes), or absent.

☛A genus of 7 species native to North America, Eurasia, and n Africa; several have a long history of cultivation for herbal and medicinal uses; a few are weedy. (Greek: *matrix*, womb, and *aria*, pertaining to, alluding to reputed medicinal properties) (tribe Anthemidae)

REFERENCES: Rydberg 1916; Brouillet 2006b.

1. Heads with both ray and disk flowers, ray corollas white; plants smelling of sweet hay when bruised **M. chamomilla**
 1. Heads with only disk flowers; plants smelling of pineapple when bruised..... **M. discoidea**

Matricaria chamomilla L., (chamomile), GERMAN CHAMOMILE. Plants smelling of sweet hay when bruised; heads borne singly; peduncles usually 20–50 mm long; ray flowers present, corollas white; disk corollas yellow to yellowish green, 1.6–1.8 mm long, lobes 5; achenes 0.75–0.9 mm long; pappus usually absent, sometimes a small crown, or toothed auricles on ray achenes. Disturbed sites, roadsides, persisting in abandoned gardens; Gonzales Co.; also s TX in Nueces, Starr, and Webb cos.; scattered across much of North America; Eurasia. Apr–Jul. [*Chamomilla recutita* (L.) Rauschert, *M. courrantiana* DC., *M. recutita* L.] Native of Eurasia. A popular herbal remedy of long historical use, particularly as a tea made from the dried heads, it has been found to have antimicrobial and anti-inflammatory properties (McKay & Blumberg 2006). *M. chamomilla* closely resembles *Anthemis nobilis*, Roman chamomile, in appearance, and has similar uses, but is not as sweetly-scented.
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Matricaria discoidea DC., (disc-shaped), DISC MAYWEED, PINEAPPLE WEED. Plants smelling of pineapple when bruised; heads borne singly or in open corymbose arrays; peduncles usually 2–25 mm long; ray flowers absent; disk corollas yellowish green, 1.1–1.3 mm long, lobes 4(–5); achenes 1.15–1.5 mm long; pappus a small crown. Disturbed sites, roadsides, persisting in abandoned gardens; collected in Brazos Co. in 1959 (F.W. Gould 8640 (TAES)); also recorded in Brown Co. (iNaturalist.org observation 2918215 by Donna Bohnsack, Apr 2016 (iNaturalist.org 2016)); across most of North America except deep se U.S. states; introduced in Eurasia and Australia. Spring–summer. [*Chamomilla discoidea* (DC.) J. Gay ex A. Braun, *C. suaveolens* (Pursh) Rydb., *Santolina suaveolens* Pursh]

MELAMPODIUM L. BLACK-FOOT DAISY, ROCK DAISY

Ours herbaceous perennials or weak subshrubs; stems erect or prostrate; leaves opposite; heads borne singly; phyllaries in 2 series, the outer 5 often ± fused and forming a cupule; each inner phyllary subtending and clasping a ray flower ovary, creating a fruit-like structure that encloses the achene and is shed with it upon maturity; ray flowers pistillate and fertile, ligules white (in ours); disk flowers functionally staminate, yellow to orange; achenes each partially enclosed within and shed with the subtending phyllary as a conical, fruit-like structure; pappus absent.

☛A genus of 36 species native to tropical and warm areas of the Americas, especially Mexico. (Greek: *melas*, black, and *podos*, foot or base, apparently alluding to the fruit-like structure enclosing the mature achene, which turns black upon maturity) (tribe Heliantheae)

REFERENCES: Turner & King 1962; Stuessy 1971, 1972, 1979; Stuessy & Crisci 1984; Strother 2006u.

1. Outer 5 phyllaries united 1/3 their lengths or less; ray ligules 2–8+ mm long and 1–3+ mm wide **M. cinereum**
 1. Outer 5 phyllaries united 1/2 their lengths or more; ray ligules 7–13 mm long and 2.5–8 mm wide **M. leucanthum**

Melampodium cinereum DC., (ashy, for the soft grayish hairs on the leaves), SOUTH TEXAS ROCK DAISY, HOARY BLACKFOOT. Herbaceous or weakly subshrubby perennial; stems 10–20+ cm tall; leaves sessile, blades linear-oblong to linear, 10–55 mm long, usually pinnately lobed; outer 5 phyllaries united 1/3 their lengths or less; ray flowers 7–13, ligules 2–8+ mm long, 1–3+ mm wide; fruits enclosing achenes 1.3–2.2 mm long. Open sites, gravel, juniper scrublands, grasslands; on sw edge of East TX in Bexar Co.; Edwards Plateau and South TX Plains; Mexico. Feb–Oct. If varieties are recognized, ours would be var.

cinereum.

Melampodium leucanthum Torr. & A. Gray, (white-flowered), BLACK-FOOT DAISY, ROCK DAISY, PLAINS BLACKFOOT. Herbaceous or weakly subshrubby perennial; stems 12–40(–60) cm tall; leaves sessile, blades lanceolate to linear-oblong or linear, 20–35(–45) mm long, entire to pinnately lobed; outer 5 phyllaries united 1/2 their lengths or more; ray flowers 8–13, ligules 7–13 mm long, 2.5–8 mm wide; fruits enclosing achenes 1.5–2.6 mm long. Calcareous soils, juniper scrublands, grasslands, roadcuts; w edge of East TX from McLennan Co. sw to Bexar Co.; also Washington Co.; Lampasas Cut Plain and East Cross Timbers w to High Plains and Trans-Pecos; Mexico. Apr–Sep. Increasingly popular as a native xeriscaping ornamental.

MICROPSIS DC. STRAIGHTJACKETS

☛A genus of 5 species of the sc U.S. and s South America; resembling and related to *Diaperia* (*Evax*). (Greek: the genus *Micropus*, and *opsis*, resembling, for its similarity to that genus) (tribe Inuleae)

REFERENCES: Beauverd 1913; Morefield 2004, 2006b.

Micropsis dasycarpa (Griseb.) Beauverd, (thick-fruited), BIGHEAD STRAITJACKETS. Very small annuals, to 10 cm tall, taprooted; leaves alternate, spatulate, silvery or greenish gray; heads small and inconspicuous, congested in dense terminal clusters, subtended by leafy bracts, usually embedded in white cottony pubescence; heads 4–5 mm high; ray flowers absent; disk flowers of 2 series, most pistillate and fertile, a few perfect and fertile and enclosed by pales (chaff); achenes minute; pappus usually absent. Known only from one site in the U.S., in drying mud at the edge of a Gulf Coast Prairie pool in Victoria Co. (R.C. Barneby 18201 (TEX)), where it is either a recent introduction or possibly an overlooked native species; se South America. Mar–May. [*Filago dasycarpa* Griseb.] *1*?

MIKANIA Willd. HEMPWEED, CLIMBING HEMPWEED

Perennial vines twining to 3+ m; leaves opposite, petiolate, ovate to cordate or deltoid; heads arranged in spicate or corymbose panicles; phyllaries 4, ± equal; ray flowers absent; disk flowers 4, corollas white to cream or pinkish to purplish; achenes usually 5-ribbed; pappus of 30–60 bristles.

☛A mainly tropical genus of ca. 450 species of climbers; our two species are the only Asteraceae in the East TX flora that are twining vines. (Named for Joseph Gottfried Mikan, 1743–1814, professor at the University of Prague) (tribe Eupatorieae)

REFERENCES: Holmes 1981, 1990, 2006.

1. Stems 6-angled; heads 7–10 mm high; phyllaries 6–8 mm long, elliptic-ovate, acute to slightly rounded at tips; corollas white, the lobes linear; achenes 3–4 mm long; rare species of deep se TX..... **M. cordifolia**
1. Stems rounded or slightly 6-angled; heads 6–7 mm high; phyllaries 5–6 mm long, linear-lanceolate, acuminate; corollas pinkish or purplish, sometimes white, the lobes triangular; achenes 1.8–2.2 mm long; common across e and se TX **M. scandens**

Mikania cordifolia (L.f.) Willd., (heart-leaved), FLORIDA KEYS HEMPVINE, GUACO. Perennial twining vine; stems 6-angled; leaf blades deltoid to ovate, 5–10 cm long, acute to acuminate, bases cordate, margins subentire to undulate-dentate; heads 7–10 mm high; phyllaries 6–8 mm long, elliptic-ovate, acute to slightly rounded at tips; disk corollas white, the lobes linear; achenes 3–4 mm long, sparsely gland-dotted; pappus white, 4–5 mm long. Low woodlands, seeps, along streams; in TX recorded only from Newton and Tyler cos.; se U.S. from GA s to FL and w to TX; West Indies, Mexico, Central and South America. Sep–Dec. [*Cacalia cordifolia* L.f.]

Mikania scandens (L.) Willd., (scandent, climbing), CLIMBING HEMPWEED, HEMPVINE, CLIMBING-BONESET. Perennial twining vine; stems slightly 6-angled or rounded; leaf blades deltoid to ovate, 3–15 cm long, generally acuminate, bases cordate to hastate, margins subentire to undulate, crenate, or dentate; heads 6–7 mm high; phyllaries 5–6 mm long, linear-lanceolate, acuminate; disk corollas pinkish to purplish, sometimes white, the lobes triangular; achenes 1.8–2.2 mm long, densely gland-dotted; pappus pinkish or purplish, 4–4.5 mm long. Low woodlands, swamps, thickets along streams; e and se TX w to East Cross Timbers and Edwards Plateau; also far s TX; e and se U.S. from ME s to FL and w to MI and TX; West Indies and Mexico. Jul–Dec. [*Eupatorium scandens* L., *M. scandens* (L.) Willd. var. *pubescens* (Nutt.) Torr. & A. Gray]

ONOPORDUM L. COTTON-THISTLE, SCOTCH-THISTLE

☛A genus of ca. 60 species of prickly herbs native to Europe, the Mediterranean region, and w Asia. (Ancient Greek name of the plant, from *onos*, donkey, and *porde*, flatulence, Pliny stating that it produced flatulence when eaten by donkeys) (tribe

Cardueae)

REFERENCES: Dress 1966; Keil 2006f.

Onopordum acanthium L., (prickly), SCOTCH-THISTLE. Coarse biennial 0.5–3 m tall, often gray from sparse to dense cottony pubescence; stems with wings 5–15 mm wide, these with spine-tipped lobes; leaves alternate, lobed or toothed, conspicuously spiny-margined, sessile, decurrent; heads terminal, solitary or 2–3 in ± loose clusters, large (2.5+ cm in diam.); phyllaries in 8–10 series, linear-subulate, ascending-spreading, tapering from base to spine-tip; ray flowers absent; disk corollas purplish or pinkish, slender, 22–25 mm long; achenes 4–5 mm long; pappus of numerous barbellate bristles 7–9 mm long. Roadsides and disturbed areas; first seen in TX at the Fort Worth stockyards (Tarrant Co.) in 1938; in East TX recorded only in Collin Co., Dallas Co. (Kartesz 2015), and Bell Co. (L.L. Hansen-Sanchez 3562 (BRIT)); also a few cos. in nc TX and Edwards Plateau; scattered across North America and naturalized in many countries. May–Jul. Native of Eurasia; the national emblem of Scotland. A noxious weed and a potential problem species for TX. *I* *NOX*

PACKERA (L.) Á. Löve & D. Löve RAGWORT, GROUNDSEL, BUTTERWEED

Ours annual or perennial herbs, glabrous to woolly pubescent; leaves alternate, toothed to pinnately compound; inflorescences terminal, the heads cymosely or umbellately arranged; primary (inner) phyllaries in a single series, linear, with hyaline margins, reflexing at maturity, subtended by a secondary series of short, phyllary-like bracts; ray flowers in ours 8–13, pistillate, fertile, corollas yellow; disk flowers perfect, fertile, corollas yellow; achenes cylindrical, usually prominently 5–10-ribbed; pappus of numerous, finely barbed, white bristles, easily detached from the achene.

•A genus of 64 species centered in temperate North America, but with 16 species in Mexico and 1 or 2 in Siberia; it is well known for imprecise species boundaries and intergrading characters (Barkley et al. 1996; Trock 2006b) and was formerly included in the genus *Senecio*. *X*As with *Senecio*, some *Packera* species contain pyrrolizidine alkaloids (e.g., senecionine) which can cause severe liver damage and even death in livestock (Morton 1982); because similar effects are to be expected in people, the plants should not be used as herbal teas or otherwise ingested. (Named for John G. Packer, botanist and friend of Áskell & Doris Löve, who named the genus) (tribe Senecioneae)

REFERENCES: Greenman 1915–1918; Barkley 1962, 1978, 1980, 1981, 1985a, 1985b, 1986, 1988; Vuilleumier 1969a; Freeman & Barkley 1995; Barkley et al. 1996.; Trock 2006b.

1. Basal leaves pinnately compound or very deeply lobed; basal leaves and stem leaves usually similar; large leaves ± well-distributed along the stem, only gradually reduced upwards; annuals and biennials, without rhizomes or stolons.
 2. Plants from a cluster of fibrous roots; stems usually hollow; ray ligules 7–9 mm long; disk corolla tubes 2.5–3.5 mm long; achenes sparsely hirtellous on ribs or glabrous; plants of generally partially-shaded, drier sites..... **P. glabella**
 2. Plants from a delicate, distinct taproot; stems usually solid; ray ligules 3–7 mm long; disk corolla tubes 1.5–2.5 mm long; achenes hirtellous on ribs; plants of generally sunny, moist sites..... **P. tampicana**
1. Basal leaves nearly entire to shallowly toothed or deeply lobed; basal leaves and stem leaves quite different in appearance; largest leaves crowded near base of plant, progressively reduced up the stem; perennials, sometimes with rhizomes or stolons.
 3. Plants glabrous except in leaf axils; basal leaf blades orbiculate, ovate or obovate, < 1.5 times as long as wide..... **P. obovata**
 3. Plants with sparse or dense woolly or cobwebby pubescence on the lower stem internodes, leaves, and nodes of the inflorescences; basal leaf blades narrowly elliptic to elliptic-ovate or oblanceolate, sublyrate, or lanceolate, > 1.5 times as long as wide.
 4. Stems 1–3 in clusters; basal leaves rosette-forming, sparsely hairy beneath; ray flowers 8–10 per head, ligules 9–10 mm long; achenes 1.5–2.5 mm long, hirtellous or glabrous; plants mostly of c and w TX..... **P. plattensis**
 4. Stems usually 1; basal leaves usually not rosette-forming, usually with cobwebby or thick cottony pubescence beneath; ray flowers 10–13 per head, ligules 6–8+ mm long; achenes 1–1.5 mm long, hispid; plants of deep e and ne TX..... **P. tomentosa**

Packera glabella (Poir.) C. Jeffrey, (nearly hairless), BUTTERWEED, YELLOWTOP, CRESS-LEAF GROUNDSEL. Annuals or biennials, 20–70+ cm tall, fibrous-rooted; stems usually hollow; basal and lower leaves short-petiolate, blades deeply pinnatifid or once-pinnate, terminal leaf segments sub-orbicular to ovate or obovate, margins crenate to irregularly undulate, upper leaves reduced and weakly clasping; primary phyllaries 5–7 mm long; ray ligules 7–9 mm long; achenes 1–1.5 mm long; pappus 3–4 mm long. Partially-shaded areas, disturbed sites, along streams; e and se TX, w to nc and sc TX; c and se U.S. from OH s to FL and w to NE and TX. Mar–May. [*Senecio glabellus* Poir., *S. carolinianus* Spreng., *S. densiflorus* M. Martens, *S. lobatus* Pers.] This species is superficially similar to *P. tampicana*, but tends to be larger, and inhabits drier, shadier sites. Liver damage and death have been reported in livestock that have consumed this species; symptoms may not appear for 1 or 2 months after grazing (Morton 1982). *X*

Packera obovata (Muhl. ex Willd.) W.A. Weber & Á. Löve, (obovate), GOLDEN GROUNDSEL, ROUND-LEAF GROUNDSEL, ROUND-LEAF RAGWORT. Perennials, 20–75+ cm tall, rhizomatous and stoloniferous (forming colonies in moist sites); basal and lower leaves petiolate, simple, blades orbiculate or ovate to obovate, often purplish beneath, margins crenate to serrate, upper leaves reduced and clasping, sublyrate or pinnatisect; primary phyllaries 3–6 mm long; ray ligules 7–10 mm long; achenes 1–1.5 mm long; pappus 3–6 mm long. Stream bottoms, woodland meadows, rocky hillsides; e and se TX, w to nc TX and Edwards Plateau; also Trans-Pecos; e and sc U.S. from NH s to FL and w to MI, KS, and NM; Canada; Mexico. Feb–Apr. [*Senecio obovatus* Muhl. ex Willd., *S. aureus* L. var. *obovatus* (Muhl. ex Willd.) Torr. & A. Gray, *S. elliottii* Torr. & A. Gray, *S. elongatus* Pursh, *S. rotundus* (Britton) Small] This is one of the earliest-flowering native wildflowers in East TX.

Packera plattensis (Nutt.) W.A. Weber & Á. Löve, (of the Platte River region), PRAIRIE GROUNDSEL, PRAIRIE RAGWORT. Perennials or biennials, 20–60+ cm tall, rhizomatous and fibrous-rooted, sometimes stoloniferous; basal and lower leaves petiolate, blades suborbiculate or elliptic-ovate to obovate or sublyrate, often with cobwebby hairs, margins nearly entire to crenate or serrate-dentate to pinnately lobed, upper leaves reduced and petiolate, sublyrate or pinnatisect; primary phyllaries 5–6+ mm long; ray ligules 9–10 mm long; achenes 1.5–2.5 mm long; pappus 6.5–7.5 mm long. Prairies and open woods, roadsides, calcareous soils; uncommon in East TX, mostly nc TX to sc TX, w to Rolling Plains and s to Edwards Plateau; also Trans-Pecos; mostly c 1/3 North America, scattered farther e. Feb–May. [*Senecio plattensis* Nutt., *S. pseudotomentosus* Mack. & Bush] Reported to be poisonous (Kingsbury 1964). *X*

Packera tampicana (DC.) C. Jeffrey, (of Tampico, Mexico), YELLOWTOP, GREAT PLAINS RAGWORT. Annuals, 20–50+ cm tall, taprooted; basal and lower leaves petiolate, often variously anthocyanic, blades deeply pinnatifid or once-pinnate, terminal leaf segments reniform to orbiculate, margins crenate or dentate to irregularly lobed, upper leaves reduced and auriculate-clasping; primary phyllaries 3–7 mm long; ray ligules 3–7 mm long; achenes 1–1.5 mm long; pappus 3–5 mm long. Weedy in low prairies, disturbed areas, roadsides, typically in moist, open places; populations in some areas can number in the tens of thousands; widespread in TX, more abundant in e 1/2; KS, OK, AR, and LA; Mexico. Feb–May. [*Senecio imparipinnatus* Klatt., *S. greggii* Rydb., *S. tampicanus* DC.]

Packera tomentosa (Michx.) C. Jeffrey, (woolly pubescence), WOOLLY GROUNDSEL, WOOLLY RAGWORT. Perennials, 30–60+ cm tall, taprooted, sometimes stoloniferous; basal and lower leaves petiolate, blades lanceolate to narrowly ovate or elliptic, with cobwebby or cottony pubescence beneath, margins nearly entire to crenate or serrate-dentate, upper leaves reduced and petiolate or sessile and weakly clasping, dentate to pinnately lobed; primary phyllaries 5–8 mm long; ray ligules 6–8+ mm long; achenes 1–1.5 mm long; pappus 5–7 mm long. Meadows, roadsides, sandy or shallow soils; deep e and ne TX; se U.S. from NJ s to FL and w to OK and TX. Apr–May. [*Senecio alabamensis* Britton ex Small, *S. tomentosus* Michx.]

PALAFOXIA Lag.

Ours annual or perennial herbs, sometimes glandular; leaves alternate or lowest ones opposite, sessile or petiolate, blades linear to broadly lanceolate, sparsely to moderately pubescent; heads in corymbose arrays; phyllaries in 2–3 series, subequal or unequal, tips often purplish or whitish, reflexed at maturity; receptacles naked; ray flowers pistillate and fertile or absent, corollas pinkish to purplish or white, ligules prominently 3-toothed; disk flowers perfect and fertile, radially symmetrical or irregularly lobed and sometimes simulating rays, corollas pinkish to purplish or white; achenes obpyramidal, 4-angled, pubescent; pappus of 4–10 scales, minute to awn-like, sometimes varying within a head.

☛ A genus of 12 species native to the s U.S. and Mexico; some are cultivated as ornamentals. (Named for General José de Palafox, 1780–1847, a Spanish duke) (tribe Heliantheae)

REFERENCES: Baltzer 1944; Cory 1946; Shinnars 1952; Turner & Morris 1976; Strother 2006v.

1. Stems without stalked glands; heads with disk flowers only; all achenes with similar pappus.
 2. Phyllaries 3–5 mm long; corollas 5–6 mm long; pappus scales of central achenes mostly 0.3–1 mm long **P. callosa**
 2. Phyllaries 5–10 mm long; corollas 7–10 mm long; pappus scales of central achenes (1.5–)3–8 mm long.
 3. Leaf blades narrowly lanceolate to linear, 2–6(–12) mm wide; phyllaries usually with stalked glands **P. rosea**
 3. Leaf blades mostly lanceolate, (5–)10–20 mm wide; phyllaries usually lacking stalked glands **P. texana**
1. Stems with stalked glands (at least in the upper portion); heads with conspicuous ray flowers; ray and disk achenes with pappus differing in size.
 4. Leaf blades narrowly lanceolate to linear, 2–6 mm wide; phyllaries 6–8 mm long; achenes 5–6 mm long **P. reverchonii**
 4. Leaf blades broadly to narrowly lanceolate, 3–25 mm wide; phyllaries 7–16+ mm long; achenes 6–9 mm long.
 5. Stems usually with stalked glands ± throughout; phyllaries mostly 3–5 mm wide; ray corollas 10–20 mm long, ligules 9–14 mm long; common in East TX **P. hookeriana**
 5. Stems with stalked glands only in the upper portion and on the peduncles, or lacking stalked glands entirely;

phyllaries mostly 1.5–3 mm wide; ray corollas 15–25 mm long, ligules 5–8(–12) mm long; rare in East TX **P. sphacelata**

Palafoxia callosa (Nutt.) Torr. & A. Gray, (thick-skinned), SMALL PALAFOXIA. Annuals, 20–60 cm tall; stems lacking stalked glands; leaf blades linear; phyllaries 3–5 mm long; ray flowers absent; disk corollas 5–6 mm long; achenes 3–5 mm long; pappus scales of central achenes 0.3–1 mm long. Calcareous and rocky soils, disturbed habitats; e and sc TX w to nc TX, Rolling Plains, and Edwards Plateau; MO, AR, OK, LA, and MS; Mexico. Jul–Sep. [*P. callosa* (Nutt.) Torr. & A. Gray var. *bella* (Cory) Shinnery]

Palafoxia hookeriana Torr. & A. Gray, (for Sir William Jackson Hooker, 1785–1865, director of Kew Gardens), SHOWY PALAFOXIA, HOOKER'S PALAFOXIA, SAND PALAFOXIA. Annuals, 25–180 cm tall; stems usually with stalked glands throughout; leaf blades broadly to narrowly lanceolate; phyllaries 7–16+ mm long; ray corollas 10–20 mm long, ligules 9–14 mm long; disk corollas 10–12 mm long; achenes 6–9 mm long; pappus scales of central achenes 5–8 mm long. Sandy soils, often in forested areas; mainly se to sc TX; s TX Plains; endemic to TX. Sep–Nov. [*P. hookeriana* Torr. & A. Gray var. *minor* Shinnery] *ET*

Palafoxia reverchonii (Bush) Cory, (for Julien Reverchon, 1837–1905, a French-American immigrant to Dallas and important botanical collector of early TX), REVERCHON'S PALAFOXIA. Annuals, 10–90 cm tall; stems usually with stalked glands in the upper portion; leaf blades narrowly lanceolate; phyllaries 6–8 mm long; ray corollas 15–25 mm long, ligules 6–12 mm long; disk corollas 5–8 mm long; achenes 5–6 mm long; pappus scales of central achenes 3–6 mm long. Sandy soils, wooded areas; e and se TX; endemic to TX. Sep–Oct. *ET*

Palafoxia rosea (Bush) Cory, (rose-colored), ROSY PALAFOXIA, SLENDER PALAFOXIA. Annuals, 10–50 cm tall; stems lacking stalked glands; leaf blades linear-lanceolate; phyllaries 5–10 mm long; ray flowers absent; disk corollas 7–10 mm long; achenes 5–8 mm long; pappus scales of central achenes (1.5–)3–8 mm long. Sandy soils, disturbed habitats; mainly se and sc TX; c TX, Trans-Pecos, and Panhandle; KS, OK, WY, CO, and NM. Jun–Nov. [*P. rosea* (Bush) Cory var. *macrolepis* (Rydb.) B.L. Turner & Morris]

Palafoxia sphacelata (Nutt. ex Torr.) Cory, (dead, withered), RAYED PALAFOXIA, WESTERN PALAFOXIA, OTHAKE. Annuals, 10–90 cm tall; stems usually with stalked glands in the upper portion; leaf blades broadly to narrowly lanceolate; phyllaries 9–12+ mm long; ray corollas 15–25 mm long, ligules 5–12 mm long; disk corollas 10–14 mm long; achenes 6–9 mm long; pappus scales of central achenes 7–9 mm long. Sandy soils, grasslands; rare in East TX, with a single disjunct record in Grayson Co. in Red River drainage (Turner & Morris 1976); mainly Trans-Pecos and Panhandle e to Rolling Plains; SD, KS, OK, CO, and NM; Mexico. Jul–Oct. [*Othake sphacelata* (Nutt. ex Torr.) Rydb.]

Palafoxia texana DC., (of Texas), TEXAS PALAFOXIA. Annuals or perennials, 20–80 cm tall; stems lacking stalked glands; leaf blades ovate-lanceolate to linear-lanceolate; phyllaries 5–8 mm long; ray flowers absent; disk corollas 7–10 mm long; achenes 4–6 mm long; pappus scales of central achenes 2–6 mm long. Calcareous and gravelly soils, limestone hills, shrublands; at extreme sw margin of East TX in Bexar and Jackson cos. and Goliad Co. (TEX); s TX Plains; FL and LA; Mexico. Feb–Nov. [*P. texana* DC. var. *ambigua* (Shinnery) B.L. Turner & Morris]

PARTHENIUM L. FEVERFEW

Ours annual, biennial, or perennial herbs or subshrubs; leaves sometimes in a basal rosette, alternate on stems, petiolate or sessile, blades coarsely toothed or 1–2-pinnately lobed, usually hairy and gland-dotted (at least beneath); heads small, borne in corymbose or paniculate arrays; involucre 3–8(–12+) mm wide; phyllaries in 2 series; receptacles with pales (chaff) enfolding some or all disk flowers; ray flowers 5(–8), pistillate, fertile, corollas whitish to pale dingy yellow, ligules minute (to 2 mm long) or sometimes absent; disk flowers functionally staminate, not producing mature achenes, corollas whitish to pale dingy yellow, often obscured by pubescence; achenes black, oblanceolate, each shed with a subtending phyllary and 2 contiguous disk flowers and their subtending pales (chaff); pappus absent (achene shoulders may bear 1–4 pappus-like short awns or scales which sometimes can be observed projecting from the head adjacent to the ligules at anthesis).

♣A genus of ca. 16 species native to the New World. The genus also contains the GUAYULE RUBBER PLANT (*P. argentatum* A. Gray), a source of natural rubber (Rollins 1950) native to w TX and Mexico; during World War II, because of rubber shortages, a program to grow that species was carried out by the U.S. Forest Service (McGinnies in Foster et al. 1983). (Greek: *parthenos*, virgin (allusion unclear), or *parthenion*, an ancient name of some plant) (tribe Heliantheae)

REFERENCES: Rollins 1950; Mears 1975; Strother 2006w.

1. Subshrubs; leaves usually 1.5–2.5 cm long; outer phyllaries 1.5–2 mm long **P. incanum**
1. Annuals, biennials, or herbaceous perennials; leaves usually 3+ cm long; outer phyllaries 2–5 mm long.

2. Perennials; leaf blade margins usually crenate to serrate, sometimes coarsely toothed or somewhat lobed (but then only toward bases); pappus-like achene shoulder projections absent or if present then narrowly awn-like or thread-like.....**P. integrifolium**
2. Annuals or biennials; leaf blades mostly 1–2-pinnately lobed; pappus-like achene shoulder projections usually 2, deltate to ovate.
3. Biennials (sometimes flowering first year or persisting); leaf blades usually 1-pinnately lobed, strigillose beneath, usually with erect hairs 1–2 mm long.....**P. confertum**
3. Annuals (rarely persisting); leaf blades usually 2-pinnately lobed, scabrellous beneath, seldom with erect hairs 1–2 mm long.....**P. hysterophorus**

Parthenium confertum A. Gray, (crowded, for its closely-packed heads), GRAY'S FEVERFEW. Biennials, usually 10–30 cm tall; most leaves 1-pinnately lobed, strigillose and gland-dotted; outer phyllaries 2.5–3+ mm long; ray ligules absent or 0.1–0.5 mm long; achenes 2–3 mm long, pappus-like achene shoulder projections deltate to ovate. Sandy plains, mesquite grasslands, shallow soils; sw border of East TX in Travis, Hays, and Bexar cos.; Edwards Plateau, Trans-Pecos, and s TX; AZ and NM; Mexico. Apr–Nov. [*P. confertum* A. Gray var. *divaricatum* Rollins, *P. confertum* A. Gray var. *lyratum* (A. Gray) Rollins, *P. confertum* A. Gray var. *microcephalum* Rollins] We are following Strother 2006w in not recognizing varieties of this highly variable species.

Parthenium hysterophorus L., (old generic name, from Greek: *hystéra*, womb or uterus, and *phoros*, bearing), FALSE RAGWEED, RAGWEED PARTHENIUM, SANTA-MARIA, FEVERFEW, CICUTILLA. Annuals, usually 30–120+ cm tall; most leaves 2-pinnatifid, scabrellous and gland-dotted; outer phyllaries 2–4 mm long; ray ligules 0.3–1 mm long; achenes 1.5–2(–3.5) mm long, pappus-like achene shoulder projections deltate to ovate. In and near towns and farms, disturbed areas; widespread in TX but less common in the far e and w parts of the state; scattered in e and c U.S. but more common in the se; Mexico; introduced and weedy in tropical and warm temperate zones worldwide. Summer–fall (sporadically in all seasons). Hairs and sessile capitate glands on the leaf surfaces contain sesquiterpene lactones (parthenin and ambrosin) which can cause serious contact dermatitis in some individuals; this Central American native was introduced in India (first noted in 1956) presumably as a contaminant with cereal grains, where it has become a problematic alien invader, crowding out the native flora and causing dermatitis in agricultural workers (Lampe 1986; Mabberley 1987). *I*

Parthenium incanum Kunth, (hoary-gray), RAYWEED, HOARY PARTHENIUM, MARIOLA. Subshrubs, 30–100+ cm tall; leaves pinnately or lyrate lobed, gray-white tomentose and gland-dotted; outer phyllaries 1.5–2 mm long; ray ligules 1–1.5 mm long; achenes 1.5–2 mm long, pappus-like achene shoulder projections awn-like. Openings in desert scrub, often on limestone soils; recorded in Travis Co., disjunct from other TX records; mostly Trans-Pecos, also High Plains and s TX; AZ, NM, NV, and UT; Mexico. May–Oct.

Parthenium integrifolium L., (entire-leaved), WILD QUININE. Perennials, usually 30–60 cm tall; leaves coarsely toothed or somewhat lobed (then mostly toward bases), hispid to scabrous and gland-dotted; outer phyllaries 3–5 mm long; ray ligules 1–2+ mm long; achenes 3–4+ mm long, pappus-like achene shoulder projections absent or awn-like to thread-like. Calcareous glades and barrens, sandy prairies, disturbed areas; ne TX in Bowie, Grayson, Harrison, and Titus cos.; e and c U.S. from MA s to GA and w to MN, KS, and TX. May–Jul. [*P. auriculatum* Britton, *P. hispidum* Raf., *P. hispidum* Raf. var. *auriculatum* (Britton ex Britton) Rollins, *P. integrifolium* L. var. *hispidum* (Raf.) Mears]

PECTIS L.

♣A genus of ca. 90 species of tropical and warm areas of the New World and the Galápagos Islands. Like many members of the genus, *Pectis papposa* A. Gray, of the sw U.S. and Mexico, is strongly-scented; it was used by Native Americans for flavoring foods and as a perfume (Bradley & Haagen-Smit 1949). (Greek: *pectis*, to comb, when the marginal leaf glands become broken, the leaf has a somewhat serrated effect marginally—Bradley & Haagen-Smit 1949) (tribe Heliantheae)

REFERENCES: Fernald 1897; Bradley & Haagen-Smit 1949; Keil 1977, 2006g.

Pectis angustifolia Torr. var. **fastigiata** (A. Gray) D.J. Keil, (sp.: narrow-leaved; var.: having branches close together and erect), TEXAS CHINCHWEED. Spicy-scented, fibrous-rooted, much-branched perennial or some individuals annual, 5–15 cm tall, sometimes woody at base; leaves linear, 10–40 mm long, 1–2 mm wide, glabrous, basally ciliate with bristles 1–2 mm long, often revolute, marginally glandular-punctate; heads congested at ends of branches in cymose arrays; peduncles 3–30 mm long; phyllaries in one series, subequal, 2.5–4.5 mm long, keeled, broadest near apex, with a conspicuous subterminal oil gland 0.5–1 mm long and 1 or 2 pairs of smaller submarginal glands; ray flowers 8, pistillate, fertile, inserted on phyllary bases, ligules 3–5(–7) mm long, yellow; disk flowers 7–20, perfect, fertile, corollas 2.5–3.5 mm long, yellow; achenes 2.5–

3.5 mm long, the ray achenes usually falling attached to a subtending phyllary; pappus usually < 1 mm long, of 1–7 short bristles or awns, forming a low crown. Usually on limestone, dry uplands; w border of East TX in Bell, Williamson, Travis, and Hays cos.; Edwards Plateau and Lampasas Cut Plain; endemic to TX. Jul–Nov. Two other varieties of this species occur in s and w TX and Mexico. [*P. fastigiata* A. Gray, *P. texana* Cory] *ET*

PERITYLE Benth. ROCK DAISY

☛A genus of ca. 63 species native to sw North America, with 1 in Chile and Peru. (Greek: *peri*, around, and *tyle*, knot, knob, or callus, from the thickened margin around the fruit) (tribe Heliantheae)

REFERENCES: Powell 1973; Yarborough & Powell 2006b.

Perityle lindheimeri (A. Gray) Shinnery var. **lindheimeri**, (for Ferdinand Jacob Lindheimer, 1801–1879, German-born TX collector), LINDHEIMER'S ROCK DAISY, BLUFF DAISY. Subshrub or perennial from a woody base; plants (10–)18–45(–60) cm tall; leaves opposite below, alternate above, petioles 4–10 mm long, blades broadly ovate to ovate-lanceolate, 2–5 cm long, minutely punctate, essentially glabrous, margins entire or serrate-lobed; heads in corymbose arrays; involucre ca. 4–6 mm high; phyllaries usually in 2 series, subequal; ray flowers 3–5, pistillate and fertile, the ligules 2.5–3 mm long, 1.5–2 mm wide, yellow; disk corollas 2.3–3.5 mm long, yellow; achenes 2–2.8 mm long, linear to narrowly obconical; pappus usually of 1(–2) bristles, 0.5–1.8 mm long, plus vestigial scales or a minute crown, rarely absent. Crevices in Cretaceous limestone bluffs, often beside streams; on the sw border of East TX in Travis, Hays, Comal, and Bexar cos.; Edwards Plateau; endemic to TX. Apr–Sep. [*Laphamia halimifolia* A. Gray subsp. *lindheimeri* (A. Gray) Niles, *Laphamia rotundata* Rydb., *P. rotundata* (Rydb.) Shinnery] *ET*

PINAROPAPPUS Less. PINK-DANDELION, ROCK-LETTUCE

☛A genus of ca. 8 species native to s North America and Central America. (Greek: *pinaro*, dirty, and *pappus*, down, fuzz, pappus, in reference to the tawny pappus) (tribe Cichorieae)

REFERENCES: McVaugh 1972; Bogler 2006e.

Pinaropappus roseus (Less.) Less., (rose-colored), SMALL ROCK-LETTUCE. Glabrous, small (10–40 cm tall) perennial with a woody, branching root; leaves mostly basal, alternate; leaf blades oblong-lanceolate, becoming linear and bracteate on upper stem, entire or coarsely toothed or lobed; heads large (15–25 mm high including corollas), terminal, solitary; phyllaries semi-scarious, in several overlapping rows, usually with pinkish margins and prominent brown tips; flowers all ligulate; corollas pink to deep rose-lavender beneath, paler to white above, yellowish basally; achenes fusiform, 5–6 mm long; pappus of numerous tawny, hair-like bristles. Limestone outcrops and calcareous soils; w edge of East TX from Denton Co. s to Bell Co., and Edwards Plateau from Travis Co. to Bexar and DeWitt cos.; mostly c and sw TX; AZ, NM, and OK; Mexico. Apr–May. [*Achyrophorus roseus* Less.]

PITYOPSIS Nutt. GRASS-LEAF GOLDEN-ASTER

Perennial rhizomatous herbs, forming clumps; stems erect, ours usually pubescent and glandular; leaves overwintering in a basal rosette, alternate on the stem, sessile, often grass-like, blades 3–11-parallel-nerved, usually with long silvery-silky pubescence, margins entire; heads in corymbose or paniculate arrays; phyllaries in 3–5 series, unequal, lanceolate, margins scarious; ray flowers pistillate and fertile, corollas yellow; disk flowers perfect and fertile, corollas yellow; achenes spindle-shaped, 8–10-ribbed, strigose; pappus in (3–)4 series, the outermost series of linear scales, the inner series of longer, minutely-barbed, tawny bristles.

☛A genus of 7 species of the e U.S., Central America, and West Indies. Previously included in *Chrysopsis* or *Heterotheca*. (Greek: *pitys*, pine or fir, and *opsis*, appearance or resembling, apparently for the pine-needle-like appearance of the narrow leaves) (tribe Astereae)

REFERENCES: Shinnery 1951a; Semple 1977, 2006e; Semple et al. 1980; Semple & Bowers 1985, 1987.

1. Stem leaves (above the basal rosette) numerous, usually 20+; heads numerous, usually 10–100+; phyllaries eglandular or with sparse stalked glands; outer pappus series scales 0.4–0.9 mm long **P. graminifolia**

1. Stem leaves (above the basal rosette) few, usually 2–6; heads few, usually 1–5; phyllaries with dense stalked glands; outer pappus series scales 0.8–1.4 mm long **P. oligantha**

Pityopsis graminifolia (Michx.) Nutt., (grass-leaved), NARROW-LEAVED SILK-GRASS, GRASS-LEAF GOLDEN-ASTER. Stems 20–80

cm tall, 1–5+ per plant; stems and leaves with long, appressed, silvery-white, silky pubescence; leaves linear to lanceolate, reduced in size up the stem; phyllaries often pilose, sometimes with sparse stalked glands; achenes 2.5–4.5 mm long. Pine-oak woods, roadsides, waste areas, often in sandy soils; e 1/2 TX, mainly se and e TX; se U.S. from DE s to FL and w to OH, OK, and TX; Mexico, Central America, and West Indies. Sep–Nov. Two of the varieties apparently have overlapping ranges in East TX; the infraspecific range maps provided by Semple & Bowers (1985), Kartesz (2015), and USDA NRCS (2016) are incomplete or irreconcilable, therefore we are not providing ranges or maps for these varieties. Semple (2006e) divided the two East TX varieties of this highly variable species as follows:

1. Involucres 8–12 mm high; ray flowers 10–16, ligules 7–15 mm long;..... var. **latifolia**
 1. Involucres 4.5–8 mm high; ray flowers 8–12, ligules 4–7 mm long;..... var. **tenuifolia**

var. **latifolia** (Fernald) Semple & F.D. Bowers, (broad-leaved). [*Chrysopsis argentea* (Pers.) Elliott, *C. correllii* Fernald, *C. graminifolia* (Michx.) Elliott var. *latifolia* Fernald, *Heterotheca nervosa* (Willd.) Shinnery]

var. **tenuifolia** (Torr.) Semple & F.D. Bowers, (narrow-leaved). [*Chrysopsis graminifolia* (Michx.) Elliott var. *microcephala* (Small) Cronquist, *Heterotheca microcephala* (Small) Shinnery, *P. graminifolia* (Michx.) Nutt. var. *microcephala* (Small) Semple]

Pityopsis oligantha (Chapm. ex Torr. & A. Gray) Small, (few-flowered), FEW-HEADED GRASS-LEAF GOLDEN-ASTER, LARGE-FLOWERED GOLDENASTER, COASTAL PLAIN SILK-GRASS. Stems 20–50 cm tall, usually 1 per plant, with dense stalked glands throughout, and with long, appressed, silvery-white, silky pubescence on lower 1/3; leaves linear to broadly oblanceolate, reduced in size up the stem, with pubescence similar to the lower stem; phyllaries sericeous, with dense stalked glands; achenes 4–5 mm long. Longleaf pine savannas, sandy saline soils; in TX known only from Jasper Co. (W.C. Holmes & J.R. Singhurst 11100 (BAYLU); Holmes & Singhurst 2012), presumably rare in the state; GA, FL, AL, MS, and LA. Sep–Oct. [*Chrysopsis oligantha* Chapm. ex Torr. & A. Gray, *Heterotheca oligantha* (Chapm. ex Torr. & A. Gray) V.L. Harms]. Likely of conservation concern due to its limited range. *!*

PLECTOCEPHALUS D. DON. BASKET-FLOWER

☛A genus of 4 species native to North America; formerly included in *Centaurea*. (Greek: *plektos*, woven, and *kephale*, head, alluding to interwoven fringes of phyllaries) (tribe Cardueae)

REFERENCES: Roalson & Allred 1998; Keil 2006h.

Plectocephalus americanus (Nutt.) D. Don, (of America), BASKET-FLOWER, AMERICAN BASKET-FLOWER, POWDERPUFF THISTLE, THORNLESS-THISTLE, CARDO DEL VALLE, AMERICAN KNAPWEED, STAR-THISTLE. Annual; stems 0.5–2 m tall; stems usually 1; leaves sessile, ± entire, oblanceolate to narrowly obovate, glabrous or sparsely scabrous and gland-dotted; heads solitary at the ends of branches, large, (3–)4–8(–10) cm across including the corollas, quite showy, 1–few per plant; phyllaries appressed, imbricate, of 2 distinct parts, the lower part light green, entire, the upper part straw-colored (sometimes pinkish or light brown) and pectinately dissected into narrow straw-colored lobes or teeth; ray flowers absent; disk corollas pink to occasionally deep purple-red (rarely white); peripheral flowers neuter with corollas 3.5–5 cm long, ± simulating rays; central flowers perfect, fertile, with corollas 2–2.5 cm long; achenes grayish brown to black, 4–5 mm long, with a basal attachment scar; pappus of stiff bristles, 6–14 mm long, minutely barbed. Prairies, disturbed areas, roadsides; widespread in TX; c U.S. from WI s to TX and w to AZ; Mexico. May–Aug. [*Centaurea americana* Nutt.] Sometimes cultivated; occasionally escapes outside its native range. The basket-like appearance of the overlapping phyllary teeth gives this species its common name. The stamens are reported to be sensitive to touch; when touched by insects they suddenly contract and push pollen out onto the pollinator (Kirkpatrick 1992).

PLUCHEA Cass. MARSH-FLEABANE, STINKWEED, CAMPHORWEED

Annual or perennial aromatic herbs, usually glandular; stems erect, 0.5–2+ m tall, ± pubescent; leaves alternate, simple, ovate to elliptic or lanceolate, glabrous to puberulent or tomentose, sometimes with resin-globules, margins usually serrate to dentate or crenate; heads numerous in corymbose panicles; phyllaries in 3–6 series, sometimes pink or purplish; ray flowers absent; disk flowers of two types, the corollas pink to rose-purple or creamy white to yellowish; peripheral disk flowers pistillate and fertile, the corolla lobes 3–4, filiform; central disk flowers functionally staminate, the corollas (4–)5-lobed; achenes cylindrical, ribbed, < 1 mm long; pappus of fine barbellate bristles in a single series.

☛A genus of ca. 50 species of warm areas of the world; many species are found in seasonally wet habitats. The foliage is very

aromatic, for better or for worse. (Named for Abbé Noël-Antoine Pluche, 1688–1761, French naturalist) (tribe Inuleae)

REFERENCES: Godfrey 1952; Robinson & Cuatrecasas 1973; Gillis 1977; Nesom 1989b, 2006u; Keeley & Jansen 1991.

1. Middle and upper leaves sessile, usually broad at the base and \pm auriculate-clasping (although sometimes basally cuneate or subclasping).
 2. Heads 4–6 mm tall; phyllaries and corollas rose-pink to purplish; phyllaries with appressed, spider-web-like hairs, sometimes also with glandular hairs.....**P. baccharis**
 2. Heads 5–8 mm tall; phyllaries and corollas usually creamy-white, sometimes greenish to yellowish or pale pink; phyllaries thinly pubescent with spider-web-like hairs and sparsely dotted with resin globules**P. foetida**
1. Middle and upper leaves petiolate, tapering to a narrow base, not auriculate-clasping.
 3. Stems usually with appressed, spider-web-like hairs; heads usually arranged in a convex, elongate panicle, with the central uppermost axis maturing first, but the lateral branches never equaling or exceeding it; heads 4–6 mm tall and 3–4 mm wide; inner phyllaries glabrous (resin globules may be present)..... **P. camphorata**
 3. Stems pubescent or not, but lacking spider-web-like hairs; heads usually arranged in a flat-topped cyme, with the younger lateral branches elongating and exceeding the more central ones; heads 5–6 mm tall and 4–6(–7) mm wide; inner phyllaries clearly puberulent, at least in the upper portion (resin globules may also be present)..... **P. odorata**

Pluchea baccharis (Mill.) Pruski, (some species in the genus were originally described under *Baccharis*), ROSY CAMPHORWEED. Perennial to 60 cm tall; leaves sessile, the blades ovate to oblong-elliptic, 2–7 cm long, puberulent to sparsely villous, glandular, bases cuneate to clasping, margins toothed; heads 4–6 mm tall and 5–9 mm wide; phyllaries rose-pink to purplish, with appressed, spider-web-like hairs, sometimes with glandular hairs; corollas rose-pink to purplish. Low drainage areas, ditches, pond margins; Hardin, Harris, Jefferson, Newton, and Tyler cos.; deep se TX; coastal plains from NC s to FL and w to TX. Jul–Sep. [*Conyza baccharis* Mill., *P. rosea* Godfrey]

Pluchea camphorata (L.) DC., (camphor), CAMPHORWEED, PLOUGHMAN’S-WORT. Annual or perennial to 200+ cm tall; leaves with a camphor-like odor when crushed, petiolate, the blades elliptic to oblong-elliptic, 6–15 cm long, puberulent, glandular, margins dentate-serrate or entire; heads usually arranged in a convex panicle; heads 4–6 mm tall and 3–4 mm wide; phyllaries usually cream, sometimes purplish, nearly glabrous to sparsely puberulent, sparsely dotted with resin globules; corollas rosy to purplish. Low drainage areas, stream channels; e and c TX w to Edwards Plateau; e and c U.S. from NJ s to FL and w to WI, KS, and TX. Aug–Oct. [*Erigeron camphoratus* L.]

Pluchea foetida (L.) DC., (fetid, bad-smelling), STINKING PLUCHEA, STINKING MARSH-FLEABANE. Annual or perennial to 100 cm tall; stems often purplish; leaves with an unpleasant body-odor scent when crushed, sessile, the blades oblong-elliptic to lance-ovate, 3–10(–13) cm long, sparsely dotted with resin globules, bases clasping, margins denticulate; heads often arranged in a flat-topped cyme; heads 5–8 mm tall and 6–9(–12) mm wide; phyllaries usually creamy white, sometimes greenish or yellowish, thinly pubescent with spider-web-like hairs, sparsely dotted with resin globules; corollas creamy white to pale yellowish or pale pink. Wet areas, bogs, swampy woods; e and sc TX; mainly coastal plains from NJ s to FL and w to TX. Jul–Nov. [*Baccharis foetida* L., *P. tenuifolia* Small] If varieties are recognized, TX plants would be var. *foetida*.

Pluchea odorata (L.) Cass. var. **odorata**, (fragrant), CANELA, PURPLE PLUCHEA, SWEETSCENT. Annual or perennial to 80(–200) cm tall; leaves usually petiolate, the blades lance-ovate to ovate-elliptic, 4–15 cm long, nearly glabrous to densely tomentose, margins shallowly serrate; heads usually arranged in a flat-topped cyme; heads 5–6 mm tall and 4–6(–7) mm wide; phyllaries usually cream, sometimes purplish, nearly glabrous to puberulent, sparsely dotted with resin globules; corollas pink to rosy-purple. Low drainage areas, springs, marshes, estuaries; nearly throughout TX but most common in e 1/2; s 1/2 U.S. from MD w to CA; introduced elsewhere, often in saline habitats. Aug–Nov. [*Conyza odorata* L., *P. purpurascens* (Sw.) DC.]

PRENANTHES L. RATTLESNAKE-ROOT

Perennial taprooted herbs, often producing offshoots from slender rhizomes; stems erect, often purplish, producing milky sap; leaves in a basal rosette, alternate on the stem, entire or toothed to pinnately cleft or palmately lobed, the lowermost sometimes appearing compound; heads often nodding at flowering, in racemose or paniculate arrays; primary phyllaries in 1 series, equal, yellow-green to purplish, often hairy, subtended by a secondary series of small, unequal bractlets; ray flowers perfect and fertile, corollas creamy white to yellowish or pinkish, the ligules toothed apically; disk flowers absent; achenes spindle-shaped or columnar, 5–12-ribbed, not beaked; pappus of many minutely barbed, whitish to tawny bristles.

•A genus of 26–30 species of North America and Eurasia, with 1 species in South Africa. Sometimes treated in the genus *Nabalus*. (Greek: *prenes*, drooping, and *anthos*, flower, alluding to the nodding heads of some species) (tribe Cichorieae)

REFERENCES: Millstead 1964; Singhurst et al. 2004; Bogler 2006f; Singhurst & Holmes 2010.

1. Lower leaves present at flowering; heads (4-)5(-6)-flowered; phyllaries (4-)5(-6), glabrous or sparsely hairy; pappus 5–6 mm long **P. altissima**
1. Lower leaves usually withered by flowering; heads 8–19-flowered; phyllaries 6–10, coarsely hispid or bristly, at least along midveins; pappus 7–8 mm long.
 2. Lower stem leaf blades spatulate; heads \pm ascending; phyllaries yellow-green to tan; achenes 5–6 mm long **P. aspera**
 2. Lower stem leaf blades \pm elliptic; heads nodding; phyllaries usually purple or lavender; achenes 8–10 mm long **P. barbata**

Prenanthes altissima L., (tallest), TALL RATTLESNAKE-ROOT. Stems 40–250 cm tall; lower leaves petiolate, petioles winged, blades ovate or triangular, bases truncate or hastate to cordate, margins entire or shallowly dentate, often deeply 3-lobed, reduced in size and lobing up the stem; phyllaries pale green, glabrous or sometimes sparsely hairy; corollas pale yellow to greenish yellow; achenes 4–5 mm long. Open hardwood floodplains, creek banks and terraces; in TX recorded only from Jasper and Newton cos.; e U.S. from ME s to GA and w to MI, MO, and TX. Oct–Nov. [*Nabalus altissimus* (L.) Hook., *P. altissima* L. var. *cinnamomea* Fernald]

Prenanthes aspera Michx., (rough), ROUGH RATTLESNAKE-ROOT. Stems 35–170 cm tall; lower leaves petiolate, blades spatulate, bases attenuate, margins entire or weakly dentate, reduced in size up the stem and there sessile and clasping; phyllaries yellow-green to tan, coarsely setose; corollas pale yellow to creamy white; achenes 5–6 mm long. Calcareous pimple-mound prairies, tallgrass prairies, open woodlands; in TX known only from Bowie Co. (J.R. Singhurst & W.C. Holmes s.n., J.R. Singhurst 18337 (BAYLU); Singhurst & Holmes 2010), apparently rare in the state; c U.S. from OH s to MS and w to SD and TX. Sep–Oct. [*Nabalus asperus* (Michx.) Torr. & A. Gray]

Prenanthes barbata (Torr. & A. Gray) Milstead, (barbed), BARBED RATTLESNAKE-ROOT. Stems 50–150 cm tall; lower leaves petiolate, petioles winged, blades \pm elliptic, bases narrowed, margins coarsely or irregularly dentate or serrate, unlobed, reduced in size up the stem and there sessile and cuneate or clasping; phyllaries usually purple or lavender, coarsely hispid or bristly along midveins; corollas white to yellowish white; achenes 8–10 mm long. Oak-hickory terraces, moist ravines, seepage slopes; mostly se TX, also ne TX; se U.S. from KY s to GA and w to OK and TX. Sep–Oct. [*P. serpentaria* Pursh var. *barbata* Torr. & A. Gray] While recorded in numerous counties in East TX, this species is becoming rarer due to habitat loss through road expansions and clear-cutting on private lands (Poole et al. 2007). *!* *

Prenanthes carrii Singhurst, O'Kennon & W.C. Holmes, (for William “Bill” R. Carr, modern prolific collector of TX plants, formerly of Texas Parks & Wildlife Department and Texas Nature Conservancy), CARR'S RATTLESNAKE-ROOT, CANYON RATTLESNAKE ROOT, which would not have keyed to any other species satisfactorily here, can be distinguished by its long-petiolate, saggitate lower and midstem leaves, and its presence in the Edwards Plateau (as opposed to East TX). Endemic to rich woodlands and canyons of Bandera, Gillespie, Kerr, and Real cos. in sw Edwards Plateau, just w of the sw border of East TX (Sinhurst et al. 2004). Aug–Nov. Only recently recognized as a distinct species, this endemic has no federal or state protection but is considered imperiled due to its restricted range (Poole et al. 2007, 2010). *!* *ET*

PSEUDOGNAPHALIUM Kirp. RABBIT-TOBACCO, CUDWEED

Ours annual herbs, whitish to grayish with cottony or woolly pubescence (at least when young); stems erect or ascending; leaves sometimes in a basal rosette (usually withering before flowering), alternate on the stem, sessile, sometimes short-decurrent, blades linear to narrowly lanceolate or oblanceolate to subs spatulate; inflorescences usually with numerous heads clustered in corymbose arrays; phyllaries in several series, unequal, scarious; receptacles naked; ray flowers absent; disk flowers all fertile but only the central ones perfect, corollas usually yellowish; achenes compressed-oblong or cylindrical; pappus of 10–12 bristles, these readily separating individually, in clusters, or as an easily-fragmented ring.

☛ A genus of ca. 100 species in the New World, Africa, and Asia, mostly of temperate regions; formerly lumped into *Gnaphalium*. (Greek: *pseudo*, deceptively similar, and the genus name *Gnaphalium*, from an ancient Greek name of some downy plant, derived from *gnaphalon*, lock of wool) (tribe Inuleae)

REFERENCES: Hillard & Burt 1981; Anderberg 1991; Nesom 2001a, 2001b, 2001c, 2004b, 2006v.

1. Leaves at maturity \pm concolor (both surfaces usually gray to grayish green, tomentose), bases usually decurrent, creating wings 1–2 mm down the stem; corollas red-tipped; achenes unribbed, conspicuously dotted with whitish, globular hairs **P. luteoalbum**
1. Leaves at maturity strongly to weakly bicolor (upper surfaces green, lower surfaces gray to white and tomentose), bases not decurrent; corolla lobes yellow, lacking red tips; achenes longitudinally ribbed (may additionally be roughened with tiny bumps).
 2. Leaves with bases subclasping, margins strongly revolute; involucre 4.5–5 mm high; achenes ridged and roughened

- with tiny bumps **P. austrotexanum**
2. Leaves with bases not clasping, margins flat; involucre 5–7 mm high; achenes ridged, smooth between ridges.
3. Plants thickly-fibrous-rooted; stems greenish, with stalked glands; perfect flowers 9–15 per head **P. helleri**
3. Plants tap-rooted; stems white-woolly tomentose, eglandular; perfect flowers 4–8(–11) per head **P. obtusifolium**

Pseudognaphalium austrotexanum G.L. Nesom, (of south Texas), SOUTH TEXAS RABBIT-TOBACCO. Taprooted annuals, to 70 cm tall; stems densely white-woolly, not glandular; leaves bicolor (green above and white-tomentose beneath), sometimes slightly glandular, bases subclasping, not decurrent, margins strongly revolute; involucre 4.5–5 mm high; phyllaries silvery-white, glabrous; achenes ridged and roughened with tiny bumps. Pastures, grasslands, open disturbed sites, often in sandy soils; Brazos and Harris cos.; s TX Plains and Gulf Prairies; Mexico. Oct–Dec.

Pseudognaphalium helleri (Britton) Anderb., (for A.A. Heller (1867–1944), early collector in TX), HELLER'S CUDWEED, HELLER'S RABBIT-TOBACCO. Thickly-fibrous-rooted annuals, to 100 cm tall, sometimes aromatic; stems greenish, with stalked glands; leaves bicolor (green above and white to gray beneath, lightly tomentose), with stalked glands, bases not clasping, not decurrent, margins flat; involucre 6–7 mm high; phyllaries whitish, ± tomentose; achenes ridged, smooth between ridges. Pine-oak forests, in sandy or clay soils; ne TX in Bowie, Cass, Harrison, and Titus cos., and Marion Co. (Kartesz 2015); se U.S. from NC s to FL and w to OK and TX. Sep–Nov. [*Gnaphalium helleri* Britton, *G. obtusifolium* L. var. *helleri* (Britton) S.F. Blake]

Pseudognaphalium luteoalbum (L.) Hilliard & B.L. Burt, (yellowish white), JERSEY CUDWEED, RED-TIP RABBIT-TOBACCO. Tap- or fibrous-rooted annuals, to 40 cm tall; stems loosely white-woolly, not glandular; leaves concolor or weakly bicolor (usually gray-tomentose on both sides), not glandular, bases subclasping, usually decurrent 1–2 mm down the stem, margins weakly revolute; involucre 3–4 mm high; phyllaries silvery to yellowish, glabrous; corollas red-tipped; achenes unridged, conspicuously dotted with whitish, globular hairs. Roadsides, ditches, disturbed sites; recorded from Marion Co. (TEX), Hardin Co. (MacRoberts et al. 2010), and Liberty Co. (Brown et al. 2007); scattered in nc TX, Edwards Plateau, and Trans-Pecos; w U.S. from WA s to CA and e to UT and TX; Mexico; Eurasia; introduced and weedy in warm areas throughout the world. Apr–Jun. [*Gnaphalium luteoalbum* L., *Laphangium luteoalbum* (L.) Tzvelev] Native of Eurasia. *I*

Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burt, (blunt-leaved), EASTERN RABBIT-TOBACCO, FRAGRANT CUDWEED, CAT'S-FOOT. Taprooted annuals, to 100 cm tall, sometimes aromatic; stems sparsely to densely white-woolly, usually not glandular; leaves bicolor (green above and white-tomentose beneath), sometimes slightly glandular, bases not clasping, not decurrent, margins flat; involucre 5–7 mm high; phyllaries whitish, glabrous or the bases tomentose; achenes ridged, smooth between ridges. Prairies, open woods, roadsides, often in sandy soils; e, se, and sc TX; nc TX, Edwards Plateau, and s TX; e 1/2 North America. Aug–Oct. [*Gnaphalium obtusifolium* L.]

PSEUDOGYNOXYS (Greenm.) Cabrera FLAMEVINE

☛A genus of ca. 12 species native to the New World tropics; some are cultivated as ornamentals. (Greek: *pseudo*, deceptively similar, and the genus name *Gynoxys*, for its resemblance to that genus) (tribe Senecioneae)
REFERENCES: Robinson & Cuatrecasas 1977; Barkley 2006c.

Pseudogynoxys chenopodioides Kunth, (*Chenopodium*-like, for the leaves' resemblance to some GOOSEFOOT species), MEXICAN FLAMEVINE, ORANGE GLOW VINE. Vines to 5+ m long; stems twining; leaves alternate, petiolate, blades ovate to lanceolate, bases broadly cuneate to truncate or rounded, margins dentate; heads showy, borne in corymbose arrays or singly; involucre usually 12–20 mm wide; primary phyllaries in 1–2 series, subequal, lance-linear, subtended by small bractlets; ray flowers 6–15+, pistillate, fertile, ligules 12–20(–25+) mm long, orange to brick-red; disk flowers perfect, fertile, corollas orange; achenes (2–)4 mm long, cylindrical; pappus of many white, finely-barbed bristles, 3–8+ mm long. Disturbed sites, waste grounds, abandoned gardens; recorded in Bexar and Harris cos.; also s TX; FL; Mexico, Central and South America, and West Indies. Year-round (mostly winter). [*Senecio confusus* Britten & Rendle] Native of tropical America; possibly escaping from cultivation and naturalizing in subtropical TX; its potential to spread and become a permanent member of the flora is not known. *I*

PSILACTIS A. Gray TANSY-ASTER

☛A genus of 6 species native to sw U.S., Mexico, and South America; strongly resembling and related to *Symphotrichum* but easily distinguished by the heteromorphic achenes and strongly glandular phyllaries. (Greek: *psilos*, bare, and *actis*, ray, referring to the absence of ray flower pappus) (tribe Astereae)

REFERENCES: Turner & Horne 1964; Morgan 1993, 2006.

Psilactis heterocarpa (R.L. Hartm. & M.A. Lane) D. Morgan, (differently-fruited, for the two types of achenes), SAN PATRICIO TANSY-ASTER. Taprooted annuals, to 100 cm tall; stems appressed-hairy, with stalked glands; leaves sometimes in a basal rosette (usually withering before flowering), alternate on the stem, sessile, blades obovate or lanceolate to linear, margins entire; heads borne in loose corymbose arrays; involucre 4–6 mm high; phyllaries in 2–3 series, scarious-margined, with stalked glands; ray flowers 15–25, pistillate, fertile, corollas white to bluish or purple; disk flowers perfect, fertile, corollas yellow; achenes of ray flowers 1.3–1.5 mm long, lacking pappus; achenes of disk flowers 2–3 mm long; disk pappus of many barbellate bristles, 3.2–4 mm long. Grasslands, weedy pastures, open mesquite woodlands; endemic to the Gulf Coastal Plain of sc TX in Goliad, Jackson, and Victoria cos.; also Karnes, Kleberg, Nueces, Refugio, and San Patricio cos. Sep–Nov. [*Machaeranthera heterocarpa* R.L. Hartm. & M.A. Lane] This species is of conservation concern due to its restricted range (Poole et al. 2007) *ET* *!* *

PSILOSTROPHE DC. PAPER-FLOWER

☛A genus of 7 species native to sw U.S. and Mexico. (Greek: *psilos*, bare, and *strophe*, turn, perhaps alluding to the naked receptacles) (tribe Heliantheae)

REFERENCES: Brown 1978; Turner et al. 1988; Strother 2006x.

Psilostrophe villosa Rydb., (hairy), WOOLLY PAPER-FLOWER. Biennials or perennials (rarely flowering the first year), 10–45(–60+) cm tall, from a woody taproot; stems and leaves gray-green, cobwebby-villous; leaves alternate, blades oblanceolate, margins entire; heads showy, borne in ± crowded corymbose arrays; involucre 4–5(–7) mm high; phyllaries in 1–2 series, erect in fruit, the bases indurate; receptacles naked; ray flowers (2–)3(–5), pistillate, fertile, ligules golden-yellow, usually 3–4 mm long, tips toothed or lobed; disk flowers 5–8(–12), perfect, fertile, corollas golden-yellow; achenes cylindric, usually glabrous, sometimes gland-dotted; pappus of 4–6 lanceolate to lance-subulate scales, 2.5–3+ mm long, entire. Grassy plains, desert flats, gypsum and limestone soils; Fayette Co., also Brazos, Caldwell, Goliad, and Montgomery cos. (Kartesz 2015); mostly Plains Country, Edwards Plateau, and s TX; KS, OK, and NM; likely also Mexico. Apr–Oct. [*P. tagetina* (Nutt.) Greene var. *cerifera* (A. Nelson) B.L. Turner] Though apparently the plants are not distasteful to livestock, they are poisonous and have caused deaths in grazing sheep (Kingsbury 1964). *X*

PTEROCAULON Elliott. BLACKROOT

☛A genus of 17 species largely confined to South America, with a few found in North America and Australasia. (Greek: *pteron*, wing, and *kaulos*, stem, alluding to stems winged by decurrent leaf bases) (tribe Inuleae)

REFERENCES: D’Arcy 1975; Cabrera & Ragonese 1978; Nesom 2006w.

Pterocaulon virgatum (L.) DC., (winged), WAND BLACKROOT. Perennial herbs, 40–150 cm tall, 10–45(–60+) cm tall; stems simple, erect, winged by decurrent leaf bases; leaves alternate, sessile, blades linear to narrowly elliptic or linear-lanceolate, strongly bicolor (green above and whitish-tomentose beneath), usually glandular, margins entire or minutely denticulate, revolute; heads sessile, borne in cylindric, interrupted, spicate arrays at ends of branches; involucre 4–5 mm high; phyllaries in 4–6 series, unequal, narrowly lanceolate; ray flowers absent; disk flowers peripherally pistillate and fertile, centrally functionally staminate, corollas yellowish cream; achenes cylindric, ribbed, 1–1.4 mm long; pappus of many pale, finely-barbed bristles. Moist woods, ditches, marshes, sandy or silty-clay soils; e, se, and sc TX; s TX; LA; Mexico, Central and South America, West Indies. Aug–Oct. [*Gnaphalium virgatum* L.]

PYRRHOPAPPUS DC. FALSE DANDELION, NATIVE-DANDELION

Annuals or perennials; sap milky; leaves basal, usually in a rosette, alternate and reduced upwards; leaf blades oblanceolate or oblong- to elliptic-lanceolate, entire or usually toothed or lobed; heads solitary or few, large and showy; the inner (primary) phyllaries linear-lanceolate, subtended by a secondary series of short, phyllary-like bracts; flowers all ligulate; corollas yellow, open during morning hours; achenes fusiform, beaked; pappus of abundant hair-like bristles 7–12 mm long.

☛A North American genus of 4 or 5 species; the roots of some were eaten by Native Americans. (Greek: *pyrros*, flame-colored or red, and *pappus*, down, fuzz, pappus, referring to the reddish pappus found in some species) (tribe Cichorieae)

REFERENCES: Northington 1971, 1974; Vuilleumier 1973; Barber & Estes 1978; Turner & Kim 1990; Strother 2006y.

1. Perennials with small tuberous swelling 5–20 mm thick located 2–15 cm below ground at end of roots; stems above

- rosette with 0–2 leaves or leafy bracts, usually pubescent or short-pilose **P. grandiflorus**
1. Annuals with tapering taproot; stems above rosette with 1–9 leaves, pubescent or glabrous.
 2. Stems pubescent with curly hairs (rarely glabrous), stem leaves 1–5, the uppermost with blades deeply several-lobed; secondary phyllary-like bracts usually 1/3 as long as primary phyllaries (or less); mostly calcareous soils of c TX **P. pauciflorus**
 2. Stems glabrous, stem leaves 3–9, the uppermost with blades entire or merely toothed or with one pair of basal lobes; secondary phyllary-like bracts mostly 1/3–2/3 as long as primary phyllaries; mostly sandy soils of East TX **P. carolinianus**

Pyrrhopappus carolinianus (Walter) DC., (of Carolina), CAROLINA FALSE DANDELION. Annual or biennial from a taproot; stems usually glabrous, (5–)30–100 cm tall; basal leaves in a rosette, often early deciduous; stem leaves reduced upwards, entire or with 1–2 basal lobes; primary phyllaries 15–25 mm long; achenes 12–16 mm long (including beak). Sandy soils, woodlands and fields; throughout e 1/3 of TX; se U.S. from PA s to FL and w to NE and TX. Apr–Jul, sporadically to Sep. [*P. carolinianus* (Walter) DC. var. *georgianus* (Shinners) H.E. Ahles, *P. georgianus* Shinners]

Pyrrhopappus grandiflorus (Nutt.) Nutt., (large-flowered), TUBER FALSE DANDELION. Perennial with a tuber giving rise to 1 or several, simple or branched, erect or suberect rhizomes, these developing near ground level; basal leaves in a rosette; flowering stems 10–30(–40) cm tall; stems usually rather densely pubescent with curly hairs, rarely glabrous; primary phyllaries 15–20 mm long; achenes 10–13 mm long (including beak). Rocky, clayey, or sandy prairies; on the w borders of East TX; Grand Prairie s and w to Panhandle and w TX; KS and OK. Apr–May. [*P. scaposus* DC.]

Pyrrhopappus pauciflorus (D. Don) DC., (few-flowered), MANY-STEM FALSE DANDELION, TEXAS DANDELION, PATA DE LEON. Annual 20–60 cm tall; basal leaves in a rosette; stems usually branching from the base, usually rather densely pubescent with curly hairs, rarely glabrous; primary phyllaries 16–20 mm long; achenes 11–14 mm long (including beak). Calcareous soils, prairies, roadsides; Blackland Prairie and Grand Prairie; se and e TX w to nc TX and Edwards Plateau; OK, AR, and LA; n Mexico. Mar–Jun. Hybridizes with *P. carolinianus* along highways where sand and limestone gravel have been brought in for fill. Petersen et al. (1990) indicated that infraspecific taxa are not warranted. [*P. geiseri* Shinners, *P. multicaulis* DC., *P. multicaulis* var. *geiseri* (Shinners) Northington]

RATIBIDA Raf. MEXICAN-HAT, PRAIRIE CONEFLOWER

Herbaceous perennials; stems strigose-hirsute, gland-dotted; leaves in a basal rosette, alternate up the stem, petiolate, pinnately lobed to 1–2-pinnatifid, hirsute or strigose, usually gland-dotted; heads solitary or borne in loose corymbose arrays, long-peduncled (in ours), peduncles often with prominent, tan ribs; phyllaries in 2 series, unequal, usually reflexed in fruit; receptacles (cones) subspheric to columnar, pales (chaff) folded lengthwise, strigose and gland-dotted; ray flowers 4–15, neuter, corollas yellow, maroon, or both; disk flowers perfect, fertile, corollas yellowish green, sometimes purplish; achenes oblanceolate to broadly ovate, black, strongly compressed, margin(s) often ciliate, fringed, or comb-like; pappus of 1–2 tooth-like projections, or absent.

♣ A genus of 7 species of North America and Mexico; some are cultivated as ornamentals. (According to Fernald (1950), the derivation of the name is “...like most work of its author [Rafinesque], not clear”) (tribe Heliantheae)

REFERENCES: S. Jackson 1963; Richards 1968; Cox & Urbatsch 1990, 2006; Urbatsch & Jansen 1995.

1. Plants fibrous-rooted; cone (convex part of head, including pales and disk flowers) ellipsoid to globular or ovoid, 10–25 mm high; pappus absent, or of 1–2 tooth-like projections **P. pinnata**
1. Plants taprooted; cone (convex part of head, including pales and disk flowers) columnar, 10–70 mm high; pappus of 1–2 tooth-like projections, or sometimes absent.
 2. Disk flower style branch tips rounded; disk corollas 1–2.5 mm long; achenes with one margin glabrous, and the opposing margin glabrous or ciliate **P. columnifera**
 2. Disk flower style branch tips subulate; disk corollas 2.5–3 mm long; achenes with one margin narrowly winged to fringed or comb-like, and the opposing margin fringed or comb-like **P. peduncularis**

Ratibida columnifera (Nutt.) Wootton & Standl., (bearing columns), MEXICAN-HAT, REDSPIKE MEXICAN-HAT, THIMBLE- FLOWER, PRAIRIE CONEFLOWER, UPRIGHT PRAIRIE CONEFLOWER. Taprooted perennials, to 105+ cm tall; leaves 1–2-pinnatifid; cones columnar, 10–50 mm high; ray ligules yellow or maroon, sometimes bicolor, 7–35 mm long; achenes 1.2–3 mm long, with one margin glabrous, and the opposing margin glabrous or ciliate; pappus of 1–2 tooth-like projections, or sometimes absent. Prairies, roadsides, waste areas; throughout most of TX; throughout North America but most common in c plains; Mexico. May–Oct. [*R. columnaris* (Sims) D. Don, *Rudbeckia columnifera* Nutt.] Often included in wildflower seed mixes, contributing to an increasing geographic range; populations e of the Mississippi River may be adventive (Kartesz 2015).

Ratibida peduncularis (Torr. & A. Gray) Barnhart, (peduncled), NAKED MEXICAN-HAT, NAKED PRAIRIE CONEFLOWER.

Taprooted perennials, to 115+ cm tall; leaves 2-pinnatifid to lyrate-pinnate; cones columnar, 15–70 mm high; ray ligules yellow or maroon, often bicolor, 5–15 mm long; achenes 2.3–5 mm long, with one margin narrowly winged to fringed or comb-like, and the opposing margin fringed or comb-like; pappus of 1–2 tooth-like projections. Sandy sites, coastal areas; scattered from se to sc TX, mostly Gulf Coast and s TX Plains; LA; Mexico. Apr–Nov. The two varieties hybridize with each other, as well as with *R. columnaris* (S. Jackson 1963; Richards 1968) and they have overlapping ranges in East TX; no infraspecific range maps are provided by Richards (1968) or USDA NRCS (2016), therefore we are not providing ranges or maps for these varieties. Cox and Urbatsch (2006) divided the two East TX varieties as follows:

1. Leaves 2-pinnatifid; ray corollas mostly yellow; achenes with both margins fringed or comb-like var. **peduncularis**
 1. Leaves lyrate-pinnate; ray corollas mostly maroon (sometimes with some yellow); achenes with only one margin fringed or comb-like var. **picta**

var. **peduncularis**, (peduncled). [*Lepachys peduncularis* Torr. & A. Gray]

var. **picta** (A. Gray) Sharp, (painted, colored), [*Lepachys peduncularis* Torr. & A. Gray var. *picta* A. Gray]

Ratibida pinnata (Vent.) Barnhart, (pinnate), PINNATE PRAIRIE CONEFLOWER, GRAYHEAD PRAIRIE CONEFLOWER. Fibrous-rooted perennials, to 105+ cm tall, arising from stout rhizomes or woody crowns; leaves pinnatifid to pinnate; cones ellipsoid to globular or ovoid, 10–25 mm high; ray ligules yellow, 16–60 mm long; achenes 2–4 mm long, with margins usually glabrous, or ciliate on one margin; pappus absent, or of 1–2 tooth-like projections. Tallgrass prairies, woodland openings, limestone outcrops; in TX recorded only from Bowie Co., where it was first collected in 2009 (J. Singhurst 17500 (BAYLU); Singurst et al 2010); e 1/2 North America but most common in the c prairies. May–Oct. [*Rudbeckia pinnata* Vent.]

RAYJACKSONIA R.L. Hartman & M.A. Lane CAMPHOR-DAISY, TANSY-ASTER

Annuals or perennials, 20–100 cm tall, taprooted; herbage glabrous, glandular; leaves alternate, sessile to subpetiolate, margins coarsely serrate or rarely entire; heads in paniculate or corymbose arrays; involucre hemspherical; phyllaries in 4–5 series, subequal or unequal, tips herbaceous; ray flowers pistillate, fertile, corollas yellow; disk flowers perfect, fertile, corollas yellow; achenes dimorphic, strigose-sericeous, ribbed, ray achenes 3-angled, disk achenes compressed; pappus of 30–40 brownish, unequal, barbellate bristles.

• A genus of 3 species of North America and Mexico; it was previously included in *Haplopappus* and the taxa have been treated in a variety of genera including *Machaeranthera*. (Named for Dr. Raymond C. Jackson, American botanist and plant geneticist) (tribe Astereae)

REFERENCES: Hartman 1990; Kawaguchi 1996; Lane & Hartman 1996; Morgan 1997; Nesom 2006x; Nesom et al. 2013.

1. Midstem leaf blades linear to linear-oblongate, 1–3(–4) mm wide; involucre 4–7 mm high and 10–15 mm wide; rays 14–19, corollas 6.5–9.5 mm long **R. aurea**
 1. Midstem leaf blades oblongate to oblong-lanceolate, (1–)4–15(–25) mm wide; involucre (4.5–)6–15 mm high and 9–30 mm wide; rays (13–)17–38, corollas 6–19 mm long.
 2. Heads on short peduncles, not surpassed by subtending leaves; phyllaries strongly unequal, 0.9–1 mm wide, tips broadly spreading to recurved **R. annua**
 2. Heads essentially sessile, often surpassed by subtending leaves; phyllaries subequal, 1.3–1.7 mm wide, tips erect to spreading **R. phyllocephala**

Rayjacksonia annua (Rydb.) R.L. Hartman & M.A. Lane, (annual), VISCID CAMPHOR-DAISY, VISCID TANSY-ASTER. Annuals; leaves oblanceolate to oblong-lanceolate; heads short-peduncled, not surpassed by subtending leaves; involucre usually 6–9 mm high; phyllaries strongly unequal, 0.9–1 mm wide, tips broadly spreading to recurved; ray corollas 6–11(–14) mm long. Roadsides, prairies, alkaline flats, sandy soils; recorded in Gonzales Co. (B.C. Tharp s.n. (TEX)); otherwise far to the w in Plains Country and Trans-Pecos; c U.S. from NE s to TX and w to WY and NM. Aug–Oct. [*Haplopappus annuus* (Rydb.) Cory, *Machaeranthera annua* (Rydb.) Shinners, *Sideranthus annuus* Rydb.]

Rayjacksonia aurea (A. Gray) R.L. Hartman & M.A. Lane, (golden), HOUSTON CAMPHOR-DAISY, HOUSTON TANSY-ASTER. Annuals; leaves linear to linear-oblongate; heads short-peduncled, not surpassed by subtending leaves; involucre 4–7 mm high; phyllaries strongly unequal, ca. 1 mm wide, tips erect to slightly spreading; ray corollas 6.5–9.5 mm long. Saline prairie barrens, often in the presence of mima mounds (pimple mounds), sandy soils; endemic to the TX Gulf Coastal Plain, known from only 3 counties: Harris, Fort Bend, and Galveston cos. Oct–Nov(–Dec). [*Haplopappus aureus* A. Gray, *Machaeranthera aurea* (A. Gray) Shinners, *Sideranthus aureus* (A. Gray) Small] This species is not listed at the state or federal level, but is of conservation concern due to its restricted range and highly specialized habitat, both threatened by urban development

around Houston (Poole et al. 2007) *ET* *!*

Rayjacksonia phyllocephala (DC.) R.L. Hartman & M.A. Lane, (leafy-headed), GULF COAST CAMPHOR-DAISY. Annuals or perennials; leaves oblong to oblanceolate; heads essentially sessile, often surpassed by subtending leaves; involucre usually 10–15 mm high; phyllaries subequal, 1.3–1.7 mm wide, tips erect to spreading; ray corollas 8.5–19 mm long. Saline flats, sand dunes, canal banks, rarely inland as a waif; Gonzales, Harris, Jackson, and Victoria cos., also Austin and Brazos cos. (Nesom et al. 2013); TX Gulf Coast; FL, MS, LA; Mexico. Sep–Dec (sporadically all year). [*Haplopappus phyllocephalus* DC., *Machaeranthera phyllocephala* (DC.) Shinnery var. *megacephala* (Nash) Shinnery, *Sideranthus megacephalus* (Nash) Small] If varieties are recognized, ours would be var. *phyllocephala* (Nesom et al. 2013).

RUDBECKIA L. CONEFLOWER, BLACK-EYED-SUSAN, BROWN-EYED-SUSAN

Annual, biennial, or perennial herbs; leaves alternate, sometimes also basal, the blades simple to deeply lobed; heads terminal, large, solitary or corymbose; phyllaries in usually 1–3 series, subequal, herbaceous, loose; receptacles or “cones” subspheric or conic to columnar, often elongating after flowering; receptacle chaff (= pales) concave, each ± clasping a flower, the awn-like tips apparent between flowers at anthesis; ray flowers neuter, with ligules yellow to yellow-orange, sometimes with a splotch or zone of maroon; disk flowers perfect, fertile, with corollas yellowish green to maroon or brownish purple; achenes black, 4-angled; pappus a crown, or of a few short scales, or absent.

•A North American genus of 23 species; several are cultivated as ornamentals. (Named for the Swedish professors Rudbeck: Olaf, the father (1630–1702) and Olaf, the son (1660–1740), predecessors of Linnaeus at Uppsala) (tribe Heliantheae)

REFERENCES: Perdue 1957; Cox & Urbatsch 1990, 1994; Urbatsch & Jansen 1995; Urbatsch & Cox 2006; Campbell & Seymour 2013.

1. Lower stem and midstem leaves 3–9-lobed or pinnatifid (basal leaves, if present, may be entire).
 2. Lower stem and midstem leaves 5–9-lobed or pinnatifid; disk corollas yellow to yellowish green with yellow lobes; achenes 4.2–6 mm long..... **R. laciniata**
 2. Lower stem and midstem leaves 3–5-lobed; disk corollas mostly brownish purple (may be yellowish green basally); achenes 1.9–3.5 mm long.
 3. Tips of pales cuspidate, awn-like, glabrous; ray ligules 8–17 mm long **R. triloba**
 3. Tips of pales acute, hirsute; ray ligules 20–40 mm long..... **R. subtomentosa**
1. Lower stem and midstem leaves unlobed (leaves may be entire or variously toothed).
 4. Stems and leaves blue-green, glaucous and glabrous; midstem leaves sessile, the bases auriculate and clasping.
 5. Taprooted annuals, usually 25–60 cm tall; ray ligules 12–30 mm long; achenes 1.8–2.5 mm long; pappus absent..... **R. amplexicaulis**
 5. Robust, fibrous-rooted perennials, to 250 cm tall; ray ligules 30–80 mm long; achenes 6.5–7 mm long; pappus of 4–6 scales to 1.5 mm long..... **R. maxima**
 4. Stems and leaves green (not blue-green), usually not glaucous, often with some pubescence present; midstem leaves sessile or petiolate but not clasping (bases may be auriculate).
 6. Pales 6–8 mm long, not surpassing achenes; crown-like pappus > 1 mm long.
 7. Midstem leaves sessile, blades hairy, bases auriculate or rounded; heads borne in arrays of up to 15; achenes 3.5–5 mm long..... **R. scabrifolia**
 7. Midstem leaves petiolate, blades glabrous to sparsely hairy, bases attenuate or cuneate; heads borne singly or in arrays of 2–5; achenes 5–7.5 mm long..... **R. texana**
 6. Pales 2.5–6.5 mm long, surpassing achenes; crown-like pappus < 0.6 mm long, or absent.
 8. Annuals, biennials, or short-lived perennials, taprooted or fibrous-rooted (not rhizomatous); tips of pales hairy; style branches of disk flowers elongate, awl-like; pappus absent..... **R. hirta**
 8. Perennials, often rhizomatous or stoloniferous, crowns sometimes woody; tips of pales glabrous or sparsely strigose; style branches of disk flowers short and blunt; pappus present, crown-like (often minute).
 9. Plants to 80 cm tall; basal leaf blades linear to narrowly spatulate, 0.5–2 cm wide..... **R. missouriensis**
 9. Plants to 120 cm tall; basal leaf blades lanceolate to elliptic or ovate, 2–11 cm wide.
 10. Plants with a thick woody root or crown; leaf blades gland-dotted beneath (with microscopic resin globules that appear golden in light with lens); pales 5–6.5 mm long, the tips acute to cuspidate (awn-tipped), pubescent **R. grandiflora**
 10. Plants stoloniferous; leaf blades without microscopic resin globules; pales 2.5–4 mm long, the tips obtuse to acute, glabrous except for ciliate margin **R. fulgida**

Rudbeckia amplexicaulis Vahl, (stem-clasping), CLASPING CONEFLOWER, CLASPING-LEAF CONEFLOWER. Annuals, 25–60(–120) cm tall, taprooted; herbage glabrous and glaucous; basal leaves seldom persisting to flowering, midstem leaves sessile, blades elliptic to oblong or lanceolate to oblanceolate, unlobed, bases auriculate-clasping, margins toothed or entire; receptacles ovoid to conic; ray flowers 6–10+, ligules solid yellow or sometimes partly orange or maroon, 12–30 mm long; disk corollas greenish yellow with purplish lobes; achenes 1.8–2.5 mm long; pappus absent. Disturbed habitats, moist areas, floodplains; e

2/3 of TX; sc U.S. from MO se to FL and w to KS and TX; records outside this range are probably adventive. Apr–May. Previously treated as the monotypic species [*Dracopis amplexicaulis* (Vahl) Cass.]. This species is often included in wildflower mixes and has become weedy in some agricultural croplands.

Rudbeckia fulgida Aiton var. **palustris** (Eggert ex C.L. Boynt. & Beadle) Perdue, (sp.: fulgid, shining; var.: marsh-loving), PRAIRIE CONEFLOWER, MARSH CONEFLOWER, ORANGE CONEFLOWER. Perennials, to 120 cm tall, stoloniferous, rosettes forming at stolon tips; basal leaves usually present at flowering, midstem leaves petiolate or sessile, blades lanceolate to ovate, reduced up the stem, unlobed, sparsely to moderately hairy, bases cuneate to attenuate, margins entire to serrate or sometimes lacerate; receptacles ovoid to hemispheric; ray flowers 8–14, ligules solid yellow to yellow-orange, 15–25 mm long; disk corollas yellowish green with brownish purple lobes; achenes 2.2–4 mm long; pappus to 0.2 mm long. Calcareous soils, moist and wet sites; Upshur, Hardin, and San Jacinto cos.; Edwards Plateau; MO, AR, and OK. Jul–Nov. [*R. coryi* Shinners, *R. palustris* Eggert ex C.L. Boynt. & Beadle]

Rudbeckia grandiflora (D. Don) J.F. Gmel. ex DC., (large-flowered), ROUGH CONEFLOWER, LARGE-FLOWER CONEFLOWER. Perennials, to 120 cm tall, fibrous-rooted and often woody-crowned; basal leaves usually persisting to flowering, midstem leaves petiolate to nearly sessile, blades elliptic to lanceolate or ovate, often folded longitudinally, strigose, unlobed, bases rounded to cuneate, margins entire or remotely serrate; receptacles ovoid to hemispheric; ray flowers 12–25, ligules solid yellow, 20–50 mm long; disk corollas maroon, with greenish yellow bases and lobes; achenes 2–3 mm long; pappus to 0.5 mm long. Sandy open woods, moist to dry prairies; mostly e 1/3 TX; also nc TX; sc U.S. from MO s to LA and w to KS and TX; scattered records further e are apparently adventive (Kartesz 2015), perhaps due to the inclusion of this species in wildflower seed mixes. Jun–Jul. Several popular garden cultivars have been developed from this species. The two varieties apparently have overlapping ranges in East TX; no infraspecific range maps are provided by Turner et al. (2003) or USDA NRCS (2016), therefore we are not providing ranges or maps for these varieties. Urbatsch and Cox (2006) divided the two varieties as follows:

1. Lower stems glabrous or sparsely hairy, upper stems hairy, hairs ascending, mostly < 0.5 mm long; leaves scabrous to puberulent.....var. **alismifolia**
1. Stems hairy throughout, hairs spreading to ascending, ca. 1 mm long; leaves hirsute.....var. **grandiflora**

var. **alismifolia** (Torr. & A. Gray) Cronquist, (with leaves like *Alisma*—water-plantain). [*R. alismifolia* Torr. & A. Gray]

var. **grandiflora**, [*Centrocarpha grandiflora* Sweet]

Rudbeckia hirta L., (hairy), BLACK-EYED-SUSAN, BROWN-EYED-SUSAN. Annuals, biennials, or short-lived perennials, to 100 cm tall, taprooted or fibrous-rooted; herbage scabrous to hispid or sericeous; basal leaves often withering by flowering, midstem leaves petiolate or sessile, blades elliptic to broadly linear or spatulate to oblanceolate, unlobed, bases attenuate to cuneate, margins entire or serrate; receptacles hemispheric to ovoid; ray flowers 8–16, ligules solid yellow or sometimes partly orange or maroon, 15–45 mm long; disk corollas yellowish green with brownish purple lobes; achenes 1.5–2.7 mm long; pappus absent. Prairies, roadsides, old fields; mostly e 1/2 TX; also Edwards Plateau and s TX; across much of North America but mostly in e 2/3; scattered records further w are apparently adventive (Kartesz 2015). May–Jul(–Sep). Some strains of this species are cultivated and/or used in wildflower seeds mixes; its weedy tendencies make it popular for large-scale “wildscaping” and erosion control. *Rudbeckia hirta* is reported to cause poisoning in cattle, sheep, and hogs (Pammel 1911; Kingsbury 1964). *X* Two varieties apparently have overlapping ranges in East TX; no infraspecific range maps are provided by Turner et al. (2003) or USDA NRCS (2016), therefore we are not providing ranges or maps for these varieties. Urbatsch and Cox (2006) divided the two East TX varieties as follows:

1. Stems branched mostly at or near midstem height, leafy mostly toward bases (leaves reduced up the stem); peduncles at least 1/2 plant height.....var. **angustifolia**
1. Stems branched mostly above midstem height, leafy ± throughout; peduncles to 1/3 plant height.....var. **pulcherrima**

var. **angustifolia** (T.V. Moore) Perdue, (narrow-leaved). [*R. divergens* T.V. Moore, *R. floridana* T.V. Moore var. *angustifolia* T.V. Moore]

var. **pulcherrima** Farw., (very handsome), [*R. bicolor* Nutt., *R. longipes* T.V. Moore, *R. sericea* T.V. Moore, *R. serotina* Nutt.]

Rudbeckia laciniata L. var. **laciniata**, (cut or slashed), CUT-LEAF CONEFLOWER, GREEN-HEAD CONEFLOWER. Perennials, 50–300 cm tall, fibrous-rooted and rhizomatous, plants colonial; basal leaves often withering before flowering, midstem leaves

petiolate or sessile, blades broadly ovate to lanceolate, 5–9-lobed or pinnatifid, glabrous or sparsely hairy, bases cuneate to attenuate or cordate, margins entire or dentate; receptacles globose to ovoid; ray flowers 8–12, ligules solid yellow, 20–45 mm long; disk corollas yellow to yellowish green with yellow lobes; achenes 4.2–6 mm long; pappus 0.1–0.7 mm long. Wet sites, along streams, edges of woods; in TX recorded only from Jasper Co.; mostly e 1/2 North America but less frequent in s states; some w North American records are apparently adventive (Kartesz 2015). Jun–Jul. This species is grown as an ornamental and occasionally escapes cultivation.

Rudbeckia maxima Nutt., (largest), GIANT CONEFLOWER, GREAT CONEFLOWER, CABBAGE CONEFLOWER. Robust perennials, to 250 cm tall, fibrous-rooted and rhizomatous, forming large colonies; herbage glabrous and heavily glaucous; basal leaves usually persisting to flowering, midstem leaves sessile, blades ovate to pandurate, unlobed, bases auriculate-clasping, margins crenate; receptacles ovoid to conic, conspicuously elongating in fruit; ray flowers 10–20, ligules solid yellow, 30–80 mm long; disk corollas maroon (at least the lobes); achenes 6.5–7 mm long; pappus to 1.5 mm long. Low ground, moist ditches, sandy or silty soils; East TX to East Cross Timbers; AR, LA, and OK; adventive in SC. May–Jun. This species is cultivated as an ornamental and is sometimes a problematic pasture weed.

Rudbeckia missouriensis Engelm. ex C.L. Boynt. & Beadle, (of Missouri), MISSOURI ORANGE CONEFLOWER, OZARK BLACK-EYED-SUSAN. Perennials, to 80 cm tall, rosettes forming at stem bases; basal leaves usually present at flowering, midstem leaves petiolate or sessile, blades linear to spatulate, unlobed, hirsute, bases cuneate to attenuate, margins entire or remotely serrulate; receptacles mostly hemispheric; ray flowers 9–15, ligules solid yellow to yellow-orange, 10–25 mm long; disk corollas greenish yellow with brownish purple lobes; achenes 1.5–2.7 mm long; pappus to 0.1 mm long. Dry or rocky prairies, limestone glades; Polk, Tyler, and Walker cos., also Montgomery Co. (Brown 2014); sc U.S. from IL s to LA and w to OK and TX. Jun–Aug. [*R. fulgida* Aiton var. *missouriensis* (Engelm. ex C.L. Boynt. & Beadle) Cronquist]

Rudbeckia scabrifolia L.E. Brown, (rough-leaved), ROUGH-LEAF CONEFLOWER, BOG CONEFLOWER. Perennials, to 200 cm tall, fibrous-rooted and rhizomatous; basal leaves usually persisting to flowering, midstem leaves sessile, blades ± pandurate, hairy, unlobed, bases auriculate (not clasping) or rounded, margins entire or coarsely toothed; receptacles ovoid to ellipsoid; ray flowers 10–15, ligules solid yellow, 20–40 mm long; disk corollas greenish yellow with maroon lobes; achenes 3.5–5 mm long; pappus to 2.5 mm long. Acid seeps, longleaf pine forests, hillside bogs; Angelina, Jasper, Newton, Sabine, and Shelby cos.; LA. Jun–Aug. This species is not listed at the state or federal level, but is of conservation concern due to its restricted range and specialized habitat; habitat disturbance and fire suppression threaten some populations of this fire-dependent species (Poole et al. 2007). *!*

Rudbeckia subtomentosa Pursh, (slightly tomentose), SWEET CONEFLOWER. Perennials, to 200 cm tall, rhizomes stout; basal leaves often withering by flowering, midstem leaves petiolate, blades ovate to elliptic, 3–5-lobed, densely hirsute and gland-dotted, bases truncate to cuneate or rounded, margins denticulate to serrate; receptacles conic to hemispheric; ray flowers 10–16, ligules solid yellow to yellow-orange, 20–40 mm long; disk corollas mostly brownish purple but yellowish green basally; achenes 2–3.5 mm long; pappus to 0.2 mm long. Moist prairies, stream banks, openings in woods; Angelina, Hardin, and Tyler cos.; c U.S. from MI s to MS and w to WI, KS, and TX; scattered records further e are apparently adventive (Kartesz 2015). Jun–Jul. Sometimes cultivated as an ornamental.

Rudbeckia texana (Perdue) P. Cox & Urbatsch, (of Texas), TEXAS CONEFLOWER. Perennials, to 150 cm tall, fibrous-rooted and rhizomatous; basal leaves usually persisting to flowering, midstem leaves petiolate, blades elliptic to lanceolate, glabrous or sparsely hairy, unlobed, bases attenuate to cuneate, margins entire or toothed to serrate; receptacles ovoid to ellipsoid; ray flowers 10–16, ligules solid yellow, 20–50 mm long; disk corollas greenish yellow with maroon lobes; achenes 5–7.5 mm long; pappus to 1.5 mm long. Coastal prairies, ditches and bayous, swales; se TX w to Montgomery and Waller cos. (Brown 2014); LA. May–Jul (sporadically later). [*R. nitida* Nutt. var. *texana* Perdue]

Rudbeckia triloba L. var. **triloba**, (three-lobed), YELLOW DAISY, BROWN-EYED-SUSAN. Short-lived perennials, to 150 cm tall, rhizomatous; basal leaves often withering by flowering, lower leaves 3(–5)-lobed, midstem leaves petiolate or sessile, blades ovate to elliptic, reduced and fewer-lobed up the stem, hirsute to strigose, bases truncate or rounded to cordate, margins serrate; receptacles conic to subhemispheric; ray flowers 8–15, ligules solid yellow or sometimes partly orange or maroon, 8–17 mm long; disk corollas mostly brownish purple but yellowish green basally; achenes 1.9–2.8 mm long; pappus to 0.2 mm long. Creek bottoms, moist thickets, roadsides; Hardin, Lamar, and San Augustine cos., and Nacogdoches Co. (Kartesz 2015); mostly e 1/2 U.S.; introduced in a few w states and Canada. May–Oct.

SCLEROCARPUS Jacq. BONE-BRACT

☛A genus of 12 species native to the s U.S., Mexico, and Central America, with one species in the Old World tropics. (Greek: *skleros*, hard, and *carpos*, fruit, alluding to the hardened pales enfolding disk achenes) (tribe Heliantheae)
REFERENCES: Feddema 1972; Turner 1988b; Harriman 2006.

Sclerocarpus uniserialis (Benth.) Hemsl. var. **uniserialis**, (for the phyllaries, which appear to be in a single series), MEXICAN BONE-BRACT. Annual or perennial taprooted herbs or subshrubs, 60–200 cm tall; stems sprawling to erect, often densely hairy; leaves usually opposite below and alternate above, usually petiolate, blades 3-nerved, 2–5 cm long, ovate to rhombic or lanceolate, glabrous to scabrous, margins coarsely toothed; heads borne singly; involucre 12–20 mm wide; phyllaries in 1(–2) series, green, loose, oblong to linear; pales (receptacle chaff) each enfolding a disk flower, forming a hardened “fruit” around the achene; ray flowers 5–8, neuter, ligules yellow to orange, rotundly elliptic, 5–15 mm long, readily falling; disk flowers perfect, fertile, corollas yellow with reddish veins; achenes each enclosed within a hardened, brown, warty “fruit” formed by the subtending receptacle bract; pappus absent. Disturbed sites, caliche, limestone, sandy soils; sc TX and Gulf Coast; s TX; Mexico and Central America. Jul–Dec. [*Gymnopsis uniserialis* Hook.] This species apparently intergrades in s TX with var. *austrotexanus* B.L. Turner, which has purplish brown disk corollas.

SENECIO L. RAGWORT, SQUAW-WEED, GROUNDSEL

Ours annual herbs, glabrate to usually pubescent; leaves alternate, the blades toothed to pinnately lobed; inflorescences terminal, the heads cymosely arranged; primary (inner) phyllaries in a single series, linear, with hyaline margins, subtended by a secondary series of short, phyllary-like bracts; ray flowers usually pistillate, fertile, with yellow ligules, or ray flowers absent; disk flowers perfect, fertile, the corollas yellow; achenes cylindrical; pappus of numerous, capillary, white bristles.

☛When broadly considered, *Senecio* is a huge, cosmopolitan genus of 1,250–3,000 species depending on circumscription. Species vary in growth form from trees to shrubs, vines, herbs, or desert succulents, and include the GIANT GROUNDSELS of the mountains of e Africa. We are following Freeman and Barkley (1995), Barkley et al. (1996), and Barkley (2006d) in treating the aureoid group of Senecios as *Packera*. Even when this and numerous other segregates are removed, *Senecio* is still one of the largest genera of seed plants. *X* A number of species are toxic and can be problematic if eaten by livestock, especially horses; acute illness and death can result from hepatotoxic pyrrolizidine alkaloids that cause liver damage. Milk from grazing animals and honey from *Senecio* nectar reportedly contain the alkaloids (Lewis & Elvin-Lewis 1977; Fuller & McClintock 1986; Blackwell 1990). Human deaths have been reported from ingestion of *Senecio* herbal teas as the result of liver damage—there is no known cure (Lampe & McCann 1985; Tveten & Tveten 1993). Some *Senecio* species were in the past used in poultices for wounds and abscesses; the common name GROUNDSEL apparently is derived through a series of changes from the Anglo-Saxon *grundeswelge*, pus-absorber (Tveten & Tveten 1993). (Latin name of a plant, from *senex*, an old man, alluding to the hoariness of many species, or to the white hairs of the pappus) (tribe Senecioneae).

REFERENCES: Greenman 1915–1918; Vuilleumier 1969a; Barkley 1978, 1985a, 1985b, 1986, 2006d; Barkley et al. 1996.

1. Ray flowers yellow, prominent; primary phyllaries and subtending phyllary-like bracts green-tipped; leaves shallowly toothed to subentire; native species **S. ampullaceus**
1. Ray flowers usually absent, but if present the ligules greatly reduced and inconspicuous; phyllary-like bracts subtending primary phyllaries prominently black-tipped; leaves usually shallowly pinnately lobed; introduced weedy species **S. vulgaris**

Senecio ampullaceus Hook., (flask-shaped), TEXAS GROUNDSEL. Loosely woolly-pubescent to nearly glabrate annual (10–)20–80 cm tall; single-stemmed; lowermost leaves narrowed to a subpetiolar base, auriculate-clasping at very base; middle and upper leaves often truncate-clasping; involucre 7–11 mm high; secondary phyllary-like bracts and primary phyllaries green-tipped; ray flowers ca. 8, ligules 8–15 mm long. Sandy open woods, fields, roadsides; widespread in e 1/2 of TX; once thought to be endemic to TX but now reported from OK, MO, AR, and LA. Mar–May.

Senecio vulgaris L., (common), COMMON GROUNDSEL. Annual 10–30(–60) cm tall, woolly-pubescent to glabrate; lower leaves petiolate; middle and upper leaves sessile, auriculate, ± clasping, undulate to pinnately lobed, 2–10 cm long, 0.5–2(–4) cm wide; involucre 6–10 mm high; secondary phyllary-like bracts prominently black-tipped; ray flowers usually absent. Disturbed areas; nc TX (Dallas, Denton, Grayson cos.), c TX (McLennan Co.), sc TX (Bastrop and DeWitt cos.), and se TX (Brazos and Harris cos.); apparently first collected in TX in Dimmit Co. in 1944 (Cory 1947, 1948a); probably more common in TX than the records imply and undercollected; throughout North America; a common weed the world over. Feb–May. Native of Europe. This species is among those in the genus that contain toxic pyrrolizidine alkaloids; animal deaths have been reported; the toxins are not lost upon drying and are still present in hay (Burlage 1968; Lampe & McCann 1985; Fuller & McClintock 1986). *X* *I*

SILPHIUM L. ROSINWEED, COMPASSPLANT

Herbaceous, coarse, sunflower-like perennials; stems erect; leaves alternate to opposite, petiolate or sessile, simple, the blades entire or toothed to deeply lobed or pinnatifid, stiff, leathery, often conspicuously scabrous; heads large and showy, solitary or in corymbose or spicate-racemose arrays; phyllaries in 2–4 series, the outer series foliaceous, the inner series smaller and thinner; ray flowers pistillate, fertile, with ligules yellow or white (in one species); disk flowers functionally staminate, corollas yellow or white; achenes flattened, thin-edged, ± winged; pappus absent, or of 2 awns projecting from achene shoulders.

• An e and c North American genus of 12 species. The common name ROSINWEED refers to the sticky secretions on the stems and leaves of some species (Ajilvsgi 1984). *Silphium* is a taxonomically difficult genus that formerly had 23 recognized species (Perry 1937); differing assessments of phenotypic variability and hybridization have led to frequent species concept adjustments and nomenclatural changes. Complete specimens with mature inflorescences and lower leaves are often needed for definitive identification. Some species of this genus could be confused with *Helianthus*, however, in *Silphium* only the ray flowers produce mature achenes, which have thin, papery edges, while in *Helianthus* only the disk flowers produce mature achenes, and these are not thin-edged. (Greek: *silphion*, the ancient name of some resinous plant, applied by Linnaeus to this wholly American genus) (tribe Heliantheae)

REFERENCES: Perry 1937; Settle & Fisher 1970; Clevinger 2006.

1. Plants taprooted; leaves (at least the lower ones) deeply pinnatifid or 1–2-pinnately lobed.
 2. Ray flowers 14–30, ray and disk corollas white; stems 1 m or less tall; achenes 12–26 mm long..... **S. albiflorum**
 2. Ray flowers 27–38, ray and disk corollas yellow; stems usually 1–3 m tall; achenes 10–18 mm long..... **S. laciniatum**
1. Plants fibrous-rooted; leaves entire to toothed.
 3. Leaves both strictly opposite throughout and clasping the stem, leaves sessile, bases cordate to rounded **S. integrifolium**
 3. Leaves alternate or opposite, sessile or petiolate (if strictly opposite and sessile then not clasping the stem), bases attenuate to rounded.
 4. Outer faces of phyllaries usually glabrous (rarely scabrous)..... **S. asteriscus** (in part)
 4. Outer faces of phyllaries glandular, hirsute, hispid, or scabrous.
 5. Basal leaves present at flowering **S. radula** (in part)
 5. Basal leaves withering before flowering.
 6. Ray flowers 20–30+ **S. radula** (in part)
 6. Ray flowers 12–20..... **S. asteriscus** (in part)

Silphium albiflorum A. Gray, (white-flowered), WHITE ROSINWEED, WHITE COMPASSPLANT. Plants 20–75 cm tall, taprooted; basal leaves present at flowering, stem leaves usually alternate, petiolate or sessile, scabrous to hirsute, 1–2-pinnately lobed, margins unevenly toothed or entire, bases attenuate to cuneate or truncate; ray and disk corollas white; achenes 12–26 mm long; pappus 2–5 mm long. Calcareous soils, open fields and prairies; w border of East TX from Dallas to McLennan to Travis cos.; Blackland Prairie and Grand Prairie from nc TX s to Edwards Plateau and w to Rolling Plains; endemic to TX. May–Jul. *ET*

Silphium asteriscus L., (Greek: *asteriskos*, little star), STARRY ROSINWEED. Plants 30–200 cm tall, fibrous-rooted; basal leaves present or absent at flowering, stem leaves alternate or opposite, petiolate or sessile, hirsute or hispid to scabrous, margins dentate to serrate or entire, bases attenuate to rounded; ray and disk corollas yellow; achenes 6–15 mm long; pappus absent or to 5 mm long. Prairies, open forests, roadsides. Jun–Sep.

1. Basal leaves withering before flowering; pales not glandular var. **asteriscus**
1. Basal leaves present at flowering; pales with stalked glands var. **simpsonii**

var. **asteriscus**. E and c TX; Edwards Plateau; se U.S. from VA s to GA and w to OK and TX. [*S. asperrimum* Hook., *S. asteriscus* L. var. *scabrum* Nutt.]

var. **simpsonii** (Greene) J.A. Clevinger, (for Joseph H. Simpson (1841–1918), botanist of Florida and collector of the type). Harris Co. (L.E. Brown 33879 (SBSC); Brown 2014); also Galveston Co.; sparsely distributed from GA and FL w to MS and disjunct to TX. [*S. simpsonii* Greene]

Silphium integrifolium Michx., (entire-leaved), WHOLE-LEAF ROSINWEED. Plants 40–200 cm tall, fibrous-rooted; basal leaves withering before flowering, stem leaves opposite, sessile, hispid to scabrous or glabrous, margins finely serrate or entire, bases rounded to cordate, often clasping stems; ray and disk corollas yellow; achenes 9–14 mm long; pappus 1–4 mm long. Calcareous soils, prairies, roadsides; reported from a calcareous pimple-mound prairie in Bowie Co. (Singhurst & Holmes 2010); c U.S. from MI s to AL and w to WY, CO, and NM; Canada. May–Sep. According to Clevinger (2006), only one

variety (var. *laeve*) occurs in TX; according to Kartesz (2015), both varieties occur in TX but are only recorded from Bowie Co.; due to chronic nomenclatural changes resulting in previously recognized varieties of *S. integrifolium* being removed to other species, no complete range maps are available for the two varieties as currently circumscribed, therefore we are not providing ranges or maps for these varieties. Clevinger (2006) divided the two potential TX varieties as follows:

1. Outer faces of phyllaries usually hispid, pilose, or scabrous, rarely glabrous; ray flowers 12–22 var. **integrifolium**
 1. Outer faces of phyllaries glabrous; ray flowers 20–36+ var. **laeve**

var. **integrifolium**. [*S. integrifolium* var. *deamii* L.M. Perry]

var. **laeve** Torr. & A. Gray, (smooth). [*S. speciosum* Nutt.]

Silphium laciniatum L., (lacinate, torn), COMPASSPLANT. Plants usually 100–300 cm tall, taprooted; basal leaves present at flowering, stem leaves alternate, petiolate or sessile, hispid to hirsute or scabrous, 1–2-pinnately lobed, margins unevenly toothed or entire, bases attenuate to truncate; ray and disk corollas yellow; achenes 10–18 mm long; pappus 1–3 mm long. Calcareous or sandy soils, prairies, open or disturbed sites; scattered in e and c TX; Cross Timbers and Edwards Plateau; e and c U.S. from NY s to AL and w to MN, SD, and NM; Canada. Jun–Aug. [*S. laciniatum* L. var. *robinsonii* L.M. Perry] The common name refers to the supposedly north-south orientation of the leaves.

Silphium radula Nutt., (rough), ROUGH-STEM ROSINWEED, ROUGH-LEAF ROSINWEED. Plants 30–250 cm tall, fibrous-rooted; basal leaves present or absent at flowering, stem leaves alternate or opposite, petiolate or sessile, hispid to hirsute or scabrous, margins coarsely dentate or entire, bases attenuate to rounded; ray and disk corollas yellow; achenes 10–17 mm long; pappus 2–5 mm long. Calcareous or sandy soils, prairies, fencerows; Jun–Jul. The common name refers to the sticky resinous material secreted along the stems and leaves, which was used medicinally by Native Americans and also as a chewing gum (Ajilvsgi 1984).

1. Basal leaves present at flowering; ray flowers 12–18 var. **gracile**
 1. Basal leaves withering before flowering; ray flowers 20–30+ var. **radula**

var. **gracile** (A. Gray) J.A. Clevinger, (graceful), SLENDER ROSINWEED. Se and sc TX; LA. [*S. gracile* A. Gray]

var. **radula**, ROUGH-STEM ROSINWEED, SIMPSON ROSINWEED. E and sc TX; West Cross Timbers; MO, AR, LA, KS, and OK. [*S. reverchonii* Bush, *S. simpsonii* Greene var. *wrightii* L.M. Perry]

SILYBUM Adans. MILK-THISTLE

☛A genus of 2 species native to the Mediterranean region, both now widely introduced elsewhere, especially in areas used for cattle grazing (Turner 2016). (Greek: *silybon*, name for similar thistle-like plants) (tribe Cardueae)

REFERENCE: Keil 2006i.

Silybum marianum (L.) Gaertn., (with white-mottled leaves; the spots were supposed to have resulted from drops of Mary's milk falling on the leaves), BLESSED MILK-THISTLE, OUR-LADY'S-THISTLE, HOLY-THISTLE. Coarse prickly annual or biennial 0.5–1.5+ m tall; stems loosely woolly-pubescent, becoming glabrous; leaves alternate, mottled green and white, the lower pinnately lobed, the middle and upper toothed; stem leaves auricled-clasping, all prickly or spiny-margined, not decurrent; heads large (2.5–6 cm in diam.), solitary, terminal; phyllaries to 4 cm long, with spinescent margins, constricted below middle, with broad bases and green, sub-leafy apical portions tapering to a spiny tip to 8 mm long; ray flowers absent; disk corollas pink to rosy purple; achenes ellipsoid, 6–8 mm long; pappus of 2 series, the outer of numerous white, awn-like scales 15–20 mm long, deciduous as a ring, the inner of minute smooth bristles. Pastures and roadsides, waste areas; scattered from nc TX to Edwards Plateau; mostly along the w edge of East TX; first collected in TX in Sutton Co. in 1938 (supposedly introduced through a shipment of hay from California) (Cory 1940); scattered across North America and naturalized in many countries. May–Jun. [*Carduus marianus* L.] Native of Mediterranean region. The fruit is used medicinally and considered since the time of Dioscorides to protect the liver; it contains flavonoids effective as an antidote for mushroom (*Amanita*) poisoning—the mode of action is to displace the toxin from cell membrane receptors (Mabberley 1987); its clinical use in Europe is widespread (Leung & Foster 1996). *I*

SIMSIA Pers. BUSH-SUNFLOWER

☛A New World genus of ca. 20 species extending from the sw U.S. to Argentina with 1 taxon endemic to Jamaica (Schilling & Spooner 1988; Spooner 1990). (Named for John Sims, 1749–1831, of England, editor of *Curtis's Botanical Magazine*)

(tribe Heliantheae)

REFERENCES: Schilling & Spooner 1988; Spooner 1990, 2006.

Simsia calva (Engelm. & A. Gray) A. Gray, (naked), AWNLESS BUSH-SUNFLOWER. Perennial, herbaceous from woody base, coarsely pubescent; roots fusiform or woody; stems 30–150 cm long; herbage dark green; leaves opposite, petiolate, the petioles sometimes auricled, the auricles fused to form a nodal disk; leaf blades deltoid, sometimes 3-lobed, serrate; stipules toothed or serrate, often united; heads usually solitary at the end of long peduncles; phyllaries in several series, often reflexed; ray flowers 8–21, pistillate, sterile, the ligules yellow or orange-yellow, often spotted or striped beneath with purple or red; disk flowers perfect, fertile; corollas yellow or orange-yellow, sometimes with purplish lines, gibbous basally; achenes flattened, emarginate, 3.5–5.7 mm long; pappus of 2 short scales, often absent on mature achenes. Calcareous soils, roadsides, brushlands; along the w and sw border of East TX from Bell Co. s to Bexar and Goliad cos.; also Austin Co.; widespread in Edwards Plateau, South TX Plains, and Trans-Pecos; NM; Mexico. May–Nov. [*Barrattia calva* A. Gray & Engelm.]

SMALLANTHUS Mack. ex Small LEAFCUP

☛A genus of ca. 20 species of tropical and warm areas of the Americas; previously recognized in the genus *Polymnia*. (Named for John Kunkel Small, 1869–1938, American botanist and author of numerous works including *Manual of the Southeastern Flora*) (tribe Heliantheae)

REFERENCES: Wells 1965; Robinson 1978; Turner 1988c; Strother 2006z.

Smallanthus uvedalia (L.) Mack. ex Small, (presumably from Latin *uvida*, humid or moist, for its tendency to occur in wet habitats), BEAR'S-FOOT, HAIRY LEAFCUP. Herbaceous perennial 1–3 m tall; stems erect, purple-spotted; leaves opposite, at least lower, often huge, to ca. 70 cm long and 40 cm wide, sessile or with broad conspicuous wings to base of petiole; leaf blades ovate to deltoid, palmately 3- to 5-lobed and veined, margins irregularly dentate; heads clustered in loose leafy cymes; phyllaries in 2 series, the outer series numbering 4–6, herbaceous, 10–20 mm long, to ca. 10–12 mm wide, ovate or ovate-lanceolate; ray flowers 7–13, pistillate, fertile, the ligules yellow, 12–20(–30) mm long; disk flowers numerous, staminate, yellow; achenes obovoid, 5–6 mm long and ca. 4 mm wide; pappus absent. Wooded bottomlands; scattered across East TX, to nc TX and Edwards Plateau; e and se U.S. from NY s to FL and w to MI, KS, and TX; Mexico. Jul–Oct. [*Osteospermum uvedalia* L., *Polymnia uvedalia* (L.) L., *Polymnia uvedalia* (L.) L. var. *densipilis* S.F. Blake]

SOLIDAGO L. GOLDENROD

Herbaceous perennials from woody caudices or rhizomes; leaves alternate, sessile or short-petioled, margins often serrate, basal leaves sometimes withering before flowering time; inflorescence terminal, usually branched in cylindrical, flat-topped, or pyramidal arrays; heads numerous, relatively small, sometimes secund (in a one-sided arrangement); phyllaries imbricated, in 3–5 series, usually unequal, margins scarious; ray flowers usually 2–15(–24), pistillate, fertile, the ligules yellow in ours (sometimes minute or inconspicuous); disk flowers perfect, fertile, the corollas yellow; achenes cylindrical, usually 8–10-ribbed; pappus of numerous, white, minutely-barbed bristles.

☛A mainly North American genus of ca. 100 species, with a few taxa in Mexico, South America, and Eurasia. Because of marked phenotypic plasticity, polyploidy, and hybridization, *Solidago* is a taxonomically difficult genus. Complete specimens with mature inflorescence arrays and lower leaves are often needed for definitive identification. Despite their bad reputation as allergens, GOLDENRODS are insect-pollinated and thus do not produce significant windblown pollen; most fall allergies in TX are probably due to wind-pollinated species of *Ambrosia* (RAGWEEDS) that flower inconspicuously at the same time as the much showier GOLDENRODS. The related genus *Euthamia*, sometimes included in *Solidago*, is here treated separately. Two East TX species (*S. nitida* and *S. rigida*) are sometimes segregated in the genus *Oligoneuron*; we are following Semple and Cook (2006) in treating these traditionally and including them in *Solidago*; appropriate synonymy is given below. (Latin: *solidus*, whole, and *ago*, resembling or becoming, alluding to medicinal properties) (tribe Astereae)

REFERENCES: Taylor & Taylor 1983, 1984; Heard & Semple 1988; Gandhi & Thomas 1989; Nesom 1990e, 1993a, 2008; Semple 1992, 2013; Semple & Cook 2006; Semple et al. 2012, 2016a, 2016b.

1. Inflorescence arrays flat-topped or slightly rounded (= corymbose); petiole bases of basal leaves persistent (remaining into the next year); phyllaries striate with 3–7 prominent nerves (sometimes segregated as genus *Oligoneuron*).
2. Leaf blades, stems, and peduncles moderately to densely short-hairy; midstem leaves ovate to rhombic or sometimes lanceolate, 15–17 mm wide; ray flowers 6–13 per head; achenes 0.8–1.7 mm long; pappus 3–4 mm long.....**S. rigida**
2. Leaf blades, stems, and peduncles glabrous to sparsely hairy, midstem leaves linear to oblanceolate, 1–7 mm wide; ray

- flowers 1–4 per head; achenes 2–3 mm long; pappus 4–5 mm long..... **S. nitida**
1. Inflorescence arrays elongate, not flat-topped, either racemose, paniculate, cylindric, or pyramid-shaped and broadest near base or midsection; petiole bases not persisting on the plant; phyllaries not striate (*Solidago* in a narrower sense)..... **S. auriculata**
3. Midstem leaves ovate, blade bases or petiole bases usually cordate and auriculate-clasping..... **S. auriculata**
3. Midstem leaves of various shapes, blade bases or petiole bases not cordate and not auriculate-clasping (petiole bases may be winged and sheathing stem).
4. Heads arranged in discrete, relatively small, racemose or paniculate axillary clusters along the arching and glaucous main stem, usually interrupted by bare internodes and interspersed with leaves far surpassing in length the clusters of heads, the leaves continuing to the summit of the stem **S. caesia**
4. Plants not as described above.
5. Heads arranged in thyrsiform, racemose, or paniculate arrays, not nodding or arched at the summit, lateral array branches (if any) erect, not arching or recurved.
6. Basal and lowest stem leaves usually present at flowering; petioles of lower stem leaves nearly completely sheathing stem; plants of sandy moist soils, pine flatwoods, and coastal brackish marshes, mostly of se and coastal TX..... **S. virgata**
6. Basal and lowest stem leaves often absent at flowering; petioles or bases of lower stem leaves not sheathing stem; plants of generally drier soils throughout East TX (including se and coast).
7. Peduncles 2–15 mm long; phyllaries with stalked glands; rays (5–)7–9; achenes 3–4 mm long **S. petiolaris**
7. Peduncles 1.5–3 mm long; phyllaries eglandular; rays (2–)3–7(–9); achenes 1.6–2.5 mm long..... **S. speciosa**
5. Heads arranged in paniculate arrays, often pyramidal or rhombic, with summits usually nodding or arching, and/or lateral array branches arching or recurved.
8. Basal and lowest stem leaves usually present at flowering and relatively large; middle to upper stem leaves much reduced.
9. Petioles of lower stem leaves nearly completely sheathing stem; plants of wet, sandy-saline soils, dunes, and brackish marshes of coastal and adjacent counties of se and sc TX..... **S. sempervirens**
9. Petioles or bases of lower stem leaves not sheathing stem; plants of generally drier soils throughout East TX (including se and coast).
10. Lower stem leaves ovate to lanceolate.
11. Stems square in cross-section, at least lower parts of the stem 4-angled, sometimes winged; upper leaf surfaces strongly scabrous; disk corollas 2.8–3 mm long; pappus 2–3 mm long **S. salicina**
11. Stems rounded in cross-section; upper leaf surfaces glabrous to slightly scabrous or strigose; disk corollas 3.5–5 mm long; pappus 3–4 mm long.
12. Plants without slender stoloniferous rhizomes; ray ligules 4–5.5 mm long; achenes 1.5–2 mm long **S. arguta**
12. Plants with slender stoloniferous rhizomes in addition to deeper rhizomes; ray ligules ca. 2 mm long; achenes 2–3 mm long **S. ludoviciana**
10. Lower stem leaves lanceolate to linear-lanceolate.
13. Stems and leaves usually glabrous..... **S. missouriensis**
13. Stems and leaves sparsely to densely hairy.
14. Plants with short-branched caudices (root crowns); stems thickly short-pubescent with grayish hairs; leaves densely puberulent; peduncles 2–3.5 mm long..... **S. nemoralis**
14. Plants sometimes with creeping rhizomes; stems scabrous to loosely puberulent; leaves scabrous; peduncles 0.5–2 mm long **S. radula**
8. Basal and lowest stem leaves usually withering by flowering or relatively small; middle to upper stem leaves gradually reduced.
15. Lowermost stem leaves usually the largest on the stem; lower and midstem leaves reticulate-nerved with multiple, prominent lateral nerves, not 3-nerved.
16. Stems developing from elongate, creeping rhizomes; lowermost stem leaves sessile **S. rugosa**
16. Stems developing from branched caudices or short rhizomes; lowermost stem leaves petiolate.
17. Lower stem leaves scabrous to hirsute; peduncles 1.7–2 mm long; achenes 1–1.6 mm long **S. ulmifolia**
17. Lower stem leaves glabrous; peduncles 2–8 mm long; achenes 1.4–2.3 mm long.
18. Stems glabrous; lower stem leaves entire, minutely translucently gland-dotted (view with back lighting), usually anise-scented when crushed; pappus 2.4–3 mm long **S. odora**
18. Stems puberulent in lines; lower stem leaves serrate, not gland-dotted, not anise-scented; pappus 1.5–2 mm long **S. delicatula**
15. Lowermost stem leaves usually not the largest on the stem; lower and midstem leaves usually 3-nerved (lateral nerves sometimes obscure in *S. tortifolia*).
19. Midstem leaves linear to linear-lanceolate, often twisted; ray flowers mostly 2–8..... **S. tortifolia**
19. Midstem leaves lanceolate to oblanceolate, not twisted; ray flowers mostly 8–15.
20. Upper stems usually glabrous and sometimes glaucous; leaves glabrous above **S. gigantea**
20. Upper stems short-hairy to villous-tomentose; leaves strigose to pilose above.
21. Upper stems short-hairy; leaves scabrous above and more densely strigillose beneath, especially on nerves; inflorescences in broad or narrow pyramidal arrays, usually not more than 2 times as long as wide **S. altissima**

21. Upper stems densely villous-tomentose; leaves evenly moderately to densely pilose on both sides; inflorescences in narrow pyramidal arrays, 2–4 times as long as wide **S. juliae**

Solidago altissima L. subsp. **altissima**, (tallest), LATE GOLDENROD. Plants to 200 cm tall; rhizomes creeping, short or long; stems short-hairy (at least among the flowering branches); lower leaves withering by flowering; midstem leaves sessile, blades oblanceolate to lanceolate, scabrous above, strigillose beneath, especially on nerves, margins minutely serrate to entire; inflorescence arrays paniculate, pyramidal, branches divergent, ascending or recurved, heads secund; achenes 0.5–1.5 mm long, strigillose; pappus 2.5–3.5 mm long. Disturbed areas, fields, roadsides; throughout e 1/2 TX; Edwards Plateau and s TX; e 1/2 North America; Mexico; introduced worldwide. Aug–Oct. [*S. altissima* L. var. *pluricephala* M.C. Johnston., *S. canadensis* L. var. *scabra* (Muhl. ex Willd.) Torr. & A. Gray] Semple et al. (2015, 2016a) indicate the correct name for the infraspecific taxon in TX may be var. *pluricephala* M.C. Johnston.

Solidago arguta Aiton var. **boottii** (Hook.) Palmer & Steyerl., (sp.: sharp-toothed; var.: named for Francis Boott (1792–1863), American physician and botanist), BOOTT'S GOLDENROD, CUT-LEAF GOLDENROD. Plants to 120 cm tall; caudices branching; stems strigose among the flowering branches; basal leaves often present at flowering, bases tapered to thin, winged petioles, margins sharply serrate; midstem leaves sessile, blades lanceolate, strigose to strigillose; inflorescence arrays paniculate, open, leafy-bracted, branches recurved and hairy; phyllaries eglandular; achenes 1.5–2 mm long, strigillose; pappus 3–3.5 mm long. Dry woods; Anderson Co. (Kartesz 2015) and Hardin, Harrison, Marion, and Titus cos.; se U.S. from SC and GA n to IL and w to KS and TX. Sep–Oct. [*S. boottii* Hook., *S. arguta* Aiton subsp. *boottii* (Hook.) G. Morton]

Solidago auriculata Shuttlw. ex S.F. Blake, (auriculate, for the clasping leaf bases), EARED GOLDENROD, CLASPING-LEAF GOLDENROD. Plants to 150 cm tall; caudices or rhizomes short, stout; stems velvety or finely hirsute; basal leaves often present at flowering; basal and midstem leaves with petioles winged, bases flared and auriculate-clasping, blades broadly ovate and cordate, glabrate or scabrous to strigose, margins serrate; inflorescence arrays paniculate, branches few, short or arching, heads secund; phyllaries short-strigose, eglandular; achenes 2–2.5 mm long, distinctively ribbed, short-strigose; pappus ca. 2 mm long, shorter than achenes. Rocky wooded slopes, streambeds, mesic woods; far e and se TX; se U.S. from SC s to FL and w to OK and TX. Sep–Oct. [*S. amplexicaulis* Torr. & A. Gray ex Chapm., *S. notabilis* Mack. ex Small]

Solidago caesia L. var. **caesia**, (blue-gray), BLUESTEM GOLDENROD, WREATH GOLDENROD, WOODLAND GOLDENROD. Plants to 80(–100) cm tall; rhizomes woody; stems strongly arching, glaucous, sometimes appearing blue to purple, glabrous, or slightly strigose among the flowering branches; basal leaves withering by flowering; midstem leaves sessile, blades narrowly lanceolate, sparsely hairy above, margins serrate or entire; inflorescence arrays racemose, interrupted, leafy-bracted, heads in short, secund axillary clusters; phyllaries without stalked glands; achenes 1–2(–2.5) mm long, strigose; pappus 2–3(–3.7) mm long. Shady mesic areas, oak-hickory forests; deep e and se TX; e and se U.S. from ME to FL and w to MI, MO, and TX; Canada. Sep–Oct. [*S. axillaris* Pursh, *S. caesia* L. var. *axillaris* (Pursh) A. Gray]

Solidago delicatula Small, (somewhat delicate), ELM-LEAF GOLDENROD, SMOOTH ELM-LEAF GOLDENROD. Plants to 120 cm tall; caudices compact, branching, woody; stems glabrous; basal leaves withering by flowering, bases tapered to short petioles; midstem leaves subpetiolate or sessile, blades elliptic-lanceolate, glabrous, margins serrate; inflorescence arrays paniculate, arching, branches elongate and arching, heads secund; phyllaries glabrous, eglandular; achenes 1.5–2 mm long, 6–9-ribbed, sparsely strigose; pappus 1.5–2 mm long. Sandy soils, roadsides, openings in oak woods, drier upland sites; ne and e TX; nc and sc TX; AR, LA, KS, and OK. Aug–Oct(–Nov). [*S. microphylla* (A. Gray) Engelm. ex Small, *S. ulmifolia* Muhl. ex Willd. var. *microphylla* A. Gray] According to Semple & Cook (2006), this taxon was found to be sufficiently distinct from *S. ulmifolia*, and has therefore been returned to species status.

Solidago gigantea Aiton, (gigantic), GIANT GOLDENROD, SMOOTH GOLDENROD. Plants to 200 cm tall; rhizomes creeping, short or long; stems glabrous or sparsely strigose among the flowering branches, sometimes glaucous; lower leaves withering by flowering; midstem leaves sessile, blades lanceolate, glabrous or pilose on nerves beneath, margins sharply serrate; inflorescence arrays paniculate, broadly pyramidal, branches divergent, recurved, heads secund; achenes 1.3–1.5 mm long, sparsely strigillose; pappus 2–2.5 mm long. Low wet areas, roadsides, margins of ponds and streams, disturbed sites; widespread in TX; w 3/4 North America; Mexico. Aug–Oct. [*S. gigantea* Aiton var. *pitcheri* (Nutt.) Shinnery, *S. gigantea* Aiton var. *serotina* (Kuntze) Cronquist, *S. shinneryi* (Beaudry) Beaudry]

Solidago juliae G.L. Nesom, (named for Julia Wells Nesom, wife of the species author Guy L. Nesom), JULIA'S GOLDENROD. Plants to 250 cm tall; rhizomes short; stems densely and evenly villous-tomentose, hairs white; lower leaves withering by flowering; midstem leaves sessile, blades lanceolate to narrowly lanceolate, moderately to densely short-pilose, margins shallowly crenate to serrate or entire; inflorescence arrays paniculate, pyramidal, branches spreading and slightly arching,

heads secund; phyllaries glabrous; achenes 1.4–1.6 mm long, sparsely strigillose; pappus ca. 3 mm long. Wet calcareous soils, stream and lake edges, grasslands; Hays and Travis cos.; Edwards Plateau and Trans-Pecos; Mexico. Feb–Apr and Aug–Oct. [*S. canadensis* L. var. *canescens* A. Gray] *ET*

Solidago ludoviciana (A. Gray) Small, (of Louisiana), LOUISIANA GOLDENROD. Plants to 90(–150) cm tall; rhizomes short or slender; stems glabrous, or short-strigose among the flowering branches; basal rosette leaves often present at flowering, bases tapered to long, winged petioles, margins serrate; midstem leaves sessile, blades linear-elliptic to elliptic-oblongate, glabrous or scabrous-strigose; inflorescence arrays paniculate, open, branches ascending or arching, heads sometimes secund; phyllaries eglandular; achenes 2–3 mm long, 4–7-ribbed, short-strigose; pappus 3–4 mm long. Roadsides, edges of woods, usually sandy soils; throughout e 1/3 TX; nc TX; AR, LA, and OK. Sep–Oct. [*S. boottii* Hook. var. *ludoviciana* A. Gray, *S. strigosa* Small] Nesom (2009a) determined that *S. dispersa* Small was the correct name for this taxon, but as there seems to be a lack of consensus, we are following Semple & Cook (2006) and Semple et al (2016a) in treating it as *S. ludoviciana*.

Solidago missouriensis Nutt., (of Missouri), MISSOURI GOLDENROD. Plants to 80 cm tall; rhizomes short to long; stems glabrous or sometimes sparsely strigose among the flowering branches; basal rosette leaves often present at flowering, bases tapered to long, winged petioles, blades entire to serrulate; midstem leaves sessile, blades lanceolate to linear, glabrous; inflorescence arrays paniculate, pyramidal or rhombic, branches glabrous, arching or ascending, heads secund or not; phyllaries glabrous, eglandular; achenes 1–2 mm long, glabrous or sparsely strigose; pappus 2.5–3 mm long. Upland prairies, pastures, roadsides; ne TX in Bowie, Dallas, and Lamar cos., and an apparent disjunct population in se TX in Austin, Harris, and Waller cos. (possibly adventive); nc TX and Rolling Plains; c and w North America; adventive in a few ne states; Mexico. Aug–Oct. [*S. glaberrima* M. Martens, *S. glaberrima* M. Martens var. *moritura* (Steele) Palmer & Steyerl., *S. glaucophylla* Rydb., *S. missouriensis* Nutt. var. *fasciculata* Holz.]

Solidago nemoralis Aiton, (of the woods), OLD-FIELD GOLDENROD, GRAY GOLDENROD. Plants to 100 cm tall; caudices short-branched; stems short-canescens; basal rosette leaves often present at flowering, bases tapered to long, winged petioles; midstem leaves sessile, blades spatulate to linear-oblongate, densely puberulent, crenate to entire; inflorescence arrays paniculate, wand-like, elongate and apically recurved, heads secund; phyllaries without stalked glands; achenes 0.5–2 mm long, strigose; pappus 2–4 mm long. Wooded upland sites, sandy and gravelly soils, roadsides. Sep–Oct. Two subspecies are found in East TX:

1. Basal leaves usually entire, often linear-oblongate; involucre usually 4.6–5.8 mm high; pappus bristles usually exceeding ray flower tubes; plants of se, sc, and c TX subsp. **decemflora**
1. Basal leaves usually crenate, oblongate to obovate; involucre usually 2.6–4.2 mm high; pappus bristles usually not or barely exceeding ray flower tubes; plants of n, ne, and far e TX subsp. **nemoralis**

subsp. **decemflora** (DC.) Brammall ex Semple, (ten-flowered). Grayson Co., c TX from McLennan to Bexar cos., and sc TX; e Rolling Plains and Edwards Plateau; c U.S. from MI s to TX and w to MT and NM; Canada. [*S. decemflora* DC., *S. nemoralis* Aiton var. *decemflora* (DC.) Fernald, *S. nemoralis* Aiton var. *longipetiolata* (Mack. & Bush) E.J. Palmer & Steyerl.]

subsp. **nemoralis**. Red River drainage and Gregg and Newton cos.; nc TX; e 1/2 U.S.; Canada. [*S. nemoralis* Aiton var. *haleana* Fernald, *S. nemoralis* Aiton var. *arenicola* Burgess]

Solidago nitida Torr. & A. Gray, (shining), SHINY GOLDENROD, FLAT-TOPPED GOLDENROD. Plants to 100 cm tall; caudices branching; stems glabrous or scabrous-puberulent among the flowering branches; petiole bases of rosette leaves persistent; basal rosette leaves often present at flowering, long-petiolate; midstem leaves sessile, blades linear-lanceolate to linear, glabrous or scabrous, shiny, margins entire or sparsely serrulate; inflorescence arrays corymbose, compact, flat-topped or sometimes somewhat rounded; phyllaries glabrous, eglandular, 3–7 striately-nerved; achenes 2–3 mm long, glabrous, 7–10-nerved; pappus 4–5 mm long. Prairies, open woods, disturbed areas; e and se TX; nc TX and s TX; MS, AR, LA, and OK. (Jul–)Aug–Oct. Sometimes placed in the segregate genus *Oligoneuron* [as *O. nitidum* (Torr. & A. Gray) Small]

Solidago odora Aiton subsp. **odora**, (odorous, fragrant), FRAGRANT GOLDENROD, SWEET GOLDENROD, ANISE-SCENTED GOLDENROD. Plants to 120 cm tall; caudices short, stout; stems puberulent (at least among the flowering branches), sometimes in lines; basal leaves withering by flowering, bases tapered to broadly-winged petioles; midstem leaves sessile, blades linear-lanceolate to narrowly ovate, glabrous, finely translucent gland-dotted, usually anise-scented when crushed, margins entire; inflorescence arrays paniculate, pyramidal, branches ascending to spreading and recurved, heads secund;

phyllaries glabrous, eglandular; achenes 1.4–2.3 mm long, glabrate to strigose; pappus 2.4–3 mm long. Wet sandy soils, roadsides, oak and pine woods; mainly se and e TX; c and sc TX; e and se U.S. from NH s to FL and w to OH, AR, and TX. Sep–Oct.

Solidago petiolaris Aiton, (with a petiole), DOWNY RAGGED GOLDENROD. Plants to 150 cm tall; caudices stout, sometimes with long, slender rhizomes; stems finely pubescent (at least among the flowering branches); basal leaves withering by flowering; midstem leaves sessile to short-petiolate, blades usually lanceolate-elliptic or ovate, glabrous or scabrous, sometimes resinous or shiny beneath, margins entire or few-toothed; inflorescence arrays paniculate (rarely racemose), usually elongate and leafy-bracted, branches stiffly ascending, not recurved; phyllaries glabrous or strigose, with sparse to dense stalked glands; achenes 3–4 mm long, glabrous or glabrate; pappus ca. 4 mm long. Sandy soils, prairies, open woods; throughout most of TX with the exception of far s and w TX; se and sc U.S. from NC s to FL and w to KS, CO, and NM; Mexico. Sep–Oct. Nesom (1990e, 2008) discussed and mapped three varieties of *S. petiolaris*; Semple and Cook (2006) did not treat any subspecific taxa; Semple et al. (2016a) resurrected these varieties, based on research done after the 2006 FNA treatment was prepared. Two of the varieties have overlapping ranges in East TX; the infraspecific range maps provided by Nesom (2008), Kartesz (2015), Semple et al. (2016a), and USDA NRCS (2016) are incomplete or irreconcilable, therefore we are not providing ranges or maps for these varieties. Nesom (2008) divided the two East TX varieties as follows:

1. Phyllaries densely glandular (may appear viscid), essentially glabrousvar. **angusta**
1. Phyllaries scarcely glandular, usually finely strigose or sometimes glabrous..... var. **wardii**

var. **angusta** (Torr. & A. Gray) A. Gray, (narrow). [*S. angusta* Torr. & A. Gray, *S. lindheimeriana* Scheele]

var. **wardii** (Britton) Fernald, (named for Lester F. Ward (1841–1913), American botanist and collector), WARD'S GOLDENROD. [*S. wardii* Britton]

Solidago radula Nutt., (rough), ROUGH GOLDENROD, WESTERN ROUGH GOLDENROD. Plants to 90 cm tall; with caudices and sometimes creeping rhizomes as well; stems scabrous to puberulent; basal leaves usually withering by flowering, bases tapered to long, winged petioles; midstem leaves sessile or subsessile, blades elliptic to oblanceolate, distinctly scabrous, margins serrate or crenate; inflorescence arrays paniculate, pyramidal, branches recurved, heads secund; phyllaries without stalked glands; achenes 1.5–2.5 mm long, short-strigose; pappus 3 mm long. Dry rocky bluffs, upland xeric sites, calcareous soils; e and c TX; Rolling Plains and Edwards Plateau; mostly c U.S. from IL s to TX, scattered in se U.S. Sep–Nov. [*S. pendula* Small, *S. radula* Nutt. var. *rotundifolia* (DC.) A. Gray, *S. scaberrima* Torr. & A. Gray]

Solidago rigida L., (rigid), STIFF GOLDENROD, RIGID GOLDENROD. Plants to 150 cm tall; caudices branching, woody; stems glabrous or ± hispid; petiole bases of rosette leaves persistent; basal rosette leaves usually present at flowering, long-petiolate; midstem leaves sessile, blades ovate to lanceolate or rhombic, glabrous or strigose to hispid, margins entire or serrate; inflorescence arrays corymbose, compact or branches long and spreading, usually somewhat rounded; phyllaries glabrous or strigillose, eglandular, 3–5 striately-nerved; achenes 0.8–1.7 mm long, glabrous or strigillose, ribbed; pappus 3–4 mm long. Prairies, open woods, dry open areas; e and se TX; Panhandle, nc TX, and s TX Plains; w 3/4 U.S.; Canada. Sep–Oct(–Nov). Sometimes placed in the segregate genus *Oligoneuron* [as *O. rigidum* (L.) Small]. Three subspecies have overlapping ranges in East TX (Heard & Semple 1988; Semple and Cook 2006), and the infraspecific range maps provided by Heard & Semple (1988), Kartesz (2015), Semple et al. (2016a), and USDA NRCS (2016) are incomplete or irreconcilable, therefore we are not providing ranges or maps for these subspecies. Semple and Cook (2006) divide the subspecies as follows:

1. Outer phyllaries glabrous; leaves and stems glabrous or ± hispid.....subsp. **glabrata**
1. Outer phyllaries strigillose; leaves and stems moderately to densely strigose or hispid.
 2. Inner phyllaries conspicuously strigillose, often linear; plants usually short (40–70(–90) cm tall); inflorescence arrays compact; leaves and stems finely and densely hispid (> 50 hairs/sq. mm); achenes usually strigillose on one end.....subsp. **humilis**
 2. Inner series phyllaries glabrate to sparsely strigillose, oblong to spatulate; plants more robust (60–150 cm tall); inflorescence arrays loose, open; leaves and stems coarsely hispid (< 50 hairs/sq. mm); achenes glabrous.....subsp. **rigida**

subsp. **glabrata** (E.L. Braun) Heard & Semple, (glabrate). [*Oligoneuron rigidum* (L.) Small var. *glabratum* (E.L. Braun) G.L. Nesom, *S. rigida* L. var. *glabrata* E.L. Braun, *S. rigida* L. var. *laevicaulis* Shinnery]

subsp. **humilis** (Porter) Heard & Semple, (dwarf). [*Oligoneuron canescens* Rydb., *O. rigidum* (L.) Small var. *humile* (Porter) G.L. Nesom, *S. rigida* L. var. *humilis* Porter]

subsp. **rigida** [*Oligoneuron grandiflorum* (Raf.) Small, *S. grandiflora* Raf., *S. rigida* L.]

Solidago rugosa Mill. subsp. **aspera** (Aiton) Cronquist, (sp.: rugose, wrinkled; subsp.: rough), ROUGH-LEAF GOLDENROD, WRINKLE-LEAF GOLDENROD. Plants to 200 cm tall; rhizomes long-creeping; stems glabrous or strigose to densely hispid; basal leaves withering by flowering, midstem leaves sessile, blades lanceolate to elliptic or ovate, hispid-strigose beneath (at least on main nerves), margins serrate to subentire; inflorescence arrays paniculate, pyramidal, branches divergent and recurved, leafy-bracted, heads secund; phyllaries eglandular; achenes 0.9–1.5 mm long, strigillose; pappus 1.8–2.5 mm long. Roadside ditches, along streams, moist sites in oak-hickory forests; mostly e 1/3 TX; sc TX; e and se U.S. from ME s to FL and w to WI, IA, and TX; Canada. Sep–Nov. This subspecies is further divided into two varieties with overlapping ranges in East TX (Semple and Cook 2006), and the range maps provided by Kartesz (2015), Semple et al. (2016a), and USDA NRCS (2016) are incomplete or irreconcilable, therefore we are not providing ranges or maps for these varieties. Semple and Cook (2006) divide the TX varieties as follows:

1. Upper stem leaf blades lanceolate to elliptic, not much reduced up the stemvar. **aspera**
 1. Upper stem leaf blades ovate, much reduced up the stemvar. **celtidifolia**

var. **aspera**. [*S. aspera* Aiton]

var. **celtidifolia** (Small) Fernald, (with leaves resembling *Celtis*), CELTIS-LEAF GOLDENROD. [*S. celtidifolia* Small]

Solidago salicina Elliott, (resembling *Salix*—willow), SOUTHERN ROUGH-LEAF GOLDENROD, WILLOW GOLDENROD. Plants to 150 cm tall; caudices short, rhizomes creeping and elongate; stems angular in cross-section, glabrous, or sparsely hairy among the flowering branches; basal leaves often present at flowering, bases tapered to long, winged petioles, margins serrate; midstem leaves sessile, blades lanceolate, scabrous above; inflorescence arrays paniculate, pyramidal, open, branches ascending to recurved, heads secund; phyllaries eglandular; achenes 0.6–1.5 mm long, strigillose; pappus 2–3 mm long. Swamp margins, wet meadows; e and se TX; nc TX; se U.S. from VA s to FL and w to OK and TX. Sep–Oct. This taxon was included in *S. patula* [as *S. patula* Muhl. subsp. *strictula* (Torr. & A. Gray) Semple] in Semple & Cook (2006), but Semple et al. (2012) concluded the subspecies was sufficiently distinct to be returned to species status.

Solidago sempervirens L. var. **mexicana** (L.) Fernald, (sp.: evergreen; var.: of Mexico), SEASIDE GOLDENROD, MEXICO GOLDENROD. Plants to 200 cm tall; caudices short, stout; stems glabrous throughout, or hairy among the flowering branches; basal rosette leaves present at flowering, petioles winged and sheathing stems or nearly so; midstem leaves sessile, blades lanceolate, thick or fleshy, bases sometimes subclasping, margins entire; inflorescence arrays paniculate and narrowly elongate, branches spreading-recurved, heads secund; phyllaries eglandular; achenes 1–1.5 mm long, strigose; pappus 3.8–4 mm long. Wet sandy-saline soils, dunes, brackish marshes; coastal and adjacent cos. of se and sc TX; s TX; Atlantic and Gulf coastal states from MA s to FL and w to TX; Mexico, Central America, and West Indies. Sep–Dec. [*Aster mexicanus* (L.) Kuntze, *S. mexicana* L.] Semple et al. (2016b) suggest this taxon be returned to species status as *S. mexicana* L., based on a multivariate study of the *S. sempervirens* complex.

Solidago speciosa Nutt. var. **rigidiuscula** Torr. & A. Gray, (sp.: showy; var.: somewhat rigid), PRAIRIE GOLDENROD, NOBLE GOLDENROD, SHOWY GOLDENROD. Plants to 200 cm tall; caudices stout, woody; stems glabrous, or strigillose among the flowering branches; basal leaves sometimes withering by flowering; midstem leaves sessile, blades lanceolate to ovate-elliptic, somewhat scabrous, glabrate to sparsely strigillose, serrate to crenate or entire; inflorescence arrays paniculate or thyriform, compact and elongate, branches stiffly ascending, heads not secund; phyllaries glabrous, eglandular; achenes 1.6–2.5 mm long, glabrous; pappus 3–4.5 mm long. Sandy and gravelly soils, prairies, open woods; e and se TX; nc TX, c TX, and Plains Country; c U.S. from MI s to GA and w to ND and TX; Canada. Sep–Oct. [*S. rigidiuscula* (Torr. & A. Gray) Porter, *S. venulosa* Greene] Semple et al. (2016a) suggest this taxon be returned to species status as *S. rigidiuscula* (Torr. & A. Gray) Porter.

Solidago tortifolia Elliott, (contorted leaves), TWIST-LEAF GOLDENROD. Plants to 130 cm tall; rhizomes creeping, elongate; stems strigose-villous; lower leaves withering by flowering, often coiling; midstem leaves sessile, blades linear to linear-lanceolate, glabrous or finely strigillose, margins serrulate to entire; inflorescence arrays paniculate, broadly pyramidal, branches recurved and elongate, heads secund; achenes 1 mm long, sparsely strigillose; pappus 2–3 mm long. Dry sandy soils, pine woods; ne and se TX; sc TX; se U.S. from VA s to FL and w to TX. Aug–Nov.

Solidago ulmifolia Muhl. ex Willd. var. **ulmifolia**, (with leaves like *Ulmus*—elm), ELM-LEAF GOLDENROD. Plants to 120 cm tall; caudices branching, woody; stems glabrous or nearly so; basal leaves withering by flowering, tapering to short, winged petioles; midstem leaves subsessile to sessile, blades lanceolate, hirsute to scabrous above, hirsute on main nerves beneath, margins entire; inflorescence arrays paniculate, open, branches widely divergent, elongate or short, heads secund; phyllaries

eglandular; achenes 1–1.6 mm long, finely hairy; pappus ca. 2.5 mm long. Openings in woodlands, dry upland sites; e and se TX; nc and sc TX; e 1/2 North America. Aug–Oct. [*S. helleri* Small]

Solidago virgata Michx., (wand-like), WAND GOLDENROD, WILLOW-LEAF GOLDENROD. Plants to 200 cm tall; caudices short, rhizomes long, stolon-like; stems glabrous; basal rosette leaves present at flowering, nearly sessile or petioles winged and sheathing stems; midstem leaves sessile, blades lanceolate-oblong to linear, glabrous, margins entire; inflorescence arrays thyriform and narrowly elongate, not branching, heads not secund; phyllaries glabrous, eglandular; achenes 1.5–2.5 mm long, strigose; pappus 3 mm long. Sandy moist soils, pine flatwoods, coastal brackish marshes; se TX and Harrison Co.; s TX; se U.S. from NC s to FL and w to TX; Mexico and Central America. Sep–Nov. [*S. angustifolia* Elliott, *S. stricta* Aiton var. *angustifolia* (Elliott) A. Gray] Semple (2013) explains the separation of *S. stricta* from *S. virgata*, and why the latter is the correct name for this taxon in TX.

Solidago hispida Muhl. ex Willd., (hairy, hispid), HAIRY GOLDENROD, which would key to *S. speciosa* here, can be distinguished from that species by the usually moderately to densely hispid-villous stems and leaves. Not yet reported in TX but included here based on records from adjacent McCurtain Co., OK (OKL); e U.S. from ME s to GA and w to SD and OK. Aug–Oct. [*S. bicolor* L. var. *concolor* Torr. & A. Gray, *S. bicolor* L. var. *hispida* (Muhl. ex Willd.) Britton, Sterns & Poggenb., *S. hirsuta* Nutt., *S. lanata* Hook.]

SOLIVA Ruiz & Pav. BURRWEED, PIQUANTE, STICKERWEED, STICKERS

Low-growing taprooted annual herbs, much branched, mat-forming or ascending; stems short (usually < 15 cm tall) or nearly stemless; leaves alternate, often crowded basally and at nodes, blades 1–3-pinnatifid, reminiscent of ferns or parsley; heads greenish, bur-like, sessile in leaf axils; involucre 2–8+ mm wide; ray flowers seemingly absent; peripheral disk flowers numerous, pistillate, without corollas, styles sheathed by tissue, becoming hardened and spine-like; central disk flowers 4–8+, functionally staminate with minute 4-toothed whitish yellow or green-translucent corollas; achenes flattened, with wings or ± wing-like lateral projections, tipped by the persistent spine-like stylar sheath, conspicuously hairy to glabrous apically; pappus absent.

☛A South American genus of 4–8 species; some were formerly included in the genus *Gymnostyles*. Easily recognized by the spine-like stylar sheaths which make *Soliva* species painfully noxious lawn weeds, similar in effect to *Cenchrus* (SANDBURS). (Named for Dr. Salvador Soliva, 18th-century physician to the Spanish court and botanist at the Royal Botanic Garden, Madrid, where he studied medicinally useful plants—Arriagada & Miller 1997) (tribe Anthemideae)

REFERENCES: Cabrera 1949; Tutin 1976; Ray 1987; Arriagada & Miller 1997; Watson 2006d.

1. Achenes obovate to oblanceolate, glabrous or short-hairy; lateral projections of achenes wing-like, broad, thin, smooth, without raised lines, margins sometimes conspicuously indented toward lower half forming 2 basal lobes, each wing shoulder usually projecting as a spine-like tooth on each side of the spine-like style..... **S. sessilis**
1. Achenes oblanceolate to oblong-cuneate, usually with longer hairs at the tip; lateral projections of achenes thick, only slightly wing-like, with conspicuous raised lines running across them, margins not indented, the upper portion of each projection either not or only slightly spinose.
 2. Leaves 23 pinnati-palmately lobed; heads mostly clustered in leaf axils at ground level, rarely scattered along stems; lateral projections of achenes ± smooth in distal 1/3, without any apical awns, projections, or shoulders near the spine-like style..... **S. anthemifolia**
 2. Leaves 1(2) pinnati-palmately lobed; heads mostly scattered along stems; lateral projections of achenes with raised lines nearly to apex, with 2 divergent acute awns, projections, or shoulders at apex of achene, 1 on each side of the spine-like style..... **S. stolonifera**

Soliva anthemifolia (Juss.) Sweet, (with leaves resembling *Anthemis*—CHAMOMILE), BUTTON BURRWEED, SMOOTH-STICKERS. Stems sometimes rooting at nodes; leaves 3–8(–15) cm long, 2–3-pinnati-palmately lobed; heads mostly clustered in leaf axils at ground level, rarely scattered along stems; pistillate flowers (20–)50–100+; achenes oblanceolate to oblong-cuneate, 1.5–2+ mm long, winged, wings transversely ribbed in the lower 9/10, wing shoulders not spinose; spinose stylar sheath 1.5–3 mm long. Disturbed sites, lawns, roadsides; se and sc TX; s TX; AR, LA, MS, and FL; South America; introduced elsewhere. Mar–May. [*Gymnostyles anthemifolia* Juss., *S. mutisii* Kunth] Native of South America. *I*

Soliva sessilis Ruiz & Pav., (for the sessile heads), LAWN BURRWEED, STICKERS, JO-JO WEED. Stems often rooting at nodes; leaves 1–2(–3+) cm long, 2(–3)-pinnati-palmately lobed; heads mostly scattered along stems; pistillate flowers 5–8(–17+); achenes obovate to oblanceolate, usually 2.5–3+ mm long, usually winged, wings entire or sinuate to incised, each wing shoulder usually projecting as a spine-like tooth; spinose stylar sheath 1–2+ mm long. Disturbed sites, lawns, roadsides; e

and sc TX; nc TX; se U.S. from VA s to FL and w to OK and TX, also w coast from WA s to CA; Canada; South America; introduced elsewhere. Mar–May. [*S. daucifolia* Nutt., *S. pterosperma* (Juss.) Less] Native of South America. *I*

Soliva stolonifera (Brot.) Sweet, (bearing stolons), CARPET BURRWEED, TRAILING-STICKERS. Stems often rooting at nodes; leaves 1–2(–3) cm long, 1(–2)-pinnati-palmately lobed; heads mostly scattered along stems; pistillate flowers (20–)40–60+; achenes oblanceolate to oblong-cuneate, 1.8–2.2 mm long, winged, wings transversely ribbed in the lower 2/3, each wing shoulder ± spinose; spinose stylar sheath 0.8–1.5 mm long. Disturbed sites, lawns; Bastrop, Brazos, and Leon cos.; also Nueces Co. in s TX; se U.S. from SC s to FL and w to AR and TX; South America; introduced elsewhere. Mar–Apr. [*Gymnostyles stolonifera* (Brot.) Tutin, *S. nasturtifolia* (Juss.) DC.] Native of South America. *I*

SONCHUS L. SOW-THISTLE

Ours annual or biennial taprooted herbs, glabrous or glandular-pubescent, often ± glaucous, with milky sap; stems usually hollow; midstem leaves sessile, blades spatulate to obovate or oblong to lanceolate, bases auricled-clasping, margins coarsely or spiny-toothed or runcinate to pinnately lobed; heads small, in corymbose arrays; phyllaries in 3–5+ series, unequal, narrow, green; receptacles naked; flowers all ligulate, corollas yellow; achenes compressed, 2–3.5+ mm long, unbeaked, ribbed, glabrous; pappus of many white, hair-like bristles, 5–9 mm long.

☛A genus of ca. 60 species native from Eurasia to Australasia and tropical Africa; several have become widespread weeds. (Greek: *sonchos*, ancient name used for a prickly plant) (tribe Cichorieae)

REFERENCES: Boulos 1973, 1976; Vuilleumier 1973; Hyatt 2006.

1. Midstem leaf base auricles (lobe-like extensions on both sides at base) rounded, sometimes made irregularly so by prominent, spiny teeth; mature achenes smooth between the several ribs (not wrinkled-roughened)..... **S. asper**
 1. Midstem leaf base leaf auricles triangular, acutely pointed, often also sharp-toothed; mature achenes transversely wrinkled-roughened across and between the several ribs..... **S. oleraceus**

Sonchus asper (L.) Hill, (rough), PRICKLY SOW-THISTLE, SPINY SOW-THISTLE, ACHICORIA DULCE. Stems 10–120(–200+) cm tall; midstem leaf base auricles rounded, often recurved or curled; phyllaries usually with stalked glands; corolla tubes longer than the ligules; achenes smooth between ribs. Gardens and lawns, roadsides, disturbed areas; nearly throughout TX; widespread in North America; Europe; introduced and weedy nearly worldwide. Mar–Jun (sporadically all year). [*S. oleraceus* L. var. *asper* L.] Native of Eurasia. *I*

Sonchus oleraceus L., (of the vegetable garden, a potherb used in cooking), COMMON SOW-THISTLE. Stems 10–140(–200) cm tall; midstem leaf base auricles deltate to lanceolate, usually straight; phyllaries usually glabrous, sometimes with stalked glands; corolla tubes ca. equaling the ligules; achenes transversely wrinkled or roughened across and between ribs. Gardens and lawns, roadsides, disturbed areas; widespread in TX; widespread in North America; Europe; introduced and weedy nearly worldwide. Mar–Jun (sporadically all year). Native of Eurasia. *I*

Sonchus tenerrimus L., (very slender), SLENDER SOW-THISTLE, which would probably have keyed to *S. oleraceus* here because they share transversely wrinkled-roughened achenes, can be distinguished by its leaves that have lobes that are constricted at the bases, terminal lobes that are ± equal to the lateral lobes (as opposed to terminal lobes usually larger than the laterals), and corolla tubes that are shorter than the ligules. Disturbed sites; excluded from TX by Hyatt (2006) but included as a Gregg Co. record in Kartesz (2015), based on a pers. comm. from the same author; NY, PA, AL, and CA; possibly Canada; s Europe; introduced in w Asia and n Africa. Mar–Jun. Native of Eurasia. *I*

SPHAGNETICOLA O. Hoffm. CREEPING-OXEYE

☛A genus of ca. 5 species of tropical areas, mostly of the Americas; previously recognized in the genus *Wedelia*. (Evidently from Latin: *sphagnum*, a moss, and *cola*, dwelling in, perhaps usually alluding to wet habitats) (tribe Heliantheae)

REFERENCES: Strother 2006aa; Brown et al. 2007.

Sphagneticola trilobata (L.) Pruski, (three-lobed, for the leaves), CREEPING-OXEYE, TRAILING DAISY, WEDELIA. Tender herbaceous perennial; stems prostrate, 30–200 cm long, branching and rooting at nodes, mat-forming; leaves opposite, sessile or short-petioled, the blades 50–180 mm long, usually 3-nerved, often 3-lobed, somewhat succulent, margins entire or irregularly toothed; heads borne singly; phyllaries in 2–3 series, the outer series larger, ± foliaceous; ray flowers 4–10+, pistillate, fertile, the ligules yellow to gold-orange, 6–15 mm long; disk flowers perfect, fertile, corollas yellow to orange; achenes 3–5 mm long; pappus absent, or a minute fringed crown to 0.6 mm long. Wet soils, disturbed areas, coastal dunes;

rare in TX; recorded as escaping from cultivation in Cherokee Co. (Brown et al. 2007) and Harris Co. (Brown 2014); se U.S. from FL w to TX; introduced elsewhere. Flowering nearly year-round. [*Wedelia trilobata* (L.) Hitchc.] Native of tropical America; cultivated and escaping; now a widespread weed in tropical and subtropical regions around the world. *I*

STOKESIA L'Hér. STOKES'S ASTER

☛A monotypic genus of the se U.S. (Named for Jonathan Stokes (1755–1831), English physician and botanist) (tribe Vernoniaeae)

REFERENCES: Strother 2006bb.

Stokesia laevis (Hill) Greene, (smooth), STOKES'S ASTER. Herbaceous perennial, 20–50 cm tall; basal leaves winged-petiolate, blades simple, ovate to lanceolate or lance-linear, 8–15 cm long, stem leaves alternate, ± sessile, glabrous or glabrate, resin-gland-dotted, bases ± clasping, margins entire or spinose-toothed; heads showy, borne singly or in loose corymbose arrays; involucre 25–45 mm wide; phyllaries in 5–7 series, tomentulose, gland-dotted, the outer ones with lower margins spiny-toothed and the upper portions foliaceous; ray flowers absent; disk flowers corollas usually blue to purplish blue (rarely white or lilac), peripheral corollas zygomorphic and simulating rays, 15–25+ mm long, central corollas ± actinomorphic, 12–15+ mm long; achenes columnar, 5–8 mm long, 3–4-angled, glabrous; pappus falling early, of 4–5 scales, 8–12 mm long. Openings in woodlands, bogs, near springs. Not yet reported in TX but included here based on a record from adjacent Sabine Par., LA.; se U.S. from NC s to FL and w to LA. Jun–Sep. [*Carthamus laevis* Hill] This species has gained popularity as a garden ornamental; several cultivars have been developed that extend the corolla color range to deep purples, pinks, and yellows.

SYMPHYOTRICHUM Nees ASTER

Ours mostly herbaceous perennials (2 species annual); stems often clumped or spreading colonially by rhizomes; leaves alternate, simple, entire or toothed, the basal and stem leaves often strongly differing in shape; uppermost leaves of stem branchlets sometimes greatly reduced; heads usually numerous, usually in paniculate or corymbose arrays; phyllaries in several series, often strongly graduated, the bases often whitish and hardened, the margins often hyaline, the tips usually with a green zone; receptacles naked; ray flowers pistillate and fertile, corollas white to pink, blue, violet, or purplish, never yellow, ligules often coiling under at maturity; disk flowers perfect and fertile, corollas cream to yellow, often becoming pinkish to purplish brown at maturity; achenes somewhat flattened, several-nerved; pappus of hair-like, white to brownish, barbellate bristles.

☛A genus of ca. 90 species mostly native to North America; also found in Central and South America, the West Indies, and Eurasia; some are cultivated. Many species hybridize and intergrade; definitive identification is often difficult. *Symphotrichum* was traditionally included in the very large genus *Aster*; modern morphological and molecular studies provided strong support for their division (Brouillet et al. 2006). Nesom (1994b) treated *Aster* as an essentially Old World genus of ca. 180 species and segregated the New World taxa into 13 genera: *Ampelaster*, *Almutaster*, *Chloracantha*, *Canadanthus*, *Doellingeria*, *Eucephalus*, *Eurybia*, *Ionactis*, *Oclemena*, *Oreostemma*, *Psilactis*, *Sericocarpus*, and *Symphotrichum*. (Greek: *symphysis*, junction, and *trichos*, hair, apparently alluding to what the author perceived as a basal fusion of pappus bristles) (tribe Astereae)

REFERENCES: Shinnars 1953; Jones, A. 1978a, 1978b, 1980, 1983, 1984, 1987, 1992; Semple & Brouillet 1980a, 1980b; Jones & Young 1983; Jones, R. 1983; Semple & Chmielewski 1987; Nesom 1994b, 1997a, 2005b, 2006a; Semple et al. 1996; Yatskievych 2004; Brouillet et al. 2006.

1. Plants perennial and superficially reed-like, forming colonies from creeping rhizomes; usually some branchlets developed into thorns or spines; usually without well-developed leaves.....see **Chloracantha**
1. Plants annual or perennial, of various habits but lacking thorns/spines; leaves present.
 2. Plants annual from a slender taproot.
 3. Heads in a dense, pyramidal paniculate array; phyllaries with narrowly-lanceolate central green zone, usually extending the entire length of the phyllary, bases hardened for a short distance or not at all; restricted to salt marshes and tidal flats of the Gulf Coast.....**S. subulatum**
 3. Heads in open, diffuse paniculate arrays; phyllaries with a lanceolate to elliptic green zone in the upper portion, bases conspicuously hardened; across much of TX in many habitats, usually not in wet-saline sites.....**S. divaricatum**
 2. Plants perennial from rhizomes or branched, woody roots.
 4. Uppermost leaves crowding heads, not much reduced in size in comparison to midstem leaves, longer and broader than phyllaries, partly hiding phyllaries or grading into them.
 5. Outer phyllaries 2–3 mm wide, glabrous to slightly pubescent, margins with a fringe of long hairs; achenes 5–8-

- nerved; ray flowers usually 13–15; sandy soils throughout East TX..... **S. pratense**
5. Outer phyllaries 1.3–2 mm wide, moderately to densely canescent-sericeous, margins not distinctly fringed; achenes 7–10-nerved; ray flowers usually 15–30; calcareous soils of sc TX and Edwards Plateau..... **S. sericeum**
4. Uppermost leaves subtending heads not crowding or hiding phyllaries, usually reduced in size in comparison to midstem leaves, often smaller than phyllaries.
6. Basal and lower stem leaves cordate or truncate at the base, with long petiolar bases (sometimes winged) quite distinct from the much wider well-delimited blade portion.
7. Midstem leaves usually cordate (sometimes truncate) where narrowed to petiolar base; upper stem leaves obovate to elliptic or lanceolate, not linear; middle and sometimes even upper stem leaves sharply serrate **S. drummondii**
7. Midstem leaves usually rounded or truncate or even attenuate where narrowed to petiolar base; upper stem leaves linear; middle and upper stem leaves usually entire..... **S. oolentangiense** (in part)
6. Basal and lower stem leaves sessile or gradually narrowed to base, not distinctly differentiated into petiolar and blade portions (if differentiated, the petiole very short).
8. Midstem and upper leaves sessile and conspicuously auriculate-clasping; ray ligules usually some shade of lavender, blue, or purple, seldom white or pinkish.
9. Lower stems usually densely and uniformly hirsute, with stiff, spreading hairs; phyllaries all nearly the same length, the tips long-acuminate or caudate to attenuate, strongly recurved, sometimes foliaceous; restricted to saturated soils of bogs and seeps in ne TX..... **S. puniceum**
9. Lower stems glabrous or pubescent with the hairs softer and appressed; phyllaries strongly unequal, the outer shorter than the inner, the tips obtuse, acute, or acuminate but not long-acuminate, appressed or only slightly spreading; of various (generally drier) habitats in East TX.
10. Stems generally glabrous and glaucous; leaves glabrous; phyllaries sometimes with stalked glands; achenes glabrous or glabrate, 4–5-nerved..... **S. laeve**
10. Stems sparsely to densely pubescent; leaves scabrous to hirsute; phyllaries without glands; achenes pubescent, faintly 7–10-nerved..... **S. patens**
8. Midstem and upper leaves sessile or petiolate, not auriculate-clasping (may be weakly clasping); ray ligules of various colors or white.
11. Phyllaries, peduncles, and often also the leaves and upper stems glandular (use lens); basal and lower stem leaves sessile **S. oblongifolium**
11. Phyllaries, peduncles, leaves, and stems varying from glabrous to hairy, but not glandular; basal and lower stem leaves sessile to short-petiolate.
12. Phyllaries tipped with white or clear spines; disk corollas yellow, turning brown with age.
13. Heads numerous and densely crowded, often secund on branches; upper stem leaves as small as 10 mm long and 1.5 mm wide; involucre 2.5–4.5(–5) mm high; achenes 1.2–2 mm long; pappus 3–4 mm long **S. ericoides**
13. Heads fewer and not densely clustered, usually not secund; upper stem leaves usually longer than 25 mm and wider than 2 mm; involucre (4.5–)5–8 mm high; achenes 2–2.5 mm long; pappus 4.5–6 mm long. **S. falcatum**
12. Phyllaries not tipped with white or clear spines (inrolled phyllaries may appear spine-like and green); disk corollas various shades of cream to yellow, usually turning pinkish, reddish, or purplish brown with age.
14. Glabrous, fleshy plants of coastal saltmarshes and tidal flats; stems flexuous, wiry; leaves narrow, linear; midstem leaves < 6 mm wide; restricted to the Gulf Coast..... **S. tenuifolium**
14. Plants variable in habit, habitat, and leaf morphology, but generally not of brackish coastal habitats.
15. Lobes of the mature disk corolla comprising (45–)50–75% or more of the flaring portion above the tube (= limb), flaring or recurved.
16. Leaf blades glabrous beneath or pubescent only on veins; ray flowers 8–15(–23); lobes of the mature disk corolla comprising 50–75% of the flaring portion above the tube (= limb) **S. lateriflorum**
16. Leaf blades sparsely to densely pubescent beneath, on and between veins; ray flowers (10–)15–26; lobes of the mature disk corolla comprising 45–55(–65)% of the flaring portion above the tube (= limb)..... **S. ontarionis**
15. Lobes of the mature disk corolla comprising 15–45% of the flaring portion above the tube (= limb), erect to ascending or sometimes recurved.
17. Midstem leaves usually < 10 mm wide (often linear and < 3 mm wide).
18. Upper stems glabrate to strigose; peduncular bracts numerous, crowded, < 4 mm long; involucre usually 4.5–6.3 mm high; phyllaries of the inner series twice as wide as those of the outer series; ray flowers usually 15–33, the ligules some shade of blue, pink, or lavender, less frequently white; pappus ca. 4 mm long..... **S. dumosum**
18. Upper stems glabrous to glabrate; peduncular bracts fewer, not crowded, > 4 mm long; involucre usually 3.5–4.5 mm high; phyllaries of the inner series less than twice as wide as those of the outer series; ray flowers usually 16–20, the ligules usually white, rarely pink; pappus 2.5–3.5 mm long **S. racemosum**
17. Midstem leaves usually > 10 mm wide, not linear.

19. Phyllaries not greatly differentiated in size, the outer smallest ones 1/2 or more as long as the longest inner ones, OR if phyllaries more strongly graduated, ONLY THEN should the following characters be evident: peduncles \pm pilose; peduncular bracts 1–3(–5) and 4+ mm wide; ray ligules usually $<$ 8 mm long.
20. Leaf margins flat; reticulate brownish veins usually conspicuous on lower leaf surface (use lens), the enclosed areolae \pm isodiametric; peduncular bracts 5–12; ray flowers usually 20–35, the ligules usually bluish white or lavender (rarely white); achenes brown or purple at maturity **S. praealtum**
20. Leaf margins \pm revolute; reticulate brownish veins not conspicuous on the lower leaf surface, the inconspicuous areolae not isodiametric; peduncular bracts 1–3(–5); ray flowers usually 17–47, the ligules usually white; achenes gray or tan at maturity..... **S. lanceolatum**
19. Phyllaries more differentiated in size, the outer smallest ones 1/3 or less as long as the longest inner ones, OR if phyllaries less strongly graduated, ONLY THEN should the following characters be evident: peduncles glabrous; peduncular bracts more than 5 and $>$ 2 mm wide; ray ligules usually $>$ 8 mm long.
21. Plants long-rhizomatous and colonial; stems glabrous; leaves glabrous, margins \pm revolute; peduncular bracts 5–10, not crowded, leaf-like; ray flowers usually 27–36; pappus 4.5–5.8 mm long **S. eulae**
21. Plants caespitose from a branched, woody caudex, or short-rhizomatous; upper stems usually with hairs in lines; leaves pilose-strigose or hirsute beneath, margins flat; peduncular bracts numerous, densely crowded, scale-like; ray flowers usually 13–20; pappus 3–4 mm long **S. oolentangiense** (in part)

Symphiotrichum divaricatum (Nutt.) G.L. Nesom, (spreading, for the growth pattern), WIREWEED, BLACKWEED, SLIM ASTER. Tap-rooted annual, (10–)60–100(–200+) cm tall; leaves glabrous; basal and lower stem leaves withering by flowering; midstem leaves petiolate or sessile, blades narrowly lanceolate to subulate, margins entire or rarely with a few teeth; uppermost leaves much reduced; heads in open paniculate arrays; involucre usually 6–6.9 mm high; phyllaries unequal, bases hardened, margins hyaline, often purple-tinged; ray flowers usually 17–30, the ligules (3.5–)4.5–7 mm long, lavender to pale blue or white; disk corollas yellow, sometimes tinged with purple with age; achenes usually 1.7–2.5 mm long, 5-nerved; pappus white, (3–)3.5–4.6 mm long. Weed in lawns, ditches, disturbed moist areas, roadsides; abundant throughout TX; sc U.S. from VA s to AL and w to KS and NM; Mexico. Sep–Dec. [*Aster divaricatus* (Nutt.) Torr. & A. Gray [nom. illeg.], *A. neomexicanus* Wootton & Standl., *A. subulatus* var. *ligulatus* Shinnery, *S. subulatum* (Michx.) G.L. Nesom var. *ligulatum* S.D. Sundberg] We are following Nesom (2005b) and Turner (2016) in treating this taxon at the specific, rather than varietal level.

Symphiotrichum drummondii (Lindl.) G.L. Nesom, (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), TEXAS ASTER, DRUMMOND'S ASTER. Perennial with short rhizomes, 30–120 cm tall; basal and lower stem leaves withering by flowering; midstem leaves \pm petiolate, petioles winged, blades ovate to oblong or linear-lanceolate, bases cordate to cuneate, margins crenate to serrate; uppermost leaves reduced; heads in open paniculate arrays; involucre usually 4.5–6 mm high; phyllaries unequal, bases hardened, margins hyaline or sometimes bodies green to margins, tips often purple; ray flowers usually 10–15, the ligules (5–)7–10(–12) mm long, usually blue-lavender to deep purple (sometimes white); disk corollas cream to yellow, turning reddish purple with age; achenes (1.5–)2–3 mm long, 5–6-nerved; pappus cream to pinkish, 3–4 mm long. Two varieties exist; 1 is common in East TX and 1 is to be expected. Brouillet et al. (2006) separated the 2 varieties as follows:

1. Plants 40–120 cm tall; lower stems sparsely hirsute; leaves firm; involucre campanulate, usually 4.5–7 mm high; ligules blue-lavender to deep purple (sometimes white); achenes glabrous var. **drummondii**
1. Plants 30–80 cm tall; lower stems densely hirsute; leaves membranous, involucre hemispheric, usually 3.8–5.2 mm high; ligules bluish white; achenes finely pubescent..... var. **texanum**

var. **drummondii**, DRUMMOND'S ASTER. Open woods, stream banks, roadside ditches; *to be expected in East TX based on records from adjacent counties/parishes in other states*: Caddo Par., LA (LSU), and Marshall, Bryan, Choctaw, and McCurtain cos., OK (OKL); Midwest and sc U.S. from PA s to AL and w to MN and TX. Sep–Oct. [*Aster drummondii* Lindl., *A. sagittifolius* Wedemeyer ex Willd. var. *drummondii* (Lindl.) Shinnery]

var. **texanum** (Burgess) G.L. Nesom, (of Texas), TEXAS ASTER. Open woods and prairies, bottomlands; e and c TX to Edwards Plateau; sc U.S. from KY s to AL and w to KS and TX; Mexico. Oct–Nov, rarely Mar–Apr. [*Aster drummondii* Lindl. var. *texanus* (Burgess) A.G. Jones, *A. texanus* Burgess, *A. texanus* Burgess var. *parviceps* Shinnery, *S. drummondii* (Lindl.) G.L. Nesom var. *parviceps* (Shinnery) G.L. Nesom]

Symphotrichum dumosum (L.) G.L. Nesom, (bushy), BUSHY ASTER, RICE-BUTTON ASTER. Rhizomatous perennial, (20–)30–100 cm tall; leaves scabrous, tipped with a small white spine; basal and lower stem leaves withering by flowering; midstem leaves sometimes withering by flowering, sessile or subpetiolate with petioles widely winged and clasping, blades linear-oblongate, bases cuneate, margins crenate-serrate; uppermost leaves minute, bract-like; heads in open paniculate arrays; involucre usually 4.5–6.3 mm high; phyllaries strongly unequal, bases hardened, margins hyaline, tips sometimes reddish; ray flowers 15–33, the ligules (4–)5–7(–8) mm long, pale blue, pink, or lavender to white; disk corollas cream to pale yellow, turning pink with age; achenes 1.5–2.5 mm long, prominently 3–4-nerved; pappus whitish, 4 mm long. Low areas, roadsides, marshes, prairies, moist woods and thickets; mostly e 1/4 TX; e 1/2 U.S.; Canada. Sep–Nov. [*Aster dumosus* L., *A. coridifolius* Michx., *A. dumosus* var. *coridifolius* (Michx.) Torr. & A. Gray] We are following Brouillet et al. (2006) in not distinguishing varieties.

Symphotrichum ericoides (L.) G.L. Nesom var. **ericoides** (resembling *Erica*—heath), HEATH ASTER, WHITE PRAIRIE ASTER, WREATH ASTER. Rhizomatous, colonial perennial, usually much-branched, 20–80(–100) cm tall; leaves sessile, usually entire, ± white spine-tipped; basal and lower stem leaves withering by flowering; midstem leaves usually withering by flowering, linear to lanceolate to oblong, strigose or hirsute, bases cuneate, margins coarsely ciliate; uppermost leaves much reduced; heads in crowded paniculate arrays; involucre 2.5–4.5(–5) mm high; phyllaries unequal, bases hardened, margins hyaline, spine-tipped; ray flowers usually 10–18, the ligules 6–12(–20) mm long, white, rarely pink or bluish; disk corollas yellow, turning brown with age; achenes 1.2–2 mm long, faintly 7–9-nerved; pappus whitish, 3–4 mm long. Disturbed or open areas; widespread in TX; e and c North America; Mexico. Sep–Oct(–Nov). [*Aster ericoides* L., *A. exiguus* (Fernald) Rydb., *A. multiflorus* Aiton, *A. polycephalus* Rydb., *S. ericoides* (L.) G.L. Nesom var. *prostratum* (Kuntze) G.L. Nesom]

Symphotrichum eulae (Shinners) G.L. Nesom, (for Eula Whitehouse, 1892–1974, of Southern Methodist Univ., TX collector, artist, and author of *Texas Flowers in Natural Color*), EULA'S ASTER. Rhizomatous, colonial perennial, 5–150 cm tall; leaves scabrous, margins ± revolute; basal and lower stem leaves withering by flowering; midstem leaves petiolate or nearly sessile and clasping, blades elliptic to lanceolate, bases attenuate to cuneate, margins crenate-serrate; uppermost leaves reduced, sessile, entire; heads in open paniculate arrays; involucre usually 5–6.5 mm high; phyllaries unequal, bases hardened, margins hyaline; ray flowers usually 27–36, the ligules 8–11 mm long, usually white to bluish lavender, rarely pinkish; disk corollas yellow, turning reddish brown with age; achenes 1.4–2.9 mm long, 4–5-nerved; pappus whitish, 4.5–5.8 mm long. Shady low areas, disturbed sites, moist woods and thickets; East TX range according to Kartesz (2015) from nc TX in Dallas, Hunt, and Wood cos. to sc TX in Bexar and Travis cos.; TEX-LL holds specimens from Burleson, Walker, Waller, and Washington cos.; the only *Symphotrichum* species endemic to TX. Oct. [*Aster eulae* Shinners] This species was formerly considered a hybrid of *S. lanceolatum* and *S. praealtum* but we are following Brouillet et al. (2006) in not treating it as such here. *ET*

Symphotrichum falcatum (Lindl.) G.L. Nesom var. **commutatum** (Torr. & A. Gray) G.L. Nesom, (sickle-shaped, for the leaves), WHITE PRAIRIE ASTER. Rhizomatous, colonial perennial, 10–80 cm tall, sometimes caespitose, usually densely hairy; leaves entire, sessile, ± spine-tipped; basal leaves withering by flowering; midstem leaves strigose, blades linear-oblong to linear-lanceolate, bases cuneate; uppermost leaves somewhat reduced; heads in diffuse paniculate or racemose arrays; involucre (4.5–)5–8 mm high; phyllaries unequal, bases hardened, margins hyaline, tips strongly reflexed; ray flowers usually 20–35, the ligules (8–)18–30 mm long, usually white, sometimes blue or pink; disk corollas yellow, turning brown with age; achenes 2–2.5 mm long, faint-nerved; pappus whitish, 4.5–6 mm long. Dry soils, prairies, roadsides, stream banks; recorded in Hardin and Walker cos. in se TX, and Bastrop and Williamson cos. on the edge of Edwards Plateau; mostly w TX and Panhandle; c U.S. from WI s to TX and w to MT and AZ; Canada; Mexico. Aug–Nov. [*Aster commutatus* (Torr. & A. Gray) A. Gray, *A. crassulus* Rydb., *A. falcatus* Lindl. subsp. *commutatus* (Torr. & A. Gray) A.G. Jones, *A. multiflorus* Aiton var. *commutatus* Torr. & A. Gray, *S. falcatum* (Lindl.) G.L. Nesom var. *crassulum* (Rydb.) G.L. Nesom]

Symphotrichum laeve (L.) Á. Löve & D. Löve, (smooth, for the stems and foliage), SMOOTH ASTER, SMOOTH BLUE ASTER. Caespitose, short-rhizomatous perennial, (15–)20–70(–120) cm tall; leaves glabrous, glaucous; basal and lower stem leaves withering by flowering; midstem leaves sessile or nearly so, blades ovate-oblong or lance-ovate to linear, or sometimes ± panduriform, bases rounded or auriculate-clasping, margins entire or shallowly serrate-crenate; uppermost leaves reduced; heads in broad or flattened paniculate arrays; involucre usually 5–7 mm high; phyllaries ± unequal, bases hardened, margins hyaline; ray flowers usually 13–23, the ligules (6–)7.2–11.3(–14.6) mm long, pale to dark blue or purple, seldom white; disk corollas yellow, turning purplish red with age; achenes 2–3.5 mm long, 4–5-nerved; pappus tawny to red-tinged, 5–7 mm long. Dry prairies, open deciduous woods. Sep–Oct. We are following Brouillet et al. (2006) in separating the 2 potential East TX varieties as follows:

1. Leaves lanceolate to ovate, conspicuously auriculate-clasping, lengths < 5 times widths..... var. **laeve**
 1. Leaves linear-lanceolate to linear, slightly auriculate-clasping, lengths often > 5 times widths.....var. **purpuratum**

var. **laeve**. *To be expected in ne TX based on records from adjacent counties in other states*: Le Flore and McCurtain cos., OK (Jones, A. 1992); e 1/2 North America; cultivated and introduced/escaping elsewhere. [*Aster laevis* L.]

var. **purpuratum** (Nees) G.L. Nesom, (purple). Jasper, Polk, and Tyler cos. in se TX; se U.S. from GA w to AR and TX. [*Aster attenuatus* Lindl., *A. laevis* L. var. *purpuratus* (Nees) A.G. Jones, *A. purpuratus* Nees]

Symphotrichum lanceolatum (Willd.) G.L. Nesom, (lance-shaped), PANICLED ASTER, TALL WHITE ASTER, LANCE-LEAVED ASTER. Rhizomatous, colonial perennial, 30–150(–200) cm tall; leaves glabrous or sparsely scabrous; basal and lower stem leaves withering by flowering; midstem leaves sessile or nearly so, withering by flowering, blades lance-ovate to linear-lanceolate, bases cuneate, margins serrate; uppermost leaves slightly reduced, entire; heads in leafy paniculate arrays; involucre 4–7.2 mm high; phyllaries ± unequal, bases hardened, margins hyaline; ray flowers 17–47, the ligules 3.2–10.1 mm long, usually white to pinkish to pale blue-violet; disk corollas yellow, turning purple with age; achenes 1.5–2 mm long, 4–5-nerved; pappus white to tawny, 3.7–6.4 mm long. Low thickets, moist prairies, edges of deciduous woods, roadside ditches. Aug–Nov. We are following Semple and Chmielewski (1987) in separating the 2 East TX subspecies as follows:

1. Outer phyllaries at least 2/3 length of inner ones; heads usually subtended by large leafy bracts..... subsp. **hesperium**
 1. Outer phyllaries 1/3–2/3 length of inner ones; heads not usually subtended by large leafy bractssubsp. **lanceolatum**

subsp. **hesperium** (A. Gray) G.L. Nesom, (of the west), SISKIYOU ASTER. Harris, Jasper, Liberty, and Van Zandt cos.; sparsely distributed across TX; w 2/3 U.S.; Canada; Mexico. [*Aster hesperius* A. Gray, *A. lanceolatus* Willd. ssp. *hesperius* (A. Gray) Semple & Chmielewski, *Symphotrichum hesperium* (A. Gray) Á. Löve & D. Löve]

subsp. **lanceolatum**, PANICLED ASTER, TALL WHITE ASTER, LANCE-LEAVED ASTER. Scattered across e 1/2 TX; e 2/3 U.S.; Canada. [*Aster lanceolatus* var. *simplex* (Willd.) A.G. Jones, *A. simplex* Willd., *Symphotrichum simplex* (A. Gray) Á. Löve & D. Löve] This subspecies is sometimes further divided into 4 varieties (Brouillet et al. 2006).

Symphotrichum lateriflorum (L.) Á. Löve & D. Löve, (with one-sided inflorescences), CALIFORNIA ASTER, CALICO ASTER, SIDE-FLOWER ASTER, STARVED ASTER, WHITE WOODLAND ASTER. Cespitose perennial, 20–120(–150) cm tall; new basal rosettes often forming at flowering; leaves glabrate to scabrous; lower stem leaves sometimes persisting into flowering; midstem leaves sessile or subpetiolate with petioles winged and sheathing, blades ovate to elliptic or lanceolate, bases attenuate to cuneate, margins crenate-serrate; uppermost leaves gradually reduced; heads in pyramidal or spicate arrays; involucre usually 4–6 mm high; phyllaries unequal, bases hardened, margins hyaline or sometimes reddish; ray flowers 8–15(–23), the ligules (3–)4–5(–8) mm long, white, rarely pinkish or purplish; disk corollas cream to light yellow, turning pink or reddish purple with age; achenes (1.3–)1.8–2.2 mm long, 3–5-nerved; pappus white to pinkish, 3–4 mm long. Well-drained uplands, deciduous woods, meadows, roadsides; e 1/3 TX; e 1/2 North America. Sep–Oct. [*Aster lateriflorus* (L.) Britton var. *flagellaris* Shinnery, *A. lateriflorus* (L.) Britton var. *indutus* Shinnery, *S. lateriflorum* (L.) Á. Löve & D. Löve var. *hirsuticaule* (Lindl. ex DC.) G.L. Nesom] We are following Brouillet et al. (2006) in not recognizing varieties.

Symphotrichum oblongifolium (Nutt.) G.L. Nesom, (oblong-leaved), AROMATIC ASTER, OBLONG-LEAF ASTER. Rhizomatous, colonial perennial, 10–80(–100) cm tall; leaves entire, usually hirsute, rarely glabrous; basal and lower stem leaves sometimes persisting into flowering; midstem leaves sessile, blades oblong to linear-lanceolate, bases cuneate or rounded to slightly clasping; uppermost leaves much reduced; heads in diffuse paniculate arrays; involucre usually 7–9 mm high; phyllaries ± unequal, bases hardened, margins hyaline; ray flowers usually 25–35, the ligules 9–13(–15) mm long, rose-purple to lavender or deep purple; disk corollas yellow, turning brown or reddish purple with age; achenes 2–2.5 mm long, 7–10-nerved; pappus tawny, 3.5–6 mm long. Calcareous soils, prairies, outcrops, roadsides; w border of East TX from Denton to Travis to Bexar cos.; mostly nc and c TX; c and e U.S.; Mexico. Sep–Nov. [*Aster oblongifolius* Nutt.]

Symphotrichum ontarionis (Wiegand) G.L. Nesom var. **ontarionis**, (of Ontario), ONTARIO ASTER, BOTTOMLAND ASTER. Rhizomatous, colonial perennial, 20–120 cm tall; leaves usually strigose, margins crenate-serrate or entire; basal and lower stem leaves usually withering by flowering; midstem leaves sessile or petiolate with petioles narrowly winged and ± clasping, blades ovate or lance-ovate to elliptic-lanceolate or oblanceolate, bases attenuate or cuneate; uppermost leaves progressively reduced; heads in open paniculate arrays; involucre 3–5.5 mm high; phyllaries unequal, bases hardened, margins hyaline; ray flowers (10–)15–26, the ligules 3.5–5.5(–8) mm long, white, rarely pinkish to lavender or blue; disk corollas cream or light yellow, turning reddish purple with age; achenes 1.2–1.8(–2) mm long, 3–5-nerved; pappus whitish, 3–3.5 mm long.

Damp alluvial soils, low woods, bogs, marshes; Gonzales Co. (*F.A. Barkley & B.C. Tharp 13968* (TEX)), Jasper Co. (*D.S. Correll 28634* (LL)), Nacogdoches Co. (*B.C. Tharp & W.J. Brown 53-130* (TEX)), Red River Co. (*D.S. Correll & H.B. Correll 24801* (LL)); e and c North America. Aug–Oct. [*Aster ontarionis* Wiegand, *A. missouriensis* Britton var. *thyrsoides* (A. Gray) Wiegand]

Symphotrichum oolentangiense (Riddell) G.L. Nesom, (of Oolentangy [Olentangy] River in Ohio), AZURE ASTER, SKY-BLUE ASTER. Cespitose perennial, 20–150 cm tall; leaves scabrous; basal and lower stem leaves usually withering by flowering; midstem leaves sessile or short-petiolate, petioles slightly winged and sheathing, blades ovate to lanceolate, bases rounded or attenuate, margins crenate-serrate to nearly entire; uppermost leaves reduced; heads in diffuse paniculate arrays; involucre 4.5–8 mm high; phyllaries strongly unequal, bases hardened, margins hyaline; ray flowers usually 13–20, the ligules (5–)8–12(–14) mm long, blue to violet-purple, rarely pinkish or white; disk corollas light yellow, turning deep purple with age; achenes 1.8–2 mm long, 4–5-nerved; pappus cream or pinkish, 3–4 mm long. Dry sandy areas, prairies, open deciduous woods; scattered in e 1/4 of TX; e and c U.S.; Canada; Mexico. Sep–Nov. [*Aster azureus* Lindl., *A. oolentangiensis* Riddell]

Symphotrichum patens (Aiton) G.L. Nesom, (spreading), SPREADING ASTER, LATE PURPLE ASTER, SKY-DROP ASTER. Cespitose perennial, 10–100(–120) cm tall; leaves scabrous, margins entire to finely serrate; basal leaves usually withering by flowering; midstem leaves sessile, blades ovate to lanceolate, bases strongly cordate to auriculate and clasping; uppermost leaves much reduced, appressed; heads in paniculate arrays; involucre 5.5–12 mm high; phyllaries strigillose to canescent, strongly unequal, bases hardened, margins hyaline, tips sometimes glandular-pubescent; ray flowers 12–24+, the ligules 10–18(–20) mm long, light lavender-violet, rarely pinkish or white; disk corollas creamy-white or pale yellow, turning purple with age; achenes 2–3.5 mm long, faintly 7–10-nerved; pappus tawny or pinkish, 4.5–6.5 mm long. Disturbed or open, often sandy areas, open woods, roadsides. Sep–Nov. We are following Nesom (2006a) in distinguishing only 2 varieties, 1 common in East TX, and 1 potentially present in ne TX:

1. Involucre 8–12 mm high, broadly turbinate; phyllaries of middle series ovate-lanceolate, 1.2–1.7 mm wide, obtuse, not squarrose, eglandular or sparsely glandular var. **patentissimum**
1. Involucre usually < 8 mm high, campanulate or slenderly turbinate; phyllaries of middle series linear-lanceolate, usually < 1.2 mm wide, acute to acuminate, often at least somewhat squarrose, usually distinctly glandular var. **patens**

var. **patens**. SKY-DROP ASTER. Widespread in e 1/3 TX, w to West Cross Timbers and Edwards Plateau; e and sc U.S. from NH s to FL and w to KS and TX. [*Aster patens* Aiton, *S. patens* (Aiton) G.L. Nesom var. *gracile* (Hook.) G.L. Nesom]

var. **patentissimum** (Lindl. ex DC.) G.L. Nesom, (much-spreading). *To be expected in ne TX based on records from adjacent counties/parishes in other states*. Little River Co., AR (UARK) and McCurtain Co., OK (OKL); c U.S. from IL s to MS and w to KS and OK. [*Aster patens* Aiton var. *patentissimus* (Lindl. ex DC.) Torr. & A. Gray]

Symphotrichum praealtum (Poir.) G.L. Nesom, (very tall), WILLOW-LEAF ASTER, WILL ASTER, TALL ASTER. Rhizomatous, colonial perennial, (10–)50–150(–220) cm tall; upper stems usually with pubescence in lines; leaves scabrous, margins often revolute; basal leaves usually withering by flowering; midstem leaves sessile or nearly so, blades linear-lanceolate to elliptic or oblanceolate, bases cuneate or rounded; uppermost leaves reduced, linear to subulate; heads in dense and leafy paniculate arrays; involucre usually 5–7 mm high; phyllaries unequal, bases hardened, margins scarious or hyaline, tips sometimes reddish purple; ray flowers usually 20–35, the ligules 5–10(–12) mm long, light lavender-violet, bluish, or pinkish, rarely white; disk corollas cream or pale yellow, turning pinkish purple with age; achenes 1.5–2 mm long, 4–5-nerved; pappus white, 4–6.5 mm long. Low disturbed areas, open woods, moist banks, roadsides; scattered across East TX; w to Rolling Plains and s to Edwards Plateau and s TX; mostly e 1/2 North America; Mexico; cultivated and escaping elsewhere. Oct–Nov. [*Aster coerulescens* DC., *A. praealtus* var. *coerulescens* (DC.) A.G. Jones, *A. praealtus* var. *texicola* Wiegand, *A. salicifolius* Aiton] We are following Brouillet et al. (2006) in not recognizing varieties.

Symphotrichum pratense (Raf.) G.L. Nesom, (of the meadows), SILKY ASTER. Cespitose perennial, 40–60 cm tall; leaves sessile, glabrous or moderately strigose or scabrous, margins usually entire; basal and lower stem leaves withering by flowering; midstem leaves with blades oblong-lanceolate, bases cuneate or rounded and subclasping; uppermost leaves not much reduced; heads in open paniculate arrays; involucre 6–11 mm high; phyllaries leaf-like (at least the outer series), subequal, glabrous to sparsely pubescent, margins fringed with long hairs, bases ± hardened, tips sometimes purplish; ray flowers usually 13–15, the ligules 8–13 mm long, rose-purple to blue-violet; disk corollas pink, turning purple with age; achenes ca. 3 mm long, 5–8-nerved; pappus tan, 3.5–6 mm long. Open woods, fields, roadsides, usually sandy soils; widespread in e 1/2 TX; se U.S. from VA s to FL and w to OK and TX. Sep–Nov. [*Aster phyllolepis* Torr. & A. Gray, *A. pratensis* Raf.] Differences between this species and the closely-related *S. sericeum* (Vent.) G.L. Nesom are discussed in R.

Jones et al. (2008).

Symphotrichum puniceum (L.) Á. Löve & D. Löve var. **scabricaule** (Shinners) G.L. Nesom, (sp: purple; var: rough-stemmed), PURPLESTEM ASTER, ROUGH-STEMMED ASTER, SWAMP ASTER. Cespitose perennial, 100–250(–300) cm tall, sometimes rhizomatous; lower stems densely and uniformly hirsute; leaves scabrous, margins entire or remotely toothed, abaxial midveins pilose; basal and lower stem leaves withering by flowering; midstem leaves sessile and auriculate or subpetiolate and attenuate to cuneate with petioles widely winged and clasping, blades lanceolate or oblanceolate to oblong; uppermost leaves gradually reduced; heads in open paniculate or corymbose ± leafy arrays; involucre usually 8–12 mm high; phyllaries sometimes leaf-like and spreading (at least the outer series), subequal, bases hardened, tips sometimes purplish; ray flowers usually 20–50, the ligules (7–)12–18(–21) mm long, blue to lavender or purple, rarely white or pink; disk corollas cream or yellow, turning pink or purple with age; achenes (2–)2.5–3.5(–4) mm long, prominently 3–4-nerved; pappus white, 3.8–6 mm long. Saturated soils, oak and pine woodlands, seeps and bogs, pond margins; ne TX in Anderson, Cherokee (TEX-LL), Franklin, Henderson, Hopkins, Kaufman, Smith, and Van Zandt cos.; LA, MS, and AL. Sep–Nov. [*Aster puniceus* L. var. *scabricaulis* (Shinners) A.G. Jones, *A. scabricaulis* Shinners] The conservation status of this taxon, which is currently considered imperiled at the state, national, and global level, is discussed in Nesom (1997b) and Poole et al. (2007). *!*

Symphotrichum racemosum (Elliott) G.L. Nesom, (clustering), SMOOTH WHITE OLDFIELD ASTER, OLDFIELD ASTER, SMALL WHITE ASTER. Cespitose or colonial perennial, 30–90(–100) cm tall, glabrous or nearly so; new basal rosettes often forming at flowering; leaves with margins often ± revolute; basal and lower stem leaves withering by flowering; midstem leaves sessile or subpetiolate with petioles winged, bases clasping or attenuate, blades elliptic-lanceolate to linear-lanceolate, notably unequal in size, margins serrulate or entire; uppermost leaves abruptly reduced; heads in diffuse paniculate arrays; involucre usually 3.5–4.5 mm high; phyllaries unequal, bases hardened, tips sometimes purplish; ray flowers usually 16–20, the ligules 5–8 mm long, usually white, rarely pink; disk corollas cream or pale yellow, turning pink or red with age; achenes 1–1.8 mm long, faintly 4–5-nerved; pappus white, 2.5–3.5 mm long. Moist alluvial soils, open woodlands, marshes, wet prairies; e and sc TX from Anderson Co. s to Hardin Co. and w to Gonzales Co; e U.S. from ME s to FL and w to WI, OK, and TX. Aug–Oct. [*Aster brachypholis* Small, *A. racemosus* Elliott]

Symphotrichum sericeum (Vent.) G.L. Nesom, (silky), SILKY ASTER, SILVER ASTER. Cespitose perennial, (20–)30–70 cm tall, with thickened, woody stem bases; leaves sessile, silky-pilose, margins usually entire; basal and lower stem leaves withering by flowering; midstem leaves with blades oblanceolate to linear-lanceolate or elliptic, bases cuneate or rounded and subclasping; uppermost leaves not much reduced; heads in open paniculate arrays; involucre usually 7.5–10 mm high; phyllaries ± leaf-like (at least the outer series), unequal, densely silky-pilose, bases ± hardened, tips sometimes purplish; ray flowers usually 15–30, the ligules 8.5–11 mm long, rose-purple to violet, rarely white; disk corollas pink, turning purple with age; achenes 2–3 mm long, 7–10-nerved; pappus white or tawny, 6–7 mm long. Limestone slopes, fields, rocky calcareous soils, outcrops; Bastrop, Bexar, Comal, Hays, and Travis cos.; also Washington Co. (TEX-LL) and reported from Anderson Co. (Singhurst et al. 2003); an early Lindheimer collection from Harris Co. at BRIT may be a labeling error (R. Jones et al. 2008); Edwards Plateau and Lampasas Cut Plain; MI w to ND and s to AR and TX; Canada. Aug–Oct. [*Aster sericeus* Vent., *A. sericeus* var. *microphyllus* DC.] Differences between this species and the closely related *S. pratense* (Raf.) G.L. Nesom are discussed in R. Jones et al. (2008).

Symphotrichum subulatum (Michx.) G.L. Nesom, (awl-shaped, presumably for the tips of the phyllaries), EASTERN SALT MARSH ASTER. Tap-rooted annual, 30–120(–150) cm tall; leaves glabrous; basal and lower stem leaves withering by flowering; midstem leaves petiolate or sessile, blades narrowly lanceolate to subulate, margins entire or rarely with a few teeth; uppermost leaves much reduced; heads in a dense, pyramidal paniculate array; involucre usually 6–7 mm high; phyllaries unequal, bases hardened for a short distance or not at all, margins hyaline, often purple-tinged; ray flowers usually 16–30, the ligules (1.3–)1.5–2.6(–3.1) mm long, white (drying white or lavender); disk corollas yellow, sometimes tinged with purple with age; achenes usually 1.5–2.5 mm long, 5-nerved; pappus white, (3.5–)4–5.5 mm long. Salt marshes, brackish shores, salt-polluted areas; Orange Co., Newton Co. (*C. Allen & S. Allen 22496* (TEX-LL)); also Chambers and Galveston cos.; mostly coastal regions in the e and se U.S. from ME to TX; Canada; introduced elsewhere. Sep–Oct. [*Aster subulatus* Michx., *A. subulatus* Michx. var. *euroauster* Fernald & Griseb., *A. subulatus* Michx. var. *obtusifolius* Fernald, *S. subulatum* (Michx.) G.L. Nesom var. *subulatum*] We are following Nesom (2005b) and Turner (2016) in treating this taxon at the specific, rather than varietal level.

Symphotrichum tenuifolium (L.) G.L. Nesom var. **tenuifolium**, (narrow-leaved), PERENNIAL SALT MARSH ASTER. Rhizomatous, colonial perennial, 40–60(–100) cm tall; stems branching sparsely, wiry, often purplish or brown, glabrous or

sometimes with lines of hairs on upper stems; new basal rosettes often forming at flowering; leaves entire, glabrous; basal and lower stem leaves withering by flowering; midstem leaves sessile, blades lanceolate to subulate, bases cuneate, somewhat reduced upwards; heads in diffuse paniculate arrays; involucre usually 6–9.5 mm high; phyllaries subequal, bases hardened, margins hyaline, tips often tinged with purple; ray flowers usually 17–25, the ligules (4.5–)5–8.5(–9.5) mm long, white or pink; disk corollas yellow, turning purplish with age; achenes 2.8–4(–4.5) mm long, 5–6-nerved; pappus tawny to white, 5–6.1 mm long. Coastal salt marshes, tidal flats, brackish shores; Harris Co. (*D.J. Rosen 6184* (TEX) and *L.E. Brown 15785* (SBSC)) and Jackson Co.; e and c coastal TX; e U.S. coast from ME to FL to TX. Sep–Nov. [*Aster tenuifolius* L.]

Symphotrichum anomalum (Engelm.) G.L. Nesom, (anomalus), MANYRAY ASTER, which would key to *S. drummondii* here, can be distinguished by the entire midstem leaves, long-acuminate, reflexed phyllary tips, and ray petals that are more numerous (18–45) with a longer ligule (usually 9–15 mm or longer). Not yet reported in TX but included here based on records from adjacent counties in other states: McCurtain Co., OK (OKL) and Little River Co., AR (UARK); c U.S. from IL s to AR and w to OK. Aug–Oct. [*Aster anomalus* Engelm. ex Torr. & A. Gray]

Symphotrichum cordifolium (L.) G.L. Nesom, (heart-shaped leaves), HEARTLEAF ASTER, BLUE WOOD ASTER, which would key to *S. drummondii* here, can be distinguished by the usually unwinged petioles, and leaves with less pubescence beneath, often restricted to the veins. Not yet reported in TX but included here based on records from adjacent counties in other states: Bryan Co., OK (OKL) and several cos. in sw AR; e 1/2 North America. Aug–Oct. [*Aster cordifolius* L., *S. lowrieianum* (Porter) G.L. Nesom, *S. sagittifolium* (Wedem. ex Willd.) G.L. Nesom]

Symphotrichum pilosum (Willd.) G.L. Nesom var. *pilosum*, (hairy), FROST ASTER, OLDFIELD ASTER, HAIRY WHITE ASTER, which would key to *S. dumosum* or *S. racemosum* here, and is often confused with *S. ericoides*, can be distinguished by the basal rosette of oblanceolate leaves usually present at flowering, and phyllaries with an inrolled margin that creates a green spinulose tip. To be expected in ne TX based on records from adjacent counties/parishes in other states: McCurtain Co., OK (OKL), Little River & Miller cos., AR (UARK), Caddo Par., LA (LSU); e 1/2 North America; introduced and sometimes weedy elsewhere. Aug–Oct. [*Aster pilosus* Willd., *A. ericoides* L. var. *pilosus* (Willd.) Porter]

Symphotrichum squamatum (Spreng.) G.L. Nesom, (scaly), TROPICAL ASTER, which would key to *S. divaricatum* here, can be distinguished by the broadly lanceolate green zones of the phyllaries, which do not extend to the phyllary tip, phyllary tips that are appressed rather than loose, ray flowers with erect ligules often incurled lengthwise, and fewer disk florets (usually 7–14). This South American species of saline habitats is known in TX only from the city of Galveston (Galveston Co.; Nesom 2005c) and might be expected in other coastal TX counties; also in Cameron Par., LA; NC and AL; introduced elsewhere. Jul–Nov. [*Aster subulatus* Michx. var. *australis* (A. Gray) Shinnery, *A. subulatus* Michx. var. *sandwicensis* (A. Gray) A.G. Jones, *S. subulatum* (Michx.) G.L. Nesom var. *squamatum* (Spreng.) S.D. Sundb.] *I*

Symphotrichum turbinellum (Lindl.) G.L. Nesom, (turban-shaped), PRAIRIE ASTER, SMOOTH VIOLET PRAIRIE ASTER, which would key to *S. eulae* or *S. oolentangiense* here, can be distinguished by the large turbinate heads with involucre 7–12 mm high, phyllaries in 6–9 series, rounded-keeled inner phyllaries, 8–15 uncrowded peduncular bracts, and 14–20 ray flowers that are 12–20 mm long. Not yet reported in TX but included here based on records from adjacent counties in other states: McCurtain Co., OK (OKL) and several cos. in sw AR; central U.S. from IL s to LA and w to KS and OK. Aug–Oct. [*Aster turbinellus* Lindl.]

TAGETES L. MARIGOLD

•A genus of 40+ species of the tropical and warm-temperate Americas, especially Mexico; several species are cultivated for ornamental, culinary, medicinal, and ceremonial purposes; a few species have naturalized in other regions and are considered invasive. The common name MARIGOLD is derived from Mary's-gold, a name first applied to a similar plant native to Europe, *Calendula officinalis*. (Name thought to be derived from a common name for a French or African plant so called to honor the early Etruscan deity, Tages) (tribe Heliantheae)

REFERENCES: Soule 1993; Keith 2004b; Strother 2006cc.

Tagetes erecta L., (erect), AZTEC MARIGOLD, AFRICAN MARIGOLD, FRENCH MARIGOLD. Highly aromatic annuals to 120+ cm tall; leaves opposite, the blades 30–120(–250+) mm long, usually pinnately lobed or pinnatisect with 9–25 segments; heads borne singly; involucre 10–22 mm high; phyllaries in 1–2 series, fused for most of their lengths, usually with oil glands; ray flowers few to 100+ in “double” cultivars, pistillate, sometimes fertile, the ligules usually some combination of yellow, gold, orange, or red-brown, occasionally other colors in cultivars; disk flowers perfect, fertile, corollas greenish yellow to orange,

sometimes tipped with red-brown; achenes 6–11 mm long; pappus of 2–4 linear-oblong scales, 2–6+ mm long, plus 0–2 narrower scales, 6–12+ mm long. Disturbed sites; rare in TX; recorded in Walker Co. (Keith 2004b) and Harris Co. (Brown 2014); scattered across the U.S.; Mexico; introduced elsewhere. Spring–Fall. [*T. patula* L.] This is one of several *Tagetes* species in which the roots produce thiophenes, shown to be an effective control for nematodes in crops (Strother 2006cc). Native of Mexico; widely cultivated and sometimes escaping; possibly not persisting in the TX flora. *I*

TARAXACUM F.H. Wigg. DANDELION

Small perennials, sometimes behaving as winter annuals, with coarse taproot; sap milky; leaves all in a basal rosette, the blades oblong-lanceolate, coarsely toothed to deeply pinnately lobed; scapes hollow, ± pubescent, to 40(–60) cm tall; heads solitary, terminal; phyllaries green, the outer series short and ± curved-spreading or reflexed, the inner 2 series long, erect, reflexed at maturity; flowers all ligulate; corollas sulphur-yellow; achenes oblanceoloid, with slender beak 1–2.5 times as long as the body; pappus of numerous minutely barbed bristles, 4–7(–8) mm long; mature achenes with their umbrella-like pappi form a conspicuous, easily disrupted, ball-like arrangement.

•A genus of at least 60 species of the n temperate zone and temperate South America, including some cosmopolitan weeds. Asexual reproduction, hybridization, and polyploidy have made the taxonomy of this group exceedingly complex. Our two species are difficult to distinguish without mature achenes, and in each case the nomenclature is confusing and not yet satisfactorily resolved (Brouillet 2006c). *Taraxacum* species have been used medicinally, as edible greens, and to produce wine; they are particularly rich sources of vitamin C (Small & Catling 1999). The name DANDELION comes from the French: *dent de lion*, tooth of the lion, apparently in reference to the leaf shape (Tveten & Tveten 1993). (Persian: *talkh chakok*, bitter herb, through medieval Latin *tarasacon*) (tribe Cichorieae)

REFERENCES: Shinners 1949a; Vuilleumier 1973; Taylor 1987; Brouillet 2006c.

1. Ligules 12–16 mm long; mature achenes red to purplish red or brownish red; leaf blades typically consistently lacerate, deeply lobed for their whole length; the terminal lobe often with straight or concave sides, usually not larger than the upper lateral lobes **T. erythrospermum**
1. Ligules 15–22 mm long; mature achenes greenish tan or brownish to straw-colored; leaf blades occasionally lacerate, usually shallowly to deeply lobed or toothed; the terminal lobe often rounded with convex sides, usually as large as the upper lateral lobes **T. officinale**

Taraxacum erythrospermum (Andrz. ex Besser) Britton, (red-seeded), RED-SEED DANDELION. Leaf blades consistently lacerate, with terminal lobe usually triangular, with straight or concave, rarely convex, sides; corollas 12–16 mm long; mature achenes red to purplish red or brownish red, 15-ribbed. In lawns, disturbed areas, and under trees in towns; widespread in TX but frequently ignored by collectors; a widespread weed in North America and throughout temperate regions of the world. Dec–Jun, sporadically to Nov, often drying up and disappearing during summer heat. Native of Eurasia. [*T. laevigatum* (Willd.) DC., *T. officinale* var. *erythrospermum* (Andrz.) Bab.] *I*

Taraxacum officinale F.H. Wigg., (medicinal), COMMON DANDELION. Leaf blades shallowly to deeply lobed or toothed, with terminal lobe rounded-triangular with convex sides; corollas 15–22 mm long; mature achenes greenish tan or brownish to straw-colored, 4–12-ribbed. In lawns, disturbed areas, and under trees in towns; widespread in TX but frequently ignored by collectors; a widespread weed in North America and throughout temperate regions of the world. Dec–Jun, sporadically to Nov, often drying up and disappearing during summer heat. Native of Eurasia. [*Leontodon taraxacum* L.] *I*

TETRAGONOTHECA L. NERVERAY, SQUAREHEAD

Herbaceous perennials; stems sometimes from a basal rosette; stem leaves opposite, distinct or connate-perfoliate, the blades deltoid or lanceolate to ovate; heads large, 2–4+ cm broad (including ligules), borne singly or in loose corymbose arrays; phyllaries in ± 2 series; outer phyllaries 4, broadly lanceolate, foliaceous, conspicuous, inner series more numerous, smaller, scarious, each subtending a ray flower; ray flowers pistillate, fertile, with ligules conspicuous, yellow, often with some reddish or brownish venation; disk flowers numerous, perfect, fertile, the corollas yellow, sometimes with darker stripes or reddish lobes; achenes 4(–5)-angled, finely ribbed; pappus of scales or absent.

•A genus of 4 species of the se U.S. and n Mexico; easily recognized by the 4 large outer phyllaries that give the buds a square appearance. (Greek: *tetragonos*, four-angled, and *theca*, a case, from the shape of the involucre) (tribe Heliantheae)

REFERENCES: Turner & Dawson 1980; Urbatsch & Fischer 1989; Strother 2006dd.

1. Leaves mostly basal, reduced upwards, narrowed into petiole-like bases and not connate-perfoliate; ray flowers 16–21+,

- the ligules 20–30+ mm long; sandy soils on sw border of East TX from Bexar to Goliad cos..... **T. repanda**
1. Leaves generally well-developed up the stems, connate-perfoliate; ray flowers < 15, the ligules 8–18 mm long; various habitats in e and c TX and Edwards Plateau.
2. Leaf blades usually toothed, the upper stem leaves often broadest near the base; achenes 4–6 mm long; pappus of 16–30 obovate-spatulate scales, 0.5–2 mm long; sandy habitats in e and c TX..... **T. ludoviciana**
2. Leaf blades usually lyrate to pinnatifid, the upper stem leaves usually not broadest near the base; achenes 2.5–4 mm long; pappus absent, or of 1–10+ narrow or fringe-like scales to 0.5(–1.5) mm long; calcareous habitats in Edwards Plateau..... **T. texana**

Tetragonotheca ludoviciana (Torr. & A. Gray) A. Gray ex H.M. Hall, (of Louisiana), SAWTOOTH NERVERAY, LOUISIANA NERVERAY. Plant to 100 cm tall; leaves mostly cauline, connate-perfoliate, the blades rounded-deltoid to ovate, 8–12 cm long, prominently and coarsely toothed; ray flowers 12–13, the ligules 8–18 mm long; achenes 4–6 mm long; pappus of 16–30 scales, 0.5–2 mm long. Sandy soils, oak woodlands; mainly se and e TX; also nc and sc TX; AR and LA. May–Aug. [*Halea ludoviciana* Torr. & A. Gray]

Tetragonotheca repanda (Buckley) Small, (having an undulating margin, for the leaves), SHOWY NERVERAY. Plant to 50 cm tall; leaves mostly basal, reduced upwards, narrowed into petiole-like bases and not connate-perfoliate, the blades rounded-deltoid to ovate or lanceolate, 5–12 cm long, repand or irregularly toothed; ray flowers 16–21, the ligules 20–30+ mm long; achenes 4–5.5 mm long; pappus of 20–30 scales, 1–2 mm long. Deep sandy soils; sw border of East TX in Bexar and Goliad cos.; s TX Plains; possibly Mexico. Mar–Nov. [*Halea repanda* Buckley] *ET*

Tetragonotheca texana Engelm. & A. Gray ex A. Gray, (of Texas), PLATEAU NERVERAY, SQUARE-BUD DAISY. Plant to 50 cm tall; leaves mostly cauline, connate-perfoliate, the blades ovate to lanceolate, 3–7 cm long, lyrate to pinnatifid or sometimes nearly entire; ray flowers 8–13, the ligules 10–18 mm long; achenes 2.5–4 mm long; pappus absent, or of 1–10+ scales to 0.5(–1.5) mm long. Calcareous soils, uplands, dry limestone ridges; w border of East TX in Comal, Hays, and Travis cos.; Edwards Plateau, Trans-Pecos, and far s TX; Mexico. Apr–Jun. *ET*

TETRANEURIS Greene FOUR-NERVE DAISY

Ours small annuals or perennials, 16–50+ cm tall, ± soft-pilose or woolly-pubescent to glabrate; stems erect or decumbent; leaves basal and/or cauline, alternate, simple, the blades spatulate to oblanceolate or linear, with petiolar base, entire or few-lobed, usually gland-dotted; heads terminal, rather large, long-peduncled, solitary or in corymbose arrays; phyllaries in 3 series, the outer herbaceous and ± hairy, the inner with scarios margins; ray flowers pistillate, fertile; ligules golden yellow or orange-yellow, with 4 prominent veins, usually 3–lobed at tip, often reflexed and persistent in age and becoming almost whitish; disk corollas perfect, fertile, orange-yellow; achenes obpyramidal, hairy; pappus of 4–7 awn-tipped scales.

♣A genus of 9 species, mostly confined to w North America and Mexico; it is a segregate of *Hymenoxys* and has sometimes been treated in that genus (e.g., Karis & Ryding 1994; Mabberley 1997). (Greek: *tetra*, four, and *neuron*, cord or nerve, alluding to the venation of the ray ligules) (tribe Heliantheae)

REFERENCES: Seeligmann & Alston 1967; Bierner & Jansen 1998; Bierner & Turner 2003, 2006.

1. Taprooted annuals with branched, conspicuously leafy stems; peduncles 8–14(–19) cm long..... **T. linearifolia**
1. Woody-crowned perennials with leaves all basal or nearly so; peduncles 12–50 cm long.
2. Plants not colonial; stems erect; leaves sparsely to densely hairy (but not woolly); involucre 7–12 mm wide; pappus 1.6–2.3 mm long; widespread in w 1/2 TX..... **T. scaposa**
2. Plants forming colonies by short lateral stolons; stems erect or decumbent; leaves moderately to densely silky or woolly; involucre 12–20 mm wide; pappus 3–4 mm long; restricted to sc TX..... **T. turneri**

Tetraneuris linearifolia (Hook.) Greene var. **linearifolia**, (linear-leaved), FINE-LEAF FOUR-NERVE DAISY. Taprooted annuals; stems branched in the upper portion; leaves mostly on the stems, blades ± hairy, sparsely to densely gland-dotted, margins entire or with 2–6 teeth or lobes; involucre usually 8–11 mm wide; ray flowers 9–20; achenes 1.5–2.1(–2.5) mm long; pappus scales 1.2–1.9(–2.5) mm long. Prairies, roadsides, in calcareous clay or rocky soils; nearly throughout TX but most common in c, s, and sw TX; KS, OK, and NM; Mexico. Mar–May, re-branching and producing additional smaller heads to Jul. [*Hymenoxys linearifolia* Hook.]

Tetraneuris scaposa (DC.) Greene var. **scaposa**, (with scapes), PLAINS YELLOW DAISY, YELLOW PAPER-FLOWER, FOUR-NERVE DAISY. Woody-crowned perennials; stems sometimes branched near the bases; leaves nearly all basal, blades ± hairy, usually densely gland-dotted, margins entire or with 2 teeth or lobes; involucre 7–12 mm wide; ray flowers 12–26; achenes 2–3 mm long; pappus scales 1.6–2.3 mm long. Gravelly or rocky prairies on limestone, roadsides, pastures; w border of East TX from

McLennan to Travis to Bexar cos., also Brazos Co.; c and w TX and Panhandle; NE, KS, OK, CO, and NM; Mexico. Mar–May, sporadically through summer, often repeating in Sep–Oct. [*Hymenoxys glabra* (Nutt.) Shinners, *H. scaposa* (DC.) K.L. Parker, *H. scaposa* (DC.) K.F. Parker var. *villosa* Shinners, *T. glabra* (Nutt.) Greene, *T. linearis* (Nutt.) Greene] The leaves are dotted with thin granules of a resin-like substance which gives them a bitter taste (Ajilvsigi 1984). The common name YELLOW PAPER-FLOWER is probably derived from the tendency of the rays to remain on the heads long after maturity, eventually turning almost white.

Tetraneuris turneri (K.F. Parker) K.F. Parker, (for Billie Lee Turner, 1925–, long-time professor of botany at Univ. of TX Austin), TURNER'S FOUR-NERVE DAISY. Woody-crowned perennials; stems sometimes branched near the bases; leaves nearly all basal, blades moderately to densely woolly, usually densely gland-dotted, margins entire or with 2–4 teeth or lobes; involucre 12–20 mm wide; ray flowers 12–24; achenes 2.6–3.4 mm long; pappus scales 3–4 mm long. Gravelly or rocky calcareous soils, roadsides, pastures; Goliad Co.; s TX in Bee, Jim Wells, Karnes, Live Oak, and San Patricio cos.; Mexico. May–Jun. [*Hymenoxys turneri* K.F. Parker] *ET*

THELESPERMA Less. GREENTHREAD

Perennial or annual herbs, usually glabrous; leaves opposite, usually compound or deeply lobed, the segments narrow; heads terminal on naked peduncles, borne singly or in loose corymbose arrays; primary (inner) phyllaries in 2 series, scarious-margined, basally fused for 1/5 to 1/2 of their lengths or more, subtended by a secondary series of phyllary-like bracts, these herbaceous, often spreading; ray flowers neuter, with ligules yellow to golden yellow or bicolored (yellow and reddish brown to purple), toothed at the tips, or ray flowers absent; disk flowers bisexual and fertile, the corollas yellow with reddish brown veins, or dark reddish brown, sometimes unequally lobed; achenes linear to linear-oblong; pappus of 2 prominent or minute awns, or pappus absent.

☛A genus of ca. 12 species native to w North America, Mexico, and s South America; similar in appearance to and sometimes confused with *Coreopsis*; the inner phyllaries of *Thelesperma* are basally united for 1/5 to 1/2 of their lengths or more, while those of *Coreopsis* are separate or nearly so. (Greek: *thele*, nipple, and *sperma*, seed, in reference to the papillose achenes of some species) (tribe Heliantheae)

REFERENCES: Shinners 1950a; Melchert 1990; Greer 1997; Strother 2006ee; Turner 2007.

1. Throats of disk corollas equal to or longer than lobes; pappus usually absent, or rarely of two awns < 0.5 mm long **T. simplicifolium**
1. Throats of disk corollas shorter than lobes; pappus usually of two awns or scales (0.5–)1–3 mm long, or rarely absent.
 2. Perennials (sometimes flowering first year); secondary phyllary-like bracts 3–5+, ovate to oblong, 1–3 mm long; ray ligules 4–8(–12+) mm long..... **T. ambiguum**
 2. Annuals or short-lived perennials; secondary phyllary-like bracts 5–9, linear to narrowly triangular, (2–)4–8+ mm long; ray ligules 10–20+ mm long.
 3. Ray ligules largely reddish brown to purple (usually tipped with yellow)..... **T. burridgeanum**
 3. Ray ligules yellow or golden-yellow throughout (may be reddish tinged at base).
 4. Robust plants 30–70(–120+) cm tall; internodes 35–100+ mm long; disk corollas yellow, often with reddish brown nerves; plants of deep sandy soils in e and sc TX..... **T. flavodiscum**
 4. Nonrobust plants 10–40(–70+) cm tall; internodes mostly 10–35(–50+) mm long; disk corollas reddish brown or yellow with reddish brown nerves; plants of calcareous clays throughout TX..... **T. filifolium**

Thelesperma ambiguum A. Gray, (ambiguous), COLORADO GREENTHREAD. Perennials, (10–)30–50 cm tall, leaves simple, trifid, or usually 1–2-pinnatifid, the ultimate segments linear; secondary phyllary-like bracts 3–5+, ovate to oblong, 1–3 mm long; ray flowers usually 8, rarely 0, ligules 4–8(–12+) mm long, yellow; disk corollas reddish brown, throats shorter than lobes; achenes 4–5+ mm long; pappus of 2 awns, 1.5–2+ mm long, or rarely absent. Open limestone areas, sands and clays, disturbed sites; sw border of East TX in Bexar and Wilson cos.; mainly s TX and Edwards Plateau; NM; Mexico. Apr–Jun. [*T. fraternum* Shinners, *T. megapotamicum* var. *ambiguum* (A. Gray) Shinners]

Thelesperma burridgeanum (Regel, Korn. & Rach.) S.F. Blake, (for a 19th-century horticulturist named Burridge, who brought this species into cultivation in Europe), BURRIDGE'S GREENTHREAD, COSMIDIUM. Annuals, 30–40(–70+) cm tall, leaves usually pinnatifid, the ultimate segments usually linear to filiform; secondary phyllary-like bracts 5–6(–9), linear to narrowly triangular, 2–4 mm long; ray flowers 8, ligules 7–9(–12+) mm long, mostly reddish brown to purplish, often with yellow tips; disk corollas reddish brown to purplish, throats shorter than lobes; achenes 3.5–4 mm long; pappus of 2 awns, 0.5–1+ mm long. Deep sandy soils; sw border of East TX in Bexar and Wilson cos.; interior s TX Plains. Apr–May. [*Cosmidium burridgeanum* Regel] *ET*

Thelesperma filifolium (Hook.) A. Gray, (thread-leaved), GREENTHREAD, THREAD-LEAF THELESPERMA. Annuals or short-lived perennials blooming the first year, 10–40(–70+) cm tall, leaves pinnatifid, the ultimate segments mostly linear to filiform; secondary phyllary-like bracts 7–8+, linear to narrowly triangular, (2–)4–8+ mm long; ray flowers 8, ligules 12–20+ mm long, yellow to golden-yellow, sometimes reddish-tinged at the base; disk corollas reddish brown or yellow with reddish brown nerves, throats shorter than lobes; achenes 3.5–4+ mm long; pappus of 2 awns, 0.5–1(–2+) mm long. Calcareous clays, prairies, roadsides, disturbed areas; widespread in TX but less common in East TX; c U.S. from MS n to ND and w to AZ; Mexico. Apr–Jun, sporadically to Sep. [*Coreopsis filifolia* Hook., *T. filifolium* (Hook.) A. Gray var. *intermedium* (Rydb.) Shinners, *T. intermedium* Rydb.] If varieties are recognized, ours would be var. *filifolium*.

Thelesperma flavodiscum (Shinners) B.L. Turner, (for the yellow disk flowers), EAST TEXAS GREENTHREAD. Annual, 30–70(–120+) cm tall, leaves pinnatifid, the ultimate segments mostly linear to filiform; secondary phyllary-like bracts 7–9, linear to narrowly triangular, 4–6(–8) mm long; ray flowers 8, ligules 12–20+ mm long, yellow; disk corollas yellow, often with reddish brown nerves, throats shorter than lobes; achenes 4–5 mm long; pappus of 2 awns, 0.5–1.5+ mm long. Deep sandy soils, post oak savannas; Cass Co. sw to Wilson Co. and e to Newton Co.; s TX Plains; AR and LA. May–Jul. [*T. filifolium* (Hook.) A. Gray var. *flavodiscum* Shinners] Turner (2007) discusses the distinction between this species and *T. filifolium*.

Thelesperma simplicifolium A. Gray, (simple-leaved), SLENDER GREENTHREAD. Perennial, (20–)30–70+ cm tall, usually glaucous; leaves simple and thread-like or 3–5-parted, often few, the plant thus sometimes with a naked appearance; secondary phyllary-like bracts 6–8+, linear to subulate, 1–3+ mm long; ray flowers usually 8, rarely 0, ligules 9–15(–20+) mm long, yellow; disk corollas yellow with red-brown nerves, throats equal to or longer than lobes; achenes 3–4 mm long; pappus usually absent, or rarely of 2 minute tooth-like awns < 0.5 mm long. Limestone hillsides, oak-juniper woodlands, desert scrub; w border of East TX from McLennan Co. s to Bexar and Wilson cos.; mostly c TX, Edwards Plateau, and s TX Plains; NM; Mexico. May–Sep. [*T. curvicaupum* T.E. Melchert]

THUROVIA ROSE THREE-FLOWER SNAKEWEED

☛A monotypic genus endemic to TX; it was formerly treated in the genus *Gutierrezia*. (Named for collector Fredrick William Thurow (1852–1952), originally from Germany, later of Hockley, near Houston) (tribe Astereae)

REFERENCES: Lane 1985; Suh & Simpson 1990; Nesom 2006y.

Thurovia triflora Rose, (three-flowered), THREE-FLOWER SNAKEWEED, THREE-FLOWER BROOMWEED. Taprooted annuals or short-lived perennials, 6–45 cm tall; stems erect, glabrous, branching mostly in the upper portion; leaves alternate, sessile, usually 2–10 mm long, linear-filiform, glabrous, ascending-appressed and reduced up the stem, margins entire; heads numerous, small, sessile, in leafy-bracted spicate arrays; involucre narrowly cylindrical, 1.5–2 mm wide; phyllaries 5–9, glabrous; ray flowers absent; disk flowers 3, corollas white to yellowish cream, to 2.8 mm long; achenes 0.9–1.7 mm long, densely white-sericeous; pappus of 10 silvery-white, ovate-lanceolate scales in 2 series, equalling corollas. Saline prairie barrens and slicks, coastal flats; a rare endemic restricted to the TX Gulf Coastal Plain, known from Harris and Jackson cos. and Waller Co. (historical, possibly extirpated (Poole et al. 2007)); also Aransas, Brazoria, Fort Bend, Galveston, Matagorda, and Refugio cos. Sep–Nov. [*Gutierrezia triflora* (Rose) M.A. Lane] This species is not protected at the state or federal level, but is of conservation concern due to its restricted range, small population numbers, and specialized habitat; it is threatened by urban development and the expanding oil and gas industry around Houston (Poole et al. 2007). *!* *ET*

THYMOPHYLLA Lag. DOGWEEED, PRICKLYLEAF

Ours low annual or perennial herbs or subshrubs, aromatic, to 30 cm tall; stems frequently much-branched, sometimes forming dense clumps; leaves opposite or alternate, petiolate or sessile, often pinnately lobed, often with scattered oil glands; heads mostly borne singly; involucre 4–7 mm high; primary phyllaries in 2 series, fused for a portion of their lengths, usually with oil glands, sometimes subtended by a series of small bractlets; ray flowers 10–21, pistillate, fertile, corollas yellow to yellowish orange; disk flowers perfect, fertile, corollas yellow to yellowish orange; achenes linear to obconic, glabrous or pubescent; pappus of awn-tipped and sometimes rough-margined scales, to 3.5 mm long.

☛A genus of ca. 30 species native to the sw U.S. and Mexico; a few are weedy or are cultivated as ornamentals. *Thymophylla* species were formerly included in the genus *Dyssodia*. (Greek: *thymon*, thyme, and *phyllon*, leaf) (tribe Heliantheae)

REFERENCES: Johnston 1956; Strother 1969, 1986, 1989, 2006ff; Gandhi & Thomas 1984; Nesom 2009b; Turner 2009c.

1. Perennial herbs or subshrubs(sometimes flowering first year); leaves mostly opposite; pappus of alternating awn-tipped

scales and scales without awns.

2. Leaf lobes mostly 9–11; phyllaries usually glabrous or glabrescent, rarely hairy, margins of outer phyllaries fused ca. 1/2 their lengths..... **T. pentachaeta**
2. Leaf lobes mostly 5–7; phyllaries densely puberulent, margins of outer phyllaries fused ca. 2/3 their lengths..... **T. puberula**
1. Annuals (rarely persisting); leaves mostly alternate, at least the upper ones; pappus of awn-tipped scales.
3. Leaf blades rigid, pinnatisect, with 7–15 subulate lobes; pappus scales each terminating in 3–5 awns..... **T. tenuiloba**
3. Leaf blades relatively lax, seldom lobed (linear to filiform, usually entire, rarely with a few pairs of tooth-like lobes); pappus scales usually terminating in a single awn (or rarely 2)..... **T. wrightii**

Thymophylla pentachaeta (DC.) Small, (five-bristled), COMMON DOGWEED, PARRALENA, FIVE-NEEDLE PRICKLYLEAF. Perennials or subshrubs, ± grayish or green, glabrous or puberulent; leaves mostly opposite, leaf lobes (3–)9–11, linear to filiform, stiff and sharp-tipped; peduncles 6–10 cm long; involucre 4–6 mm high; phyllaries usually glabrescent or glabrous, margins of outer phyllaries fused ca. 1/2 their lengths; achenes 2–3 mm long; pappus of 10 alternating awnless and awned scales. Sandy, often calcareous soils, scrublands, disturbed sites; sw margin of East TX from Williamson to Hays to Bexar cos., DeWitt and Goliad cos., and Colorado Co. (BRIT-SMU); Rolling Plains, Edwards Plateau, and s TX; Mexico; Argentina. Mar–Jul, Sep–Nov. [*Dyssodia pentachaeta* (DC.) B.L. Rob., *T. pentachaeta* (DC.) Small var. *pentachaeta*] The foliage has an unpleasant scent if handled (Ajilvsgi 1984). *ET*

Thymophylla puberula Rydb., (finely pubescent), DOGWEED, PARRALENA, FIVE-NEEDLE PRICKLYLEAF. Perennials or subshrubs, ± grayish green, glabrous or puberulent; leaves mostly opposite, leaf lobes 3–7(–10), linear to filiform, stiff and sharp-tipped; peduncles 4–10 cm long; involucre 4.5–5.5 mm high; phyllaries densely puberulent, margins of outer phyllaries fused ca. 2/3 their lengths; achenes 2–3 mm long; pappus of 10 alternating awnless and awned scales. Calcareous bluffs and slopes, scrublands; sw margin of East TX in Travis and Hays cos. and Williamson Co. (TEX); Edwards Plateau; Mexico. Mar–Jul, Sep–Nov. [*Dyssodia pentachaeta* (DC.) B.L. Rob. var. *puberula* (Rydb.) Strother, *T. pentachaeta* (DC.) Small var. *puberula* (Rydb.) Strother] This taxon was treated as *T. pentachaeta* var. *puberula* in Strother (2006ff), but Turner (2009c) concluded the variety was sufficiently distinct to be returned to species status. *ET*

Thymophylla tenuiloba (DC.) Small var. **tenuiloba**, (slender-lobed), BRISTLE-LEAF DYSSODIA, BRISTLE-LEAF PRICKLYLEAF, TINY-TIM. Annuals (rarely persisting), green, glabrous or sparsely hirtellous; leaves mostly alternate, rigid, leaf lobes 7–15, subulate; peduncles 3–8 cm long; involucre 5–7 mm high; phyllaries glabrous or sparsely hirtellous, margins of outer phyllaries fused more than 4/5 their lengths; achenes 2–3.5 mm long; pappus of 10–12 similar scales, each bearing 3–5 awns. Sandy, often calcareous soils, roadsides, disturbed areas; se and c TX; Plains Country to w and s TX; NM; recently adventive in CA and se U.S.; introduced in West Indies, Asia, and Africa. Apr–Oct. [*Dyssodia tenuiloba* (DC.) B.L. Rob.] DAHLBERG DAISY and GOLDEN FLEECE are names used for cultivars of this variety in the horticultural trade.

Thymophylla wrightii (A. Gray) Small, (for Charles Wright, 1811–1885, prolific collector of TX and elsewhere), WRIGHT'S PRICKLYLEAF. Annuals (rarely persisting), green, glabrous or sparsely hirtellous; leaves mostly alternate, relative lax, usually entire (rarely with a few pairs of tooth-like lobes), linear to filiform; peduncles 3–8 cm long; involucre 5–7 mm high; phyllaries glabrous or sparsely hirtellous, margins of outer phyllaries fused more than 4/5 their lengths; achenes 2–3.5 mm long; pappus of 10–12 similar scales, each bearing a single awn (or rarely 2). Sandy soils, coastal grasslands, roadsides; endemic to sc TX; Bastrop, DeWitt, Goliad, Gonzales, Guadalupe, and Lavaca cos., also Wilson Co. (TEX); s to TX coast. Apr–Oct. [*Dyssodia wrightii* (A. Gray) B.L. Rob., *D. tenuiloba* (DC.) B.L. Rob. subsp. *wrightii* (A. Gray) Strother, *T. tenuiloba* (DC.) Small var. *wrightii* (A. Gray) Strother] *ET* This taxon was treated as *T. tenuiloba* var. *wrightii* in Strother (2006ff), but Nesom (2009b) concluded the variety was sufficiently distinct to deserve species status.

TOWNSENDIA Hook. EASTER DAISY

☛A genus of 27 species native to w North America and Mexico; some are cultivated as ornamentals. (Named for David Townsend, 1787–1858, amateur U.S. botanist from Pennsylvania) (tribe Astereae)

REFERENCES: Larsen 1927; Beaman 1957; Strother 2006gg.

Townsendia exscapa (Richardson) Porter, (without scapes), STEMLESS TOWNSENDIA, EASTER DAISY. Tufted or matted, appressed-pubescent, dwarf perennial, the woody stems barely out of the ground; leaves ± in rosettes; leaf blades spatulate to linear-oblongate, 1.2–4(–7.5) cm long, 2–6 mm wide, entire; heads large in relation to plant size, 1–2.5 cm across, sessile or short-pedunculate; phyllaries in 4–6 series, linear to narrowly lanceolate; ray flowers 20–40, pistillate and fertile, with ligules white to pinkish or rosy-lavender, often with a darker stripe beneath, showy, 12–18+ mm long, curling under at night or in age; disk flowers perfect and fertile, corollas yellow, often pink- or purple-tipped or -tinged; achenes 2(–3)-ribbed, 4–6

mm long; pappus of minutely-barbed bristles 6–11+ mm long. Eroding limestone slopes; rare in East TX; mostly Plains Country and Trans-Pecos, with disjunct occurrence in Cross Timbers in Bell Co. and adjacent cos. to the w; widespread in w 1/2 North America excepting coastal states; Mexico. Jan–Apr. [*Aster exscapus* Richardson, *T. sericea* Hook.]

TRAGOPOGON L. SALSIFY, GOAT’S-BEARD

Biennial herbs with stout taproot; sap milky; stems 15–100+ cm tall; leaves alternate, sessile and clasping, to 30 cm long, grass-like, tapered from base to a long, narrow tip, entire; heads solitary, terminal, large, on swollen peduncles; phyllaries in one row, equaling or longer than corollas, ca. 2.4–4 cm long in flower; flowers all ligulate, open mainly in morning hours; achenes 25–40 cm long including elongate beak; pappus of very conspicuous plumose bristles, 20–30 mm long; mature achenes with their pappi in a ball-like arrangement resembling the infructescence of a giant dandelion.

☛A temperate Eurasian and Mediterranean genus of ca. 110 species of taprooted herbs with monocot-like leaves. While both species occurring in East TX are diploids, hybridization and polyploidy are well-documented in the genus (Soltis et al. 1995; Soltis 2006). (Greek: *tragos*, goat, and *pogon*, beard, in reference to the conspicuous pappus) (tribe Cichorieae)

REFERENCES: Shinnery 1949a; Ownbey 1950; Vuilleumier 1973; Roose & Gottlieb 1976; Soltis & Soltis 1989, 1991; Novak et al. 1991; Soltis et al. 1995; Soltis 2006.

1. Corollas lemon-yellow; phyllaries typically ca. 13 per head (sometimes less on depauperate plants) **T. dubius**
1. Corollas purple; phyllaries typically ca. 8 per head **T. porrifolius**

Tragopogon dubius Scop., (doubtful), GOAT’S-BEARD, WESTERN SALSIFY, NOON-FLOWER. Plant 0.3–1 m tall; phyllaries 13–17; corollas lemon-yellow. Disturbed sites, roadsides; mostly w 1/3 of TX, uncommon further e; Grayson and Collin (TEX) cos. in nc TX and Bell (TEX) and McLennan (Hannick et al. 2013) cos. in c TX; a widespread weed in North America and other temperate regions. Apr–Jun. Native of Eurasia. [*T. major* Jacq.] *I*

Tragopogon porrifolius L., (with leaves like leek, in the Porrum group of genus *Allium*), SALSIFY, VEGETABLE-OYSTER SALSIFY, OYSTERPLANT. Plant 0.4–1 m tall; phyllaries 8–9(–12); corollas purple. Disturbed sites, roadsides; scattered in w 1/3 of TX; in East TX known only from Dallas Co.; reported by Reverchon as “naturalized in gardens” in Dallas in 1903 (Mahler 1988); a single plant found in vacant lot in University Park, Dallas, in 1946; a 1977 collection from freeway waste area in downtown Dallas; also observed in Harry S. Moss Park, Dallas (R.A. May, pers. comm.); a widespread weed in North America and other temperate regions. Apr–Jun. Native of Eurasia. Cultivated for its edible root (Mabberley 1987). *I*

TRICHOCORONIS A. Gray BUGHEAL

☛A genus of 2 species native to TX and Mexico. (Greek: *trichos*, hair, and *koronos*, crown, alluding to the pappus) (tribe Eupatorieae)

REFERENCES: King & Robinson 1970d; Nesom 2006z.

Trichocoronis wrightii (Torr. & A. Gray) A. Gray var. **wrightii**, (for Charles Wright, 1811–1885, prolific collector of TX and elsewhere), LIMESTONE BUGHEAL, WRIGHT’S HAIRY-CROWN. Perennial subaquatic herbs, fibrous-rooted, sometimes colonial; stems decumbent to erect, glabrate to pilose, sometimes rooting at nodes; leaves mostly opposite, sessile, blades oblong to elliptic or lanceolate, 10–25 mm long, margins ± dentate (at least the upper portion); heads usually 3–4 mm wide, borne singly or in loose corymbose arrays; phyllaries in 2–3 series, lanceolate, ± equal; ray flowers absent; disk flowers 75–125, corollas whitish to pinkish or purplish, ca. 1 mm long; achenes spindle shaped, 4–5-ribbed, ca. 1 mm long; pappus of 2–6+ bristle-like scales, to 0.5 mm long. Edges of ponds, ditches, wet depressions in clay and sand; endemic to sc TX; Colorado, Gonzales, Lavaca, and Victoria cos.; s to TX coast; adventive in CA; Mexico. Feb–Jul(–Oct). [*T. riparia* (Greene) Greene]

VERBESINA L. CROWNBEARD, FLAT-SEED SUNFLOWER, WINGSTEM

Ours herbaceous annuals or perennials, ± pubescent; leaves alternate or opposite; leaves simple, margins usually toothed; petioles usually winged when present, the wings in some species extending down along the stem; phyllaries in 2 to several series, subequal; ray flowers pistillate, fertile or infertile, the ligules yellow or whitish, or ray flowers absent; disk flowers perfect, fertile, the corollas yellow or whitish, usually the same color as ray ligules; achenes flattened, usually winged; pappus of 2 awns or scales, or pappus rarely absent.

☛A genus of 200+ species of trees, shrubs, and herbs of warm areas of the Americas; some are cultivated as ornamentals. (Name said to be modified from *Verbena*, reason unknown) (tribe Heliantheae)

REFERENCES: Robinson & Greenman 1899; Coleman 1966; Olsen 1979, 1985; Strother 2006hh.

1. Corollas white to dingy pale yellow or grayish yellow (but not bright yellow); ray ligules absent or < 8 mm long.
 2. Involucres 8–10 mm in diameter; ray flowers absent; disk flowers 40–60+ **V. walteri**
 2. Involucres 3–7 mm in diameter; ray flowers (1–)2–12+; disk flowers 8–25+.
 3. Involucres 3–5 mm in diameter; ray flowers (1–)2–3(–7), the ligules 3–4(–7+) mm long; disk flowers 8–12(–15) **V. virginica**
 3. Involucres 5–7 mm in diameter; ray flowers (9–)10–12+, the ligules 4–6 mm long; disk flowers 20–25+ **V. microptera**
1. Corollas bright yellow; ray ligules 8–30+ mm long.
 4. Leaves all or mostly opposite (sometimes alternate on uppermost stems); phyllaries 24–30+, oblong to orbiculate or ovate; achenes ca. 7 mm long; pappus of disk flowers 0–0.5 mm long **V. lindheimeri**
 4. Leaves all or mostly alternate (sometimes opposite on lowermost stems); phyllaries 8–21+, spatulate or lance-ovate to lanceolate or linear; achenes 3.5–5+ mm long; pappus of disk flowers 0.5–2 mm long.
 5. Plants annual from a taproot; stem internodes unwinged; leaf blades usually gray-canescens beneath; ligules of ray flowers prominently toothed at the tips, the lobes mostly 2–4 mm long; disk flowers 80–150+ **V. encelioides**
 5. Plants perennial from fibrous or fleshy roots or rhizomes, stem internodes, at least on lower stems, winged (with leaf-like tissue extending from the leaves down along the stem); leaf blades green and not gray-canescens beneath; ligules of ray flowers only slightly toothed or rounded at the tips, the lobes (if any) mostly < 1 mm long; disk flowers 40–80+.
 6. Heads several to numerous, (3–)8–25(–50+) per array; phyllaries 8–12+, spreading or reflexed; ray flowers (2–)6–8; pappus 1.5–2 mm long **V. alternifolia**
 6. Heads few to several, 2–5(–10+) per array; phyllaries 16–21+, erect; ray flowers 8–13+; pappus 0.5–1.5 mm long **V. helianthoides**

Verbesina alternifolia (L.) Britton ex Kearney, (alternate-leaved), WINGSTEM. Rhizomatous perennials, 30–100(–200+) cm tall; lower stem internodes winged; leaves alternate (lower leaves sometimes opposite), sessile, blades lance-elliptic or lanceolate to lance-linear, margins coarsely toothed or nearly entire; heads several to numerous in corymbose or paniculate arrays; ray flowers (2–)6–8+, the ligules 15–25+ mm long, yellow; achenes 4.5–5 mm long; pappus 1.5–2 mm long. Woodlands, along streams; Collin, Dallas, Fannin, and Grayson cos.; e 1/2 North America. Sep.

Verbesina encelioides (Cav.) Benth. & Hook. f. ex A. Gray, (resembling *Encelia*, another genus of Asteraceae), COWPEN DAISY, GOLDEN CROWNBEARD, FEVERWEED, BUTTER DAISY. Annuals, 10–50(–120+) cm tall; stem internodes unwinged; leaves alternate (lower leaves sometimes opposite), petioles usually winged and sometimes auriculate at base, blades deltate-ovate or rhombic to lanceolate, ashy-white to green above, gray-canescens beneath, margins coarsely toothed and lobed to nearly entire; heads solitary or 3+ in loose corymbose arrays, large and conspicuous; ray flowers (8–)12–15+, the ligules 8–10(–20+) mm long, yellow, with prominent terminal teeth; achenes 3.5–5+ mm long; pappus of disk flowers 0.5–1(–2) mm long. Disturbed areas, livestock pens, often in sandy soils; nearly throughout TX; widespread in U.S.; Mexico, West Indies, and South America; introduced and weedy elsewhere. May–Nov. [*V. encelioides* (Cav.) Benth. & Hook. f. ex A. Gray var. *exauriculata* B.L. Rob. & Greenm., *Ximenesia encelioides* Cav.] The foliage has an unpleasant odor if crushed or touched; Native Americans reportedly used the plant in treating skin diseases (Ajilvsgi 1984).

Verbesina helianthoides Michx., (resembling *Helianthus*—sunflower), GRAVELWEED CROWNBEARD. Rhizomatous perennials, 60–120 cm tall; stem internodes winged; leaves alternate (lower leaves sometimes opposite), sessile, blades lance-ovate to lanceolate, margins ± serrate; heads few to several in corymbose arrays, large and conspicuous; ray flowers 8–13+, the ligules 20–25(–30+) mm long, yellow; achenes 5 mm long; pappus of disk flowers 0.5–1.5 mm long. Disturbed areas; moist sandy woods; East TX and Red River drainage, w to nc TX; ec U.S. from OH s to GA and w to KS and TX. May–Jun.

Verbesina lindheimeri B.L. Rob. & Greenm., (for Ferdinand Jacob Lindheimer, 1809–1879, German-born TX collector), LINDHEIMER'S CROWNBEARD. Perennials, 30–70+ cm tall; stem internodes unwinged; leaves opposite, sometimes alternate upward, sessile, blades deltate-ovate or ovate to lance-ovate, margins toothed to entire; heads solitary or few in corymbose arrays, large and conspicuous; ray flowers ca. 13, the ligules 25 mm long, yellow; achenes 7 mm long; pappus 0–0.5 mm long. Juniper-oak woodlands, shaded slopes, on limestone; sw border of East TX from Bell to Comal cos., also apparently Jackson Co.; generally considered endemic to Lampasas Cut Plain and e part of Edwards Plateau. May–Sep(–Nov). *ET*

Verbesina microptera DC., (small-winged), TEXAS CROWNBEARD, MEXICAN CROWNBEARD. Perennials, 50–250 cm tall; stem internodes winged; leaves alternate (lower leaves sometimes opposite), petioles winged, blades deltate-ovate or deltate to lanceolate, margins coarsely toothed to nearly entire; heads numerous in paniculate arrays; ray flowers (9–)10–12+, the ligules 4–6 mm long, white to pale dingy yellow; achenes 4–5 mm long; pappus 1.5–2+ mm long. Disturbed sites, silty-clay soils; sw border of East TX in Wilson Co. (W. Carr 20230 (TEX)) and Goliad Co; s TX Plains and Gulf Prairies; Mexico. Aug–Nov. [*V. texana* Buckley] *ET*

Verbesina virginica L., (of Virginia), FROSTWEED, ICEPLANT, WHITE CROWNBEARD, VIRGINIA CROWNBEARD, RICHWEED, SQUAWWEED, INDIAN-TOBACCO. Perennials, (50–)100–250+ cm tall; lower stem internodes winged; leaves alternate (lower leaves sometimes opposite), petioles winged, blades lance-ovate to lance-linear, margins coarsely toothed to nearly entire; heads numerous in paniculate or corymbose arrays; ray flowers (1–)2–3(–7), the ligules 3–4(–7+) mm long, white to pale dingy yellow; achenes 3.5–5+ mm long; pappus 1.5–3+ mm long. Moist disturbed sites, bottomlands, woodland borders; se and e TX w to West Cross Timbers and Edwards Plateau; e and c U.S. from MD s to FL and w to IA and TX. Aug–Nov. [*V. laciniata* Walter, *V. virginica* var. *laciniata* A. Gray] When exposed to the first freezing temperatures of the year, the stems split and exude a sap that freezes into conspicuous ice formations—hence several of the common names (Ajilvsgi 1984). The roots were used by Native Americans to relieve cramps, chills, and fevers (Burlage 1968).

Verbesina walteri Shinnars, (for Thomas Walter (c. 1740–1789), British-born American botanist and original describer of *Athanasia paniculata*, later moved to *Verbesina*), CAROLINA CROWNBEARD, WALTER'S CROWNBEARD. Perennials, 100–400 cm tall; lower stem internodes winged; leaves alternate (lower leaves sometimes opposite), petioles winged, blades lance-elliptic to lance-linear, margins coarsely toothed to nearly entire; heads several to numerous in paniculate or corymbose arrays; ray flowers absent; disk flowers white to pale dingy yellow; achenes 3–4.5+ mm long; pappus 1–2 mm long, sometimes with shorter scales between the awns. Bottomlands, floodplains, woodland borders; in TX reported only from Jasper and Newton cos. (Singhurst & Holmes 2001); se U.S. from NC s to GA and w to OK and TX. Aug–Sep. [*Athanasia paniculata* Walter]

VERNONIA Schreb. IRONWEED

Ours clump-forming or rhizomatous perennial herbs; leaves evenly distributed along the stem, alternate, simple, often pubescent and gland-dotted beneath, margins toothed; heads many, rather small, in corymbose or paniculate arrays; phyllaries in 4–7 series, unequal, herbaceous but rather stiff or hard, sometimes purple-tinged, strongly imbricated; ray flowers absent; disk corollas purple to lavender-pink, usually more than 12 per head; achenes ± columnar, 8–10-ribbed; pappus of 2 series of numerous scales or bristles, the inner series much longer than the outer.

☛ A genus of ca. 20 species of e and c North America, Mexico, and South America; some species are cultivated as ornamentals and some are used medicinally. Interspecific hybridization is well-known in *Vernonia* (Urbatsch 1972; Jones & Faust 1978; Strother 2006ii). Hybrids tend to be intermediate to the parental species and more difficult to key (Turner 2016); three recognized hybrids of East TX are listed following the species in this treatment. The rich purple corollas make *Vernonia* species a showy component of the late summer–fall flora of East TX. The common name alludes to the strength of the erect stems. (Named for William Vernon, 1666–1711, English botanist who collected in Maryland) (tribe Vernoniaeae)

REFERENCES: Gleason 1922; Faust 1972; Urbatsch 1972; Faust & Jones 1973; King & Jones 1975; Chapman & Jones 1978; Robinson 1999; Strother 2006ii.

1. Phyllaries densely silky-tomentose, appearing white or grayish; leaf blades densely white-woolly beneath; stems densely gray-woolly **V. lindheimeri**
1. Phyllaries glabrous or slightly pubescent, not whitish or grayish; leaf blades glabrous or variously pubescent but not densely white-woolly beneath; stems glabrous to pubescent, but not gray-woolly.
 2. Leaf blades with numerous small but conspicuous pits on the lower surface (best seen with a 10x lens; can appear as black dots under low magnification).
 3. Heads campanulate, 5–7(–8+) mm high and 4–6 mm wide, in congested, corymbose arrays; achenes 3.5–4 mm long; pappus brownish gray or purplish; rare in ne TX (Red River Co.) **V. fasciculata**
 3. Heads obconic to hemispheric, 4.5–6 mm high and 5–7 mm wide, in open scorpioid-paniculate arrays; achenes 2–3 mm long; pappus whitish to straw-colored (rarely purplish); common throughout e and c TX **V. texana**
 2. Leaf blades gland-dotted or not, but without conspicuous pits on the lower surface.
 4. Leaf blades usually scabrellous on the lower surface (with appressed, awl-shaped hairs) and not or only sparsely gland-dotted beneath **V. gigantea**
 4. Leaf blades usually puberulous to tomentose on the lower surface (with erect or curled hairs) and conspicuously gland-dotted beneath.
 5. Heads broadly campanulate to hemispheric, 4–6(–8+) mm high and 4–7+ mm wide; phyllaries often gland-dotted; flowers (15–)20–25(–35+); achenes 2.5–3 mm long; pappus brownish gray or purplish **V. baldwinii**
 5. Heads broadly campanulate to urceloate, (6–)7–10+ mm high and 5–9+ mm wide; phyllaries seldom gland-dotted; flowers 30–55; achenes 3.5–4 mm long; pappus whitish to straw-colored **V. missurica**

Vernonia baldwinii Torr., (for its discoverer, William Baldwin, 1779–1819, botanist and physician of Pennsylvania), BALDWIN'S IRONWEED, WESTERN IRONWEED. Plants 60–100(–150) cm tall; midstem leaves with blades elliptic to lance-ovate or lanceolate, usually 8–15 cm long and 2–4.5 cm wide, gland-dotted and puberulent to tomentose beneath; phyllaries usually puberulent, often gland-dotted at tips; achenes 2.5–3 mm long; pappus brownish gray or purplish, outer scales 0.2–1 mm

long, inner bristles 5–7 mm long. Open woods, low ground, prairies; e and c TX and Panhandle; c U.S. from MN s to LA and w to CO and NM. Jun–Oct. [*V. baldwinii* Torr. subsp. *interior* (Small) Faust, *V. interior* Small] The bitter foliage apparently prevents herbivory by cattle and the plant is thus sometimes common in overgrazed pastures (Ajilvsigi 1984).

Vernonia fasciculata Michx., (bundled or clustered), PRAIRIE IRONWEED. Plants 30–120+ cm tall; midstem leaves with blades ± lanceolate, usually 5–12 cm long and 0.5–1.8 cm wide, gland-dotted and scabrelous beneath; phyllaries nearly glabrous; achenes 3.5–4 mm long; pappus brownish gray or purplish, outer scales or bristles 0.5–3+ mm long, inner bristles or scales 5–7+ mm long. Low prairies, bottomlands, ditches; in TX known only from Red River Co. (M. White s.n. (BAYLU); White 2012); c U.S. from MI s to KY and w to MT, CO, and TX; Canada. Jul–Sep. [*V. fasciculata* Michx. subsp. *corymbosa* S.B. Jones]

Vernonia gigantea (Walter) Trel., (gigantic), TALL IRONWEED, GIANT IRONWEED. Plants 80–200(–300) cm tall; midstem leaves with blades ± lanceolate, 12–25+ cm long and 2–6+ cm wide, scabrelous to nearly glabrous beneath, not or only slightly gland-dotted; phyllaries glabrous or nearly so; achenes 2.5–3.5 mm long; pappus usually purplish, sometimes straw-colored, outer scales 0.5–1 mm long, inner bristles 4.5–6+ mm long. Weedy areas, floodplains, low moist sites; se TX in Hardin Co. (Brown 2010), Harris Co. (TEX), and Montgomery and Polk cos.; e 1/2 U.S.; Canada. Jun–Nov. [*V. altissima* Nutt., *V. gigantea* subsp. *ovalifolia* (Torr. & A. Gray) Urbatsch, *V. ovalifolia* Torr. & A. Gray]

Vernonia lindheimeri A. Gray & Engelm., (for Ferdinand Jacob Lindheimer, 1809–1879, German-born TX collector), WOOLLY IRONWEED, LINDHEIMER'S IRONWEED. Plants 20–50(–80+) cm tall; stems densely gray-woolly; midstem leaves with blades linear, 5–8 cm long and 2–4 cm wide, densely white-woolly beneath; phyllaries silky-tomentose, appearing white or gray; achenes 3–4 mm long; pappus straw-colored to purplish, outer scales 0.6–1.1 mm long, inner bristles 6–7+ mm long. Limestone outcrops, calcareous prairies, creekbeds; w border of East TX from Dallas Co. s to Bexar Co.; c TX and Edwards Plateau; AR; Mexico. Jun–Sep.

Vernonia missurica Raf., (of Missouri), MISSOURI IRONWEED. Plants 60–120(–200+) cm tall; midstem leaves with blades elliptic to lance-ovate or lanceolate, usually 6–16 cm long and 1.8–4.8 cm wide, usually puberulent to tomentose beneath, rarely glabrate, gland-dotted; phyllaries nearly glabrous; achenes 3.5–4 mm long; pappus straw-colored to whitish, outer scales 0.5–1.1 mm long, inner bristles 6–8+ mm long. Bogs in open woods, sandy prairies, marsh edges; e 1/4 TX; ec U.S. from MI s to FL and w to NE and TX. Jul–Oct.

Vernonia texana (A. Gray) Small, (of Texas), TEXAS IRONWEED. Plants 40–80(–100+) cm tall; midstem leaves with blades lance-ovate to lanceolate, usually 5–12+ cm long and 1.2–2.5+ cm wide, glabrous or nearly so beneath and gland-pitted; phyllaries nearly glabrous; achenes 2–3 mm long; pappus straw-colored to whitish (rarely purplish), outer scales or bristles 0.3–1+ mm long, inner bristles or scales 6–7+ mm long. Sandy woods, pine savannas, prairies; widespread from East TX to sc TX; AR, LA, MS, and OK. Jun–Sep. [*V. angustifolia* Michx. var. *texana* A. Gray]

Three formally-recognized hybrids are known from East TX, and tend to be intermediate to the parent species:

Vernonia × *guadalupensis* A. Heller [*baldwinii* × *lindheimeri*], (for the Guadalupe River area of the Edwards Plateau). This hybrid is known from several counties on the w border of East TX, from Bell Co. (Hansen 2010) and Williamson and Travis cos., to Hays Co. (TEX); c TX and Edwards Plateau.

Vernonia × *illinoensis* Gleason [*gigantea* × *missurica*], (of Illinois). In TX, this hybrid is known only from Jefferson Co.; ec U.S. from MI s to FL and w to OK and TX.

Vernonia × *vulturina* Shinners [*baldwinii* × *marginata*], (for Buzzards Spring in Dallas, TX). This hybrid is known only from an apparently large plant collected by Reverchon ca. 1880 at Buzzards Spring, in the White Rock Creek drainage, Dallas (since filled and now a residential area); Shinners (1950b) noted the population was likely extirpated.

Vernonia lettermannii Engelm. ex A. Gray, (for George Washington Letterman (1840–1913), amateur botanist of the c U.S. and collector of one of the type specimens), which would have keyed to *V. fasciculata* or *V. texana* here, can be distinguished by the filiform leaves, narrowly campanulate heads that are 7–9(–10+) mm high and 4–5 mm wide, and flowers numbering 10–12+ (as opposed to 12–25+ in *V. fasciculata* and *V. texana*). To be expected in ne TX based on records from adjacent counties in OK (Bryan and McCurtain cos. (OKL)); AR. Jul–Aug.

Vernonia × *peralta* Daniels [*baldwinii* × *missurica*], (highest or tallest). This hybrid may be expected in East TX based on a record from adjacent Vernon Par., LA.; c U.S. from IA s to LA and w to OK (Kartesz 2015).

VIGUIERA Kunth GOLDEN-EYE

☛A genus of ca. 150 species native to warm and tropical areas of the Americas; a few are cultivated as ornamentals. (Named for L.G.A. Viguier, 1790–1867, French physician and botanist) (tribe Heliantheae)

REFERENCES: Blake 1918; Robinson 1977; Schilling 2006b.

Viguiera dentata (Cav.) Spreng., (toothed), SUNFLOWER GOLDEN-EYE. Herbaceous perennial 0.5–1.5 m tall; leaves opposite below, alternate above, petiolate; leaf blades ovate or rhombic-ovate to lanceolate, cuneate to truncate, margins serrate; phyllaries in 3–4 series, imbricated, ovate and indurate basally, with herbaceous linear tips; ray flowers 10–13, pistillate, infertile, the ligules yellow, 7–15 mm long, 3–7.5 mm wide; disk flowers perfect, fertile, the corollas yellow; achenes black or mottled, appressed-pubescent, 3.5–3.8 mm long; pappus awns 2, 2.2–2.8 mm long, squamellae (additional small pappus scales) 2–4, squarish, fimbriate. Dry calcareous soils, roadsides; w and sw edge of East TX from Hill Co. s to Bexar, Fayette, and Washington cos.; Edwards Plateau to Trans-Pecos; NM and AZ; Mexico. Oct–Nov. [*Helianthus dentatus* Cav.]

WEDELIA Jacq.

☛A genus of ca. 100 species of tropical and warm areas of the world; 4 species are found in the U.S.; a number of taxa have sometimes been treated in *Zexmenia*. (Named for Georg Wolfgang Wedel, 1645–1721, professor of botany at Jena, Germany) (tribe Heliantheae)

REFERENCES: Turner 1988d, 1992; Strother 1991, 2006jj.

Wedelia acapulcensis Kunth var. **hispidula** (Kunth) Strother, (sp.: of Acapulco; var.: with stiff hairs) ORANGE ZEXMENIA, HAIRY WEDELIA, ORANGE DAISY. Small shrub 0.5–1.5 m tall; herbage strigose-hispid; leaves opposite, sessile; leaf blades narrowly ovate, usually 5 cm or more long, cuneate basally, coarsely toothed to slightly lobed; heads long-peduncled, solitary or in a cyme of 3; phyllaries in 2–3 series; ray flowers pistillate, fertile, the ligules conspicuously yellow-orange; disk flowers perfect, fertile, the corollas similar in color to ligules of ray flowers; achenes 2- or 3-angled, usually winged; pappus of (0–)1–3 awns, 4.5–6 mm long, subtended by a crown of minute hyaline scales. Calcareous soils, rocky slopes; sw edge of East TX from Travis Co. s to Bexar and DeWitt cos.; sw part of nc TX s through Edwards Plateau to s TX. Apr–Nov. [*W. hispidula* Kunth, *W. texana* (A. Gray) B.L. Turner, *Zexmenia hispidula* (Kunth) A. Gray] This species is gaining popularity in TX as a long-blooming, drought-tolerant ornamental.

XANTHISMA DC. SLEEPY DAISY

☛A genus of 17 species native to w North America and Mexico; some were previously included in the genera *Haplopappus*, *Machaeranthera*, or *Sideranthus*. The common name refers to the late morning expansion of the ray flowers. (Greek: *xanthos*, yellow, and *ismos*, condition or quality, referring to the bright yellow corollas) (tribe Astereae)

REFERENCES: Semple 1974; Hartman 2006.

Xanthisma texanum DC., (of Texas), TEXAS SLEEPY DAISY. Annuals (or rarely biennials), 10–75 cm tall; stems mostly glabrous; leaves alternate, sessile or subsessile, basal leaves pinnatifid to coarsely serrate, rarely persisting, stem leaves reduced, blades lanceolate to spatulate, glabrous, margins entire to toothed or ciliate; heads mostly solitary and terminal on main stem and branches; receptacles naked; involucre 11–20 mm wide; phyllaries in 3–4 series, basally narrowed and stalk-like, expanded above, glabrous, margins often ciliate; ray flowers pistillate, fertile, ligules yellow, expanded from late morning to late afternoon, becoming erect and with tips nearly touching during the night; disk flowers perfect, fertile, corollas yellow; achenes 1.6–1.8 mm long, the ray achenes ± 3-sided, the disk achenes compressed; pappus of many basally-flattened bristles, 5–6.5 mm long. May–Jul. Burlage (1968) reported the plant to contain a saponin and to be poisonous. *X*

1. Phyllaries abruptly expanded above stalk-like base, mostly ovate, the portion above the widest part longer than wide; relatively widespread in TX..... var. **drummondii**
1. Phyllaries somewhat expanded above stalk-like base, mostly orbiculate to elliptic, the portion above the widest part shorter than wide; restricted to s TX.
 2. Phyllary tips cuspidate, flared near tip.....var. **orientale**
 2. Phyllary tips rounded, with little or no flare near tipvar. **texanum**

var. **drummondii** (Torr. & A. Gray) A. Gray, (for Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S SLEEPY-DAISY. Calcareous soils, prairies, pastures, roadsides; se to c TX; nc TX and Panhandle; OK and NM; apparently introduced in AZ. [*X. texanum* DC. subsp. *drummondii* (Torr. & A. Gray) Semple]

var. **orientale** Semple, (eastern). Sandy prairies, open woods, disturbed sites; Goliad Co. and Wilson Co. (TEX-LL); s TX and s Gulf Coast; probably Mexico.

var. **texanum**. Carrizo Formation, deep sands, pastures, roadsides; Bexar Co. and Wilson Co. (TEX-LL); s TX. [*X. texanum* DC. subsp. *texanum*] *ET*

XANTHIUM L. COCKLEBUR, BURWEED

Coarse, monoecious annuals with taproots; leaves alternate; heads small, axillary, nearly sessile, unisexual; ray flowers absent; staminate heads with 1–3 series of separate phyllaries; disk flower corollas minute, whitish; anthers 5, separate; pistillate heads with 6–12+ series of phyllaries united into a spiny bur or “fruit” with hooked prickles; bur completely enclosing 2 flowers that lack corollas; achenes 2 per bur; pappus absent.

☛A cosmopolitan (now) genus of ca. 3 species with conspicuous, accrescent involucre covered with hooked prickles effecting dispersal by mammals. According to the VELCRO® Industries website (www.velcro.com), in the early 1940s, a Swiss inventor, George de Mestral, after a walk noticed “cockleburrs” [presumably *Xanthium*] on his dog and his pants. He examined the hooked prickles under a microscope and derived the idea for the well-known two-sided fastener—one side with stiff, cocklebur-like “hooks” and the other side with soft “loops” like the cloth of his pants. The word velcro comes from the French words *velours*, velvet, and *croché*, hooked. (Greek name of some plant used to dye the hair, from *xanthos*, yellow) (tribe Heliantheae)

REFERENCES: Millsbaugh & Sherff 1919; Rydberg 1922; Löve & Dansereau 1959; Karis 1995; Strother 2006kk.

1. Nodes with a conspicuous, 1–3-pronged, yellowish spine; bur ca. 1 cm long (including prickles); leaf blades tapering or wedge-shaped at base, silvery-pubescent beneath; rare in East TX.....**X. spinosum**
1. Nodes without spines (the only spiny or prickly part of the plant is the bur or “fruit”); bur usually (1–)2–3 cm long (including prickles); leaf blades truncate or cordate at base, green and scabrous beneath; widespread in East TX.....**X. strumarium**

Xanthium spinosum L., (spiny), SPINY COCKLEBUR, CLOTBUR. Stems 0.3–1(+) m tall; nodes with spines; leaf blades to 12 cm long, entire or with a few teeth or lobes, slightly pubescent or glabrate on upper surface, densely silvery-pubescent on lower surface, tapering to a short petiole; bur 1–1.2 cm long, finely pubescent, with numerous, hooked prickles ca. 2 mm long. Disturbed areas, seasonally wet waste places; rare in East TX, with the only record from Orange Co. (Turner et al. 2003); mainly Edwards Plateau and Trans-Pecos; scattered throughout North America; Central and South America; introduced elsewhere. Jul–Oct. [*X. ambrosioides* Hook. & Arn.] Region of origin unclear, probably the Americas. The plant can cause mechanical injuries; ingestion by pigs can result in toxic symptoms including prostration and convulsions (Burlage 1968). *X* *1*

Xanthium strumarium L., (of swellings or tumors), COCKLEBUR, COMMON COCKLEBUR, ABROJO. Stems 0.4–2 m tall; nodes lacking spines; leaf blades to 15 cm long, ovate to deltoid, suborbicular, or reniform, serrate or with shallow lobes, scabrous; bur (1–)2–3+ cm long, ca. 1.5 cm in diam., terminated by 2 prominent spines, covered with stiff, hooked prickles ca. 5 mm long; bur and bases of spines densely pubescent. Disturbed moist areas or sandy soils; throughout TX; scattered throughout North America; Central and South America; introduced elsewhere. Fruiting Jul–Nov. [*X. italicum* Moretti, *X. strumarium* L. var. *canadense* (Mill.) Torr. & A. Gray] Region of origin unclear, probably the Americas. Recognition of a dozen or more taxa (treated as species, subspecies, varieties, and/or forms) has been proposed for plants treated together here as *Xanthium strumarium* (Strother 2006kk). Poisonous and potentially fatal to pigs and other livestock; the poisonous principle is hydroquinone or a diterpenoid glycoside and occurs in the seeds and seedlings (Sperry et al. 1955; Kingsbury 1964, 1965; Stephens 1980; Hardin & Brownie 1993). The burs can cause mechanical injury when eaten by livestock and are sometimes referred to as “porcupine eggs” (Barkley 1986). *X*

YOUNGIA Cass.

☛An Asian genus of ca. 30 species. (Named for “*deux Anglais célèbres, l’un comme poète, l’autre comme physicien*,” both named Young; the poet may have been Edward Young (also dramatist), 1683–1765; the physician may have been Thomas Young (also physicist and Egyptologist), 1773–1829 (Spurr 2006)). (tribe Cichorieae)

REFERENCES: Babcock & Stebbins 1939; Vuilleumier 1973; Spurr 2006.

Youngia japonica (L.) DC., (of Japan), JAPANESE-HAWKWEED. Annual herb from taproot; sap milky; stems 20–50 cm tall; basal leaves pinnatifid, crowded; stem leaves alternate, few and reduced; heads numerous, small, 6–7 mm long including

pappus, in corymbose panicles; involucre 3.5–5.7 mm high, glabrous; phyllaries usually 8, linear-lanceolate, subequal, subtended by a series of small phyllary-like bracts; flowers all ligulate, ligules yellow or yellow-orange, sometimes purplish beneath; achenes 1.5–2.5 mm long, fusiform, ribbed; pappus of numerous hair-like bristles 2.5–3.5 mm long, slightly surpassing phyllaries. Flowerbeds, gardens, weedy metropolitan areas; Dallas and Travis cos.; Brazos Co. se to Harris and Jefferson cos. (see recent county records for Liberty and Montgomery cos. in Brown et al. (2009) and Brown (2014)); scattered across the ne and se U.S. from NY s to FL and w to TX; also CA; introduced elsewhere. All seasons, but mostly Oct–Nov. Native of Asia; a widespread subtropical weed. *I*

ZINNIA L.

•A genus of ca. 17 species from the sw U.S. to Argentina, especially Mexico; herbs and low shrubs with opposite or whorled leaves and alkaloids; some are cultivated as ornamentals. (For Johann Gottfried Zinn, 1727–1759, German professor of botany at Göttingen known for his botanical work in Mexico) (tribe Heliantheae)

REFERENCES: Torres 1963; Smith 2006b.

Zinnia violacea Cav., (elegant), ELEGANT ZINNIA, GARDEN ZINNIA, YOUTH-AND-OLD-AGE. Annual herb ca. 1 m tall; stems unbranched or sparingly branched; leaves opposite, ovate to oblong, 6–10 cm long, 2–6 cm wide, scabrelous to glabrate; heads terminating stems on peduncles 8+ cm long; involucre 10–15 mm high; phyllaries obovate; ray flowers 8–21 (more in “double” cultivars), pistillate, fertile; ligules to 35 mm long, spatulate to obovate, usually red (or white, yellow, or pink-purple in cultivars); disk flowers perfect, fertile, the corollas yellow; pales red to purple; achenes 6–10 mm long, ray achenes 3-angled, disk achenes compressed; pappus absent. Disturbed sites; rare in TX; recorded in Walker Co. (Keith 2004a) and Harris Co. (Kartesz 2015); scattered across the se U.S. and CA; Mexico, Central and South America, and West Indies; introduced elsewhere. Summer–fall. [*Z. elegans* Jacq.] Native of Mexico. Originally cultivated by the Aztecs, now the most widely cultivated *Zinnia*; escaping and naturalized in humid subtropical regions around the world. In TX, occurring as an occasional escape or waif and probably not persisting in the flora. *I*

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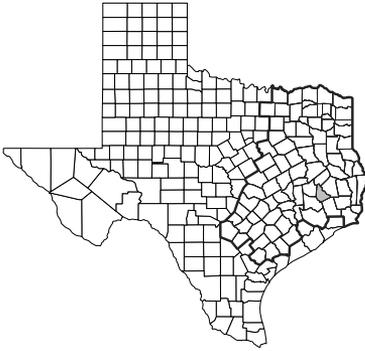
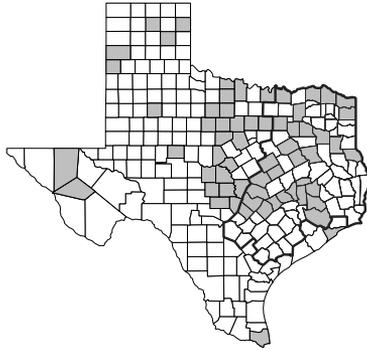
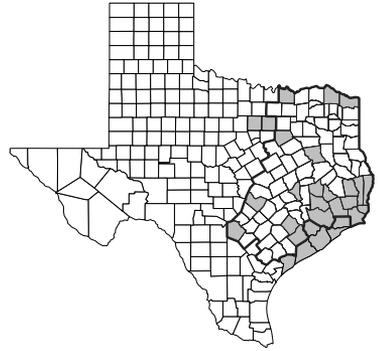
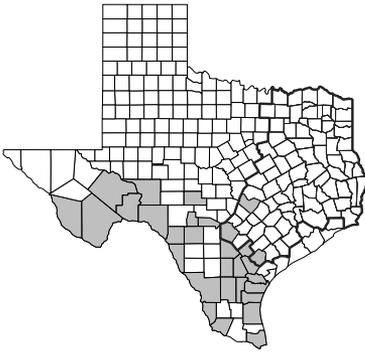
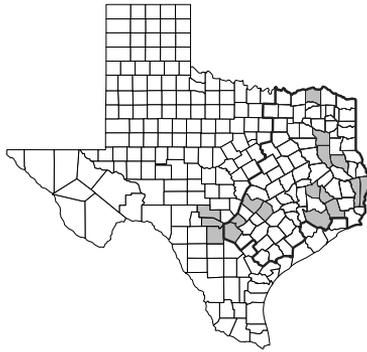
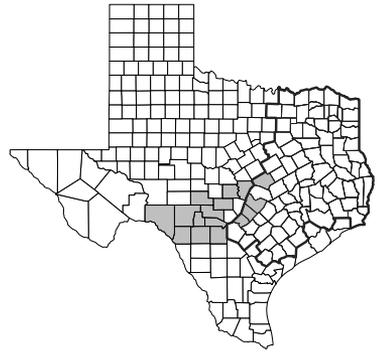
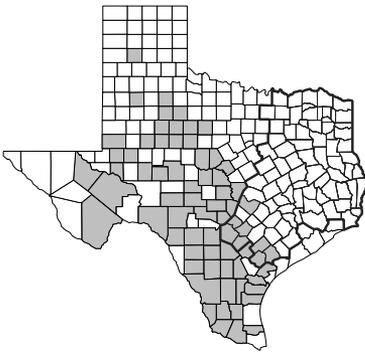
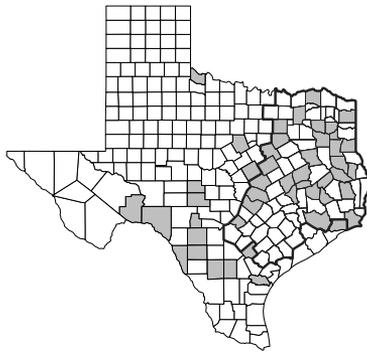
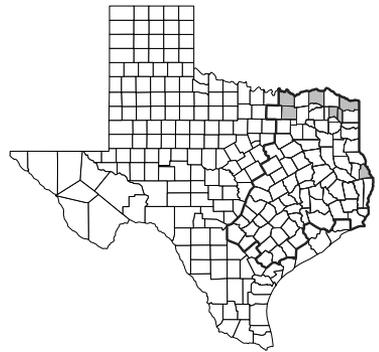
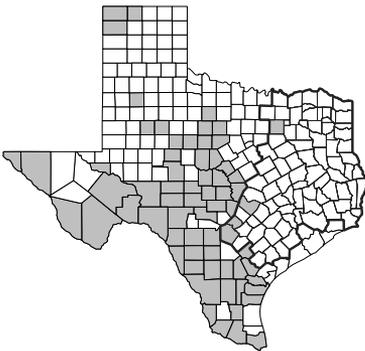
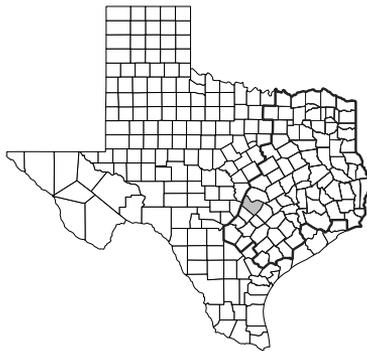
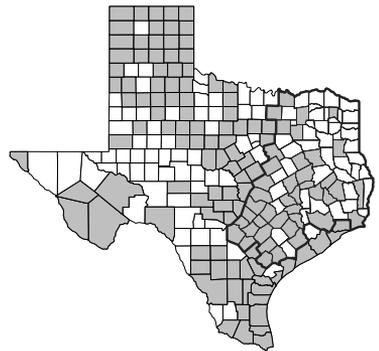
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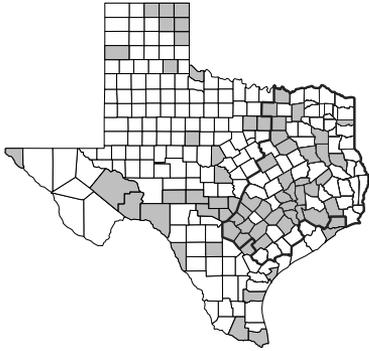
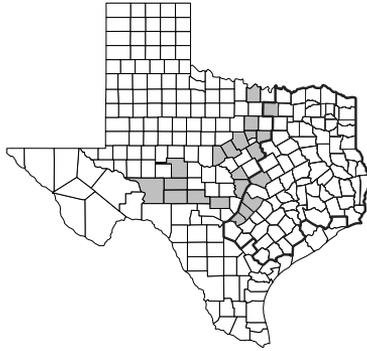
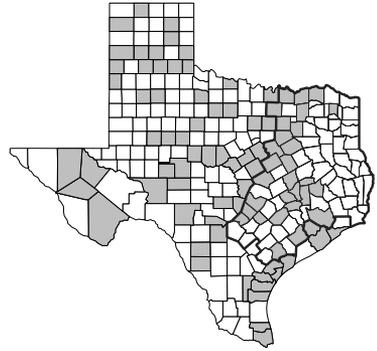
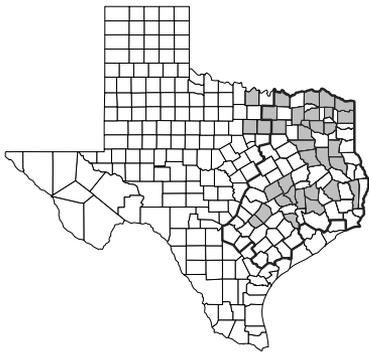
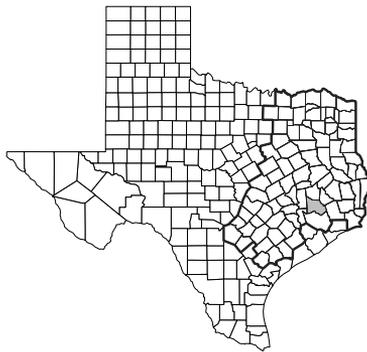
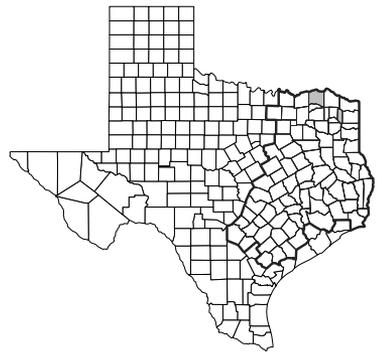
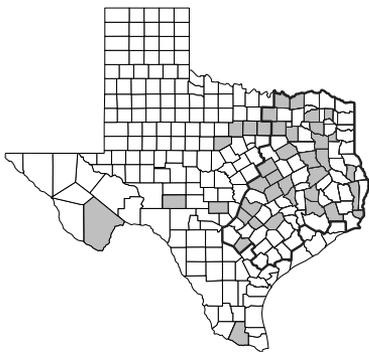
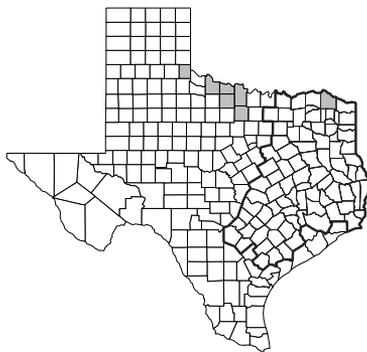
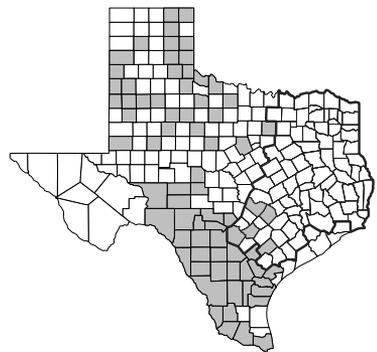
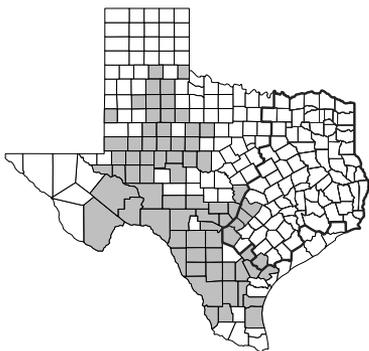
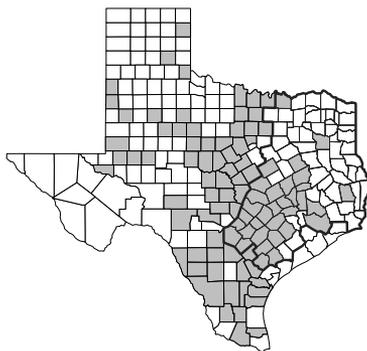
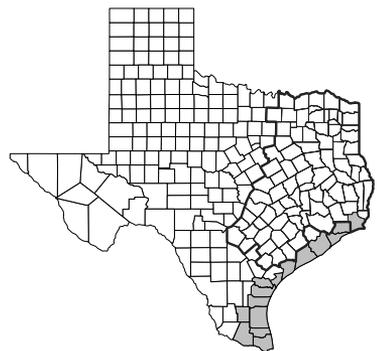
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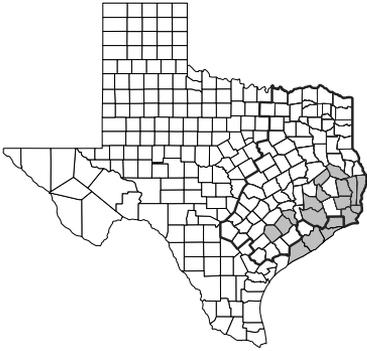
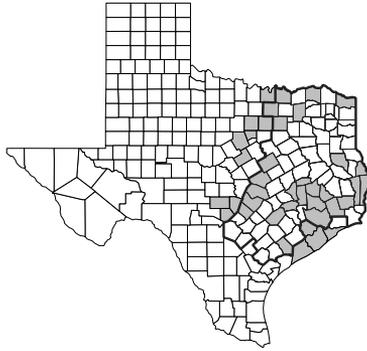
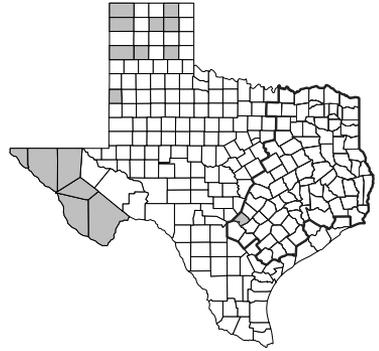
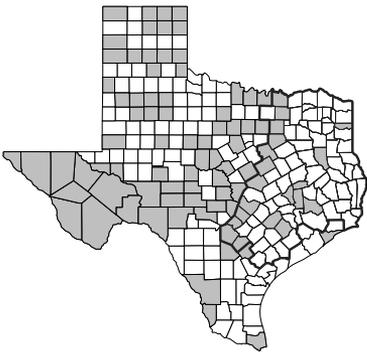
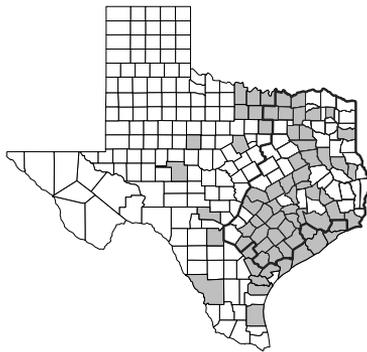
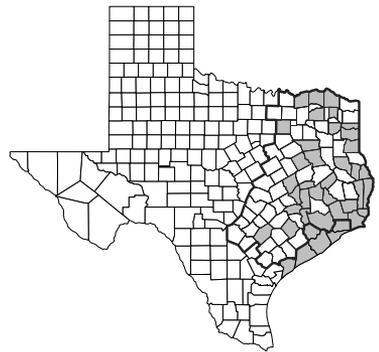
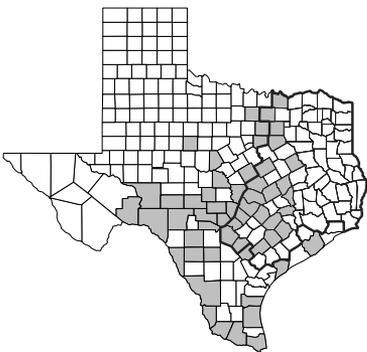
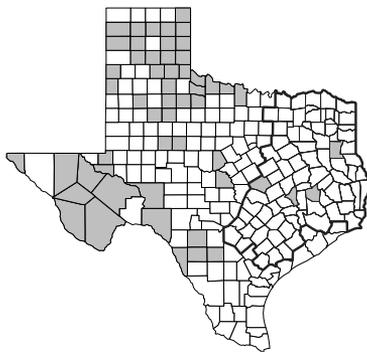
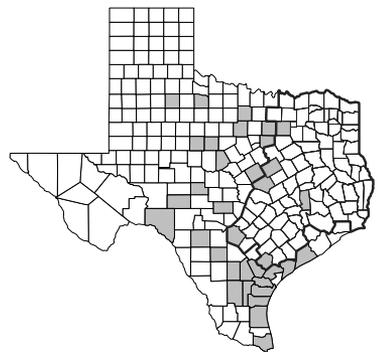
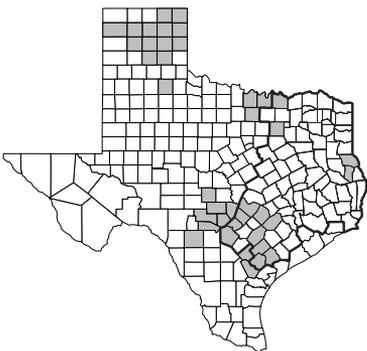
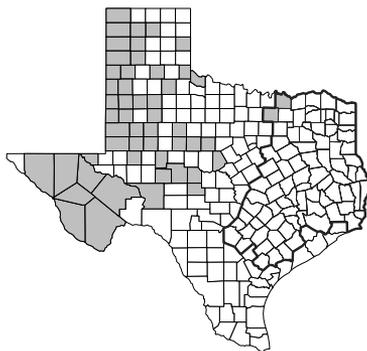
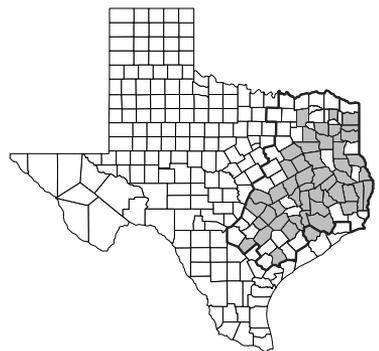
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*Acanthospermum australe**Achillea millefolium**Acmella repens**Acourtia runcinata**Ageratina altissima* var. *altissima**Ageratina havanensis**Amblyolepis setigera**Ambrosia artemisiifolia**Ambrosia bidentata**Ambrosia confertiflora**Ambrosia monogyra**Ambrosia psilostachya*

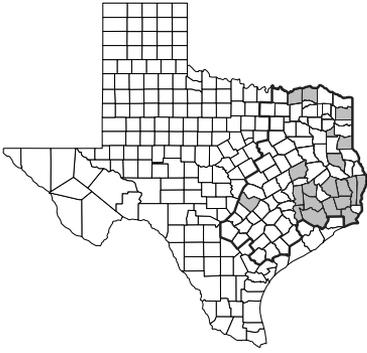
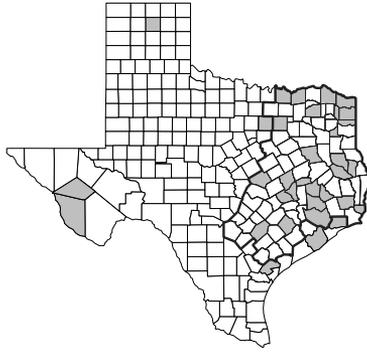
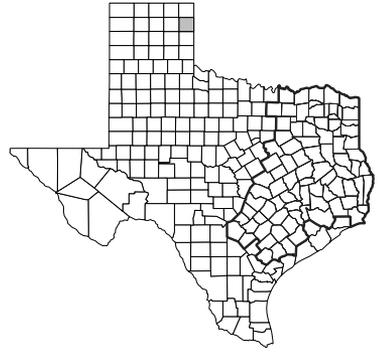
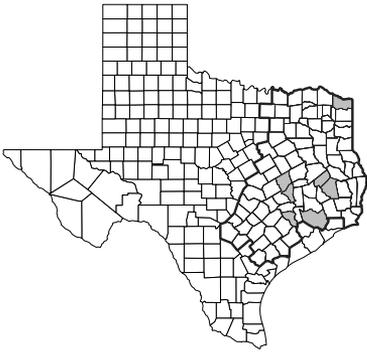
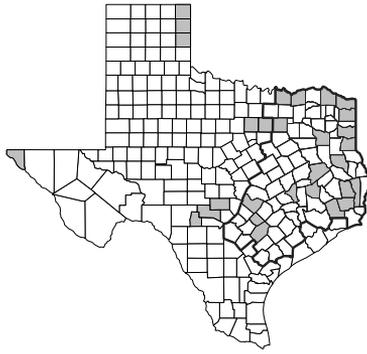
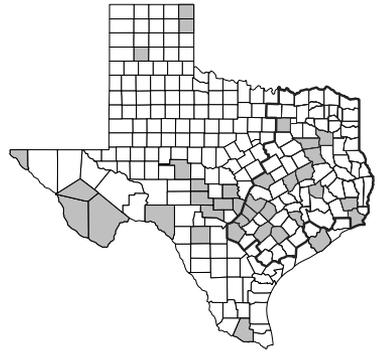
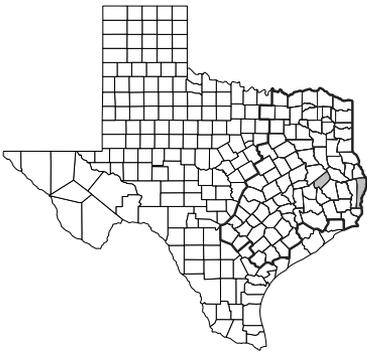
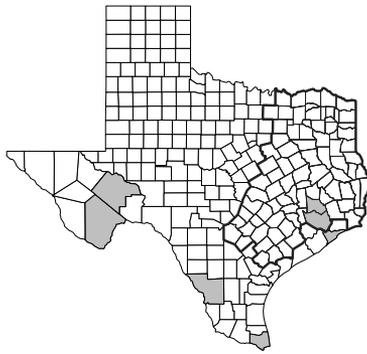
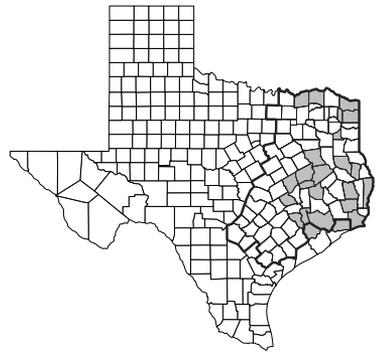
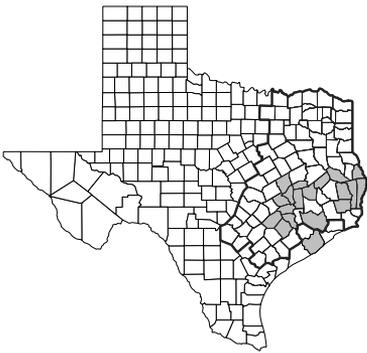
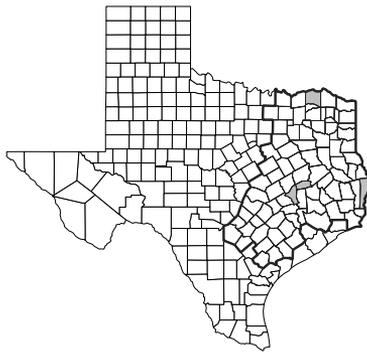
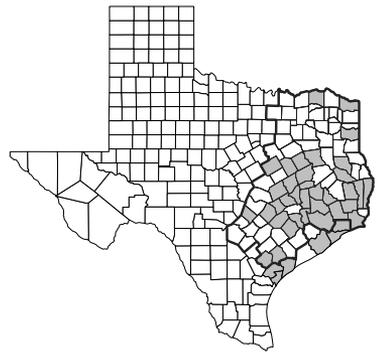
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*Ambrosia trifida**Amphiachyris amoena**Amphiachyris dracunculoides**Antennaria parlinii* subsp. *fallax**Antennaria parlinii* subsp. *parlinii**Antennaria plantaginifolia**Anthemis cotula**Aphanostephus pilosus**Aphanostephus ramosissimus*
var. *ramosissimus**Aphanostephus riddellii**Aphanostephus skirrhobasis*
var. *skirrhobasis**Aphanostephus skirrhobasis* var. *thalassius*

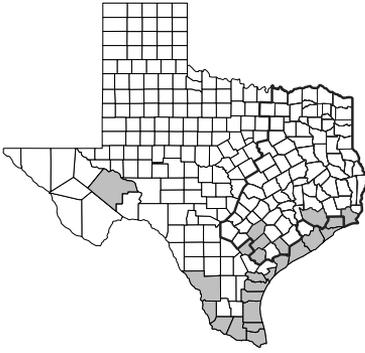
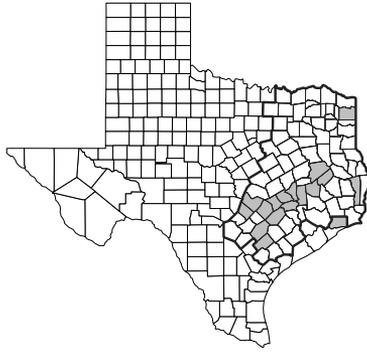
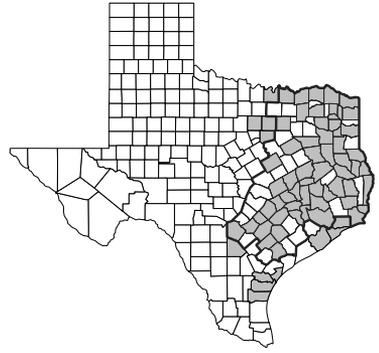
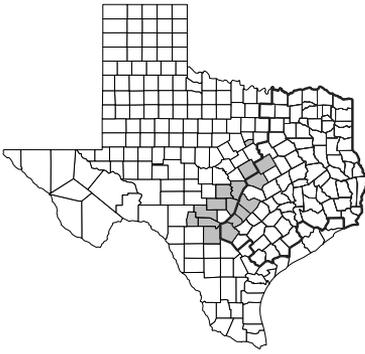
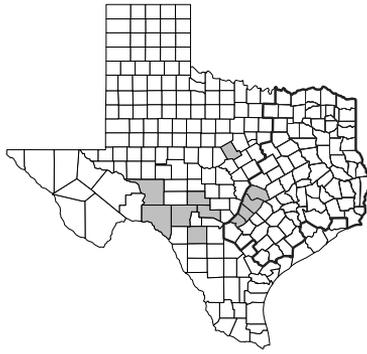
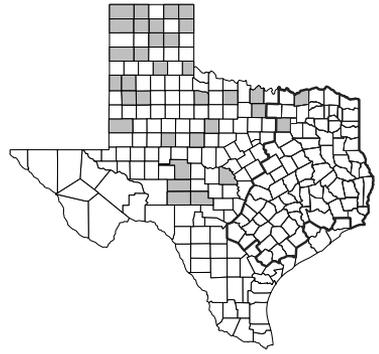
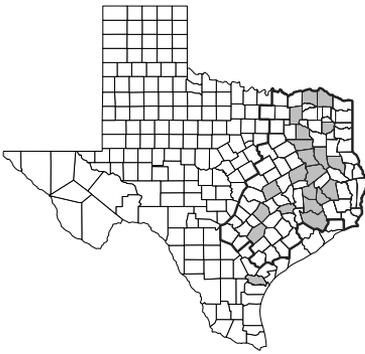
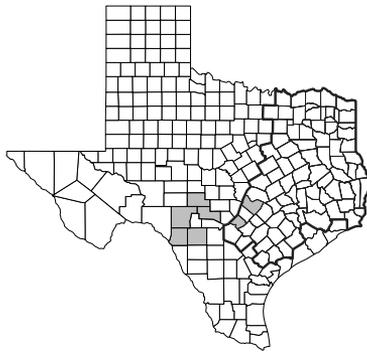
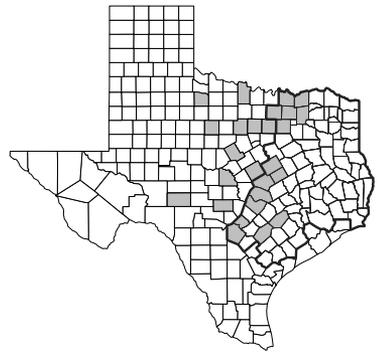
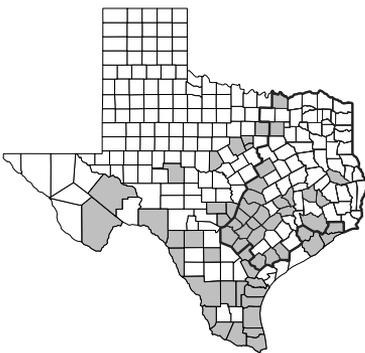
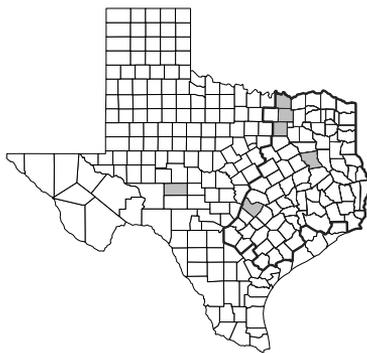
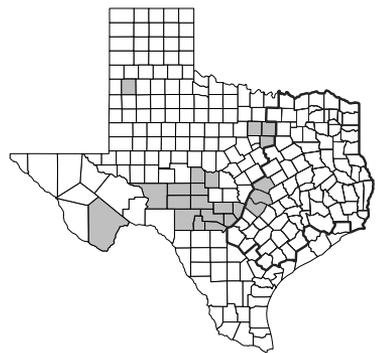
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*Arnoglossum ovatum**Arnoglossum plantagineum**Artemisia dracunculus**Artemisia ludoviciana**Astrarthium ciliatum**Baccharis halimifolia**Baccharis neglecta**Baccharis salicina**Baccharis texana**Berlandiera betonicifolia**Berlandiera lyrata**Berlandiera pumila*

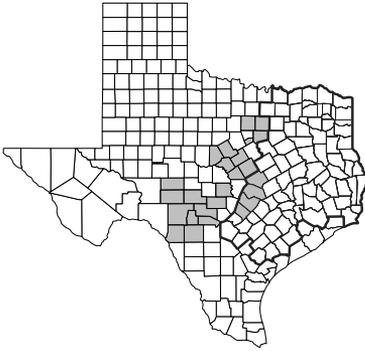
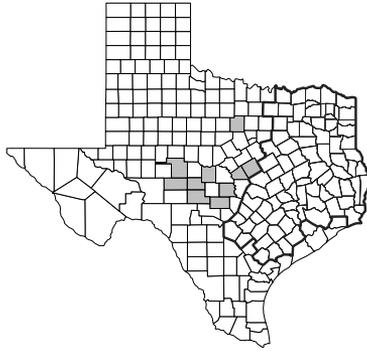
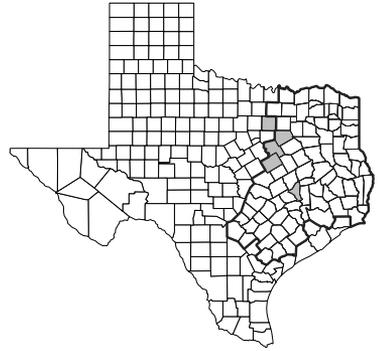
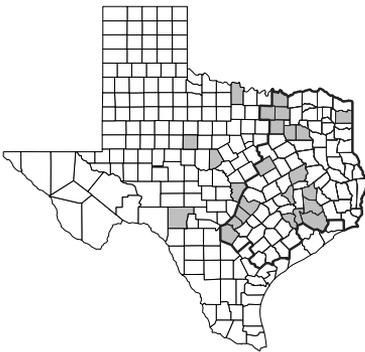
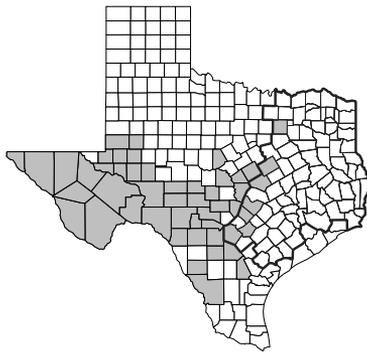
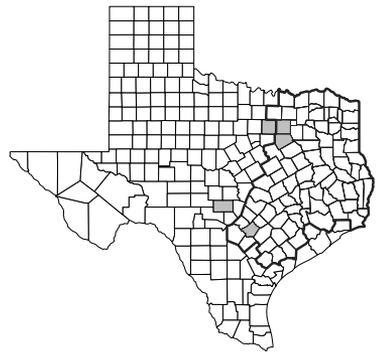
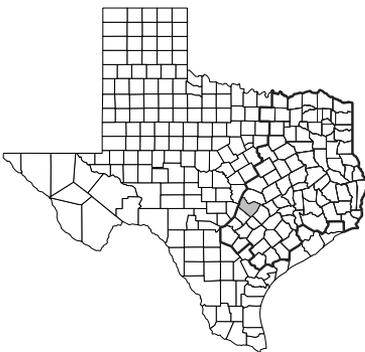
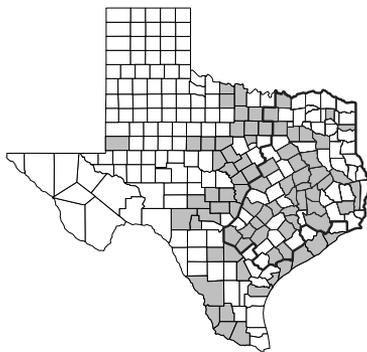
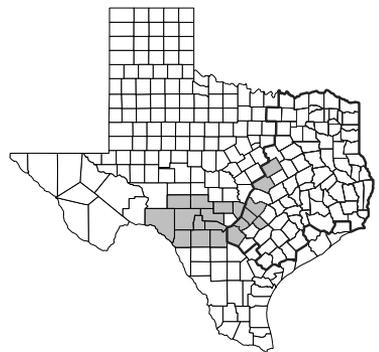
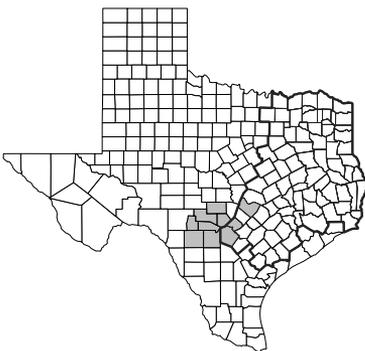
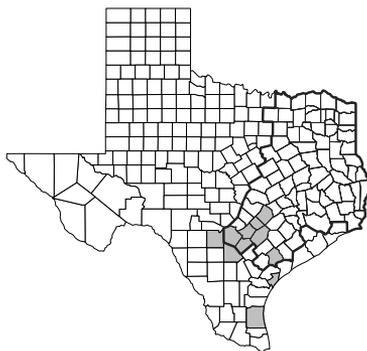
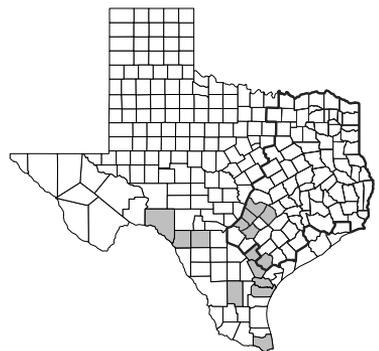
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*Bidens aristosa**Bidens bipinnata**Bidens cernua**Bidens discoidea**Bidens frondosa**Bidens laevis**Bidens mitis**Bidens pilosa**Bidens polylepis**Bigelovia nuttallii**Boltonia asteroides**Boltonia diffusa* var. *diffusa*

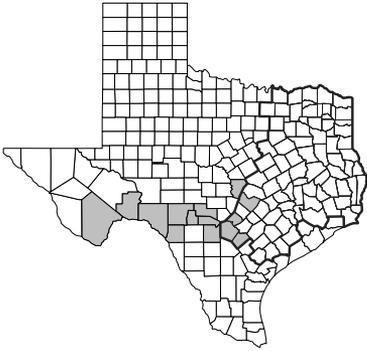
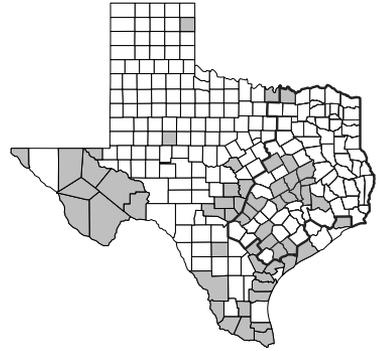
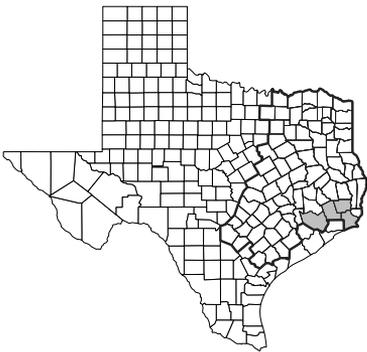
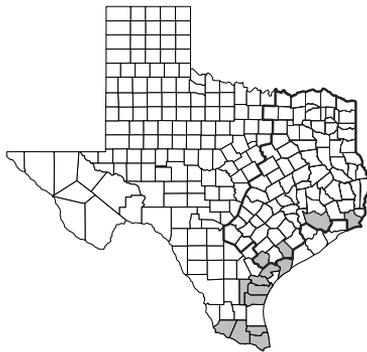
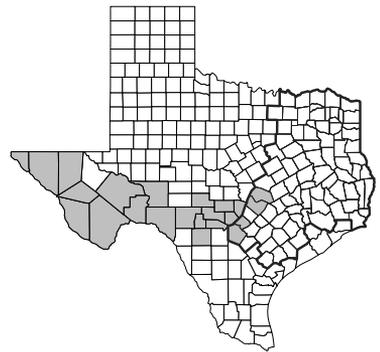
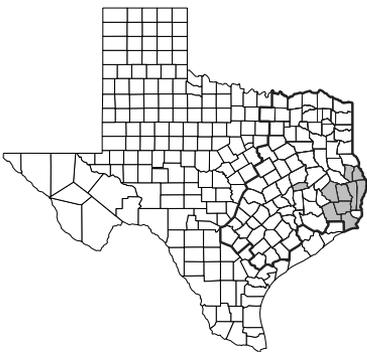
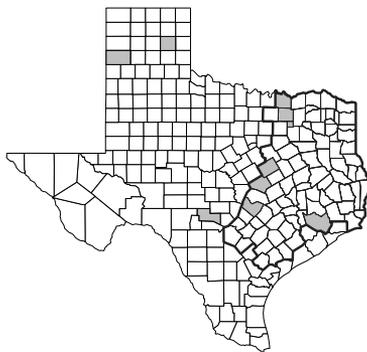
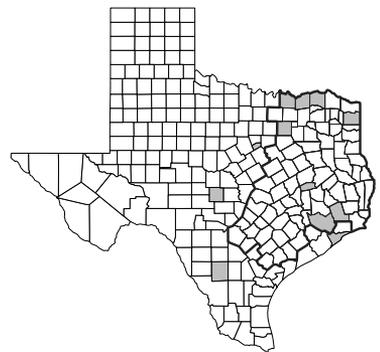
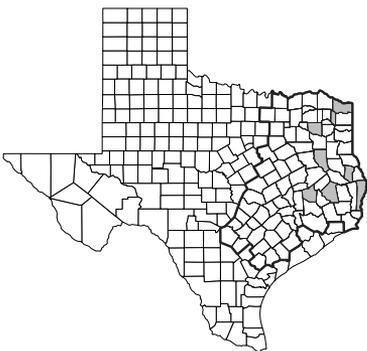
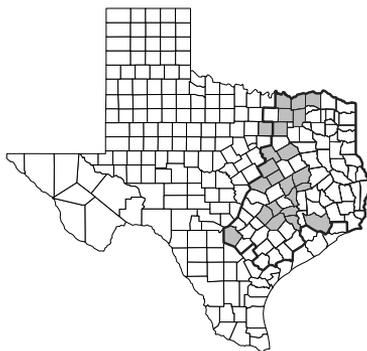
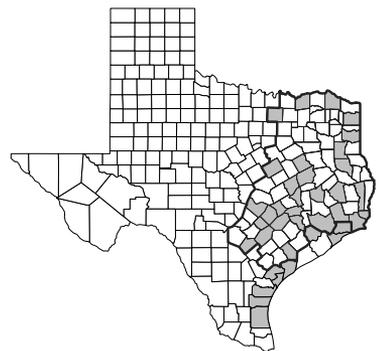
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*Borrichia frutescens**Bradburia hirtella**Bradburia pilosa**Brickellia cylindracea**Brickellia dentata**Brickellia eupatorioides* var. *corymbulosa**Brickellia eupatorioides* var. *eupatorioides**Brickellia eupatorioides* var. *gracillima**Brickellia eupatorioides* var. *texana**Calyptocarpus vialis**Carduus acanthoides**Carduus nutans*

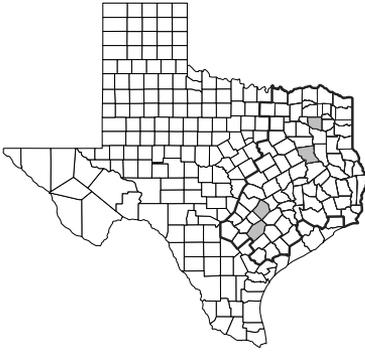
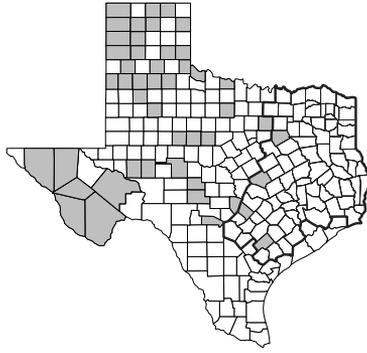
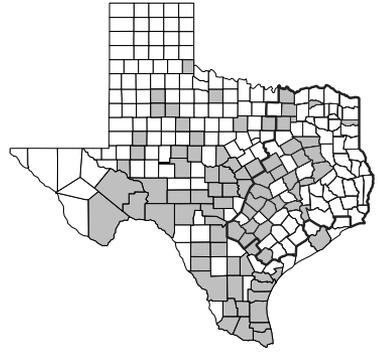
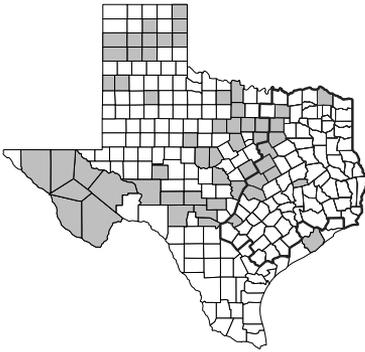
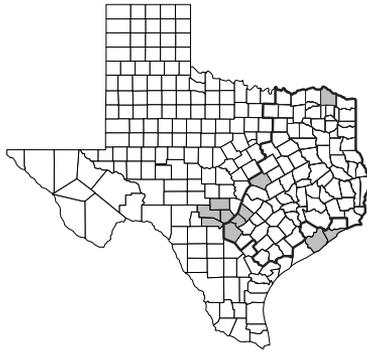
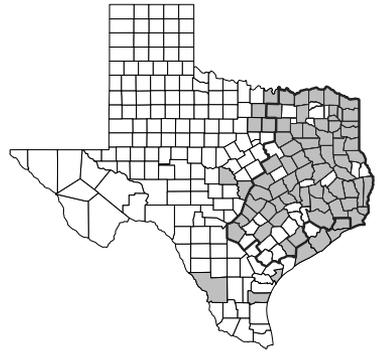
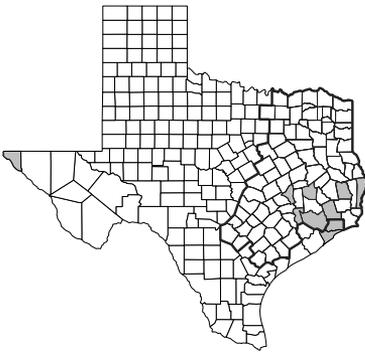
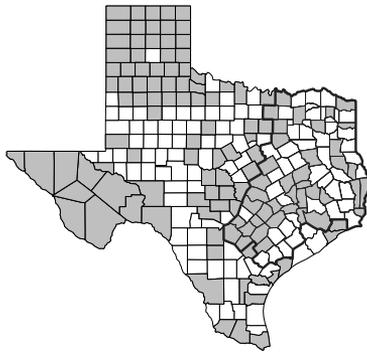
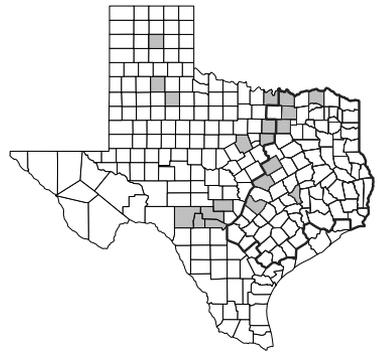
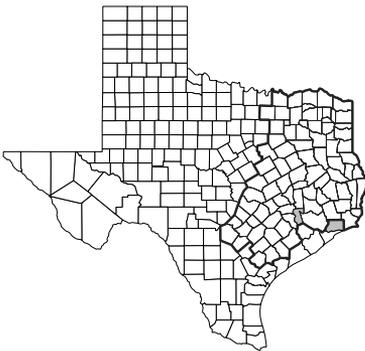
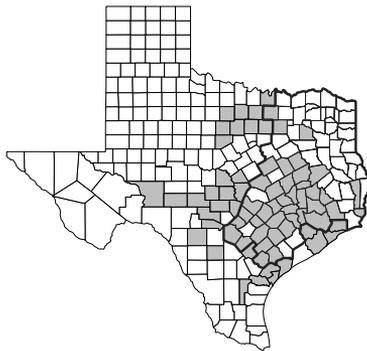
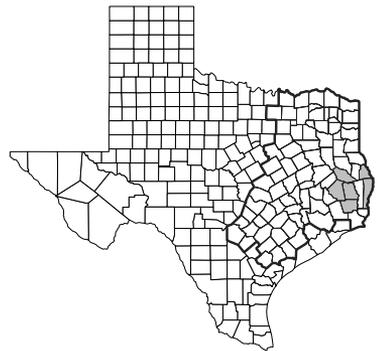
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*Carduus pycnocephalus**Carthamus lanatus**Carthamus tinctorius**Centaurea cyanus**Centaurea melitensis**Centaurea solstitialis**Centaurea stoebe* subsp. *micranthos**Chaetopappa asteroides**Chaetopappa bellidifolia**Chaetopappa effusa**Chaetopappa imberbis**Chaptalia carduacea*

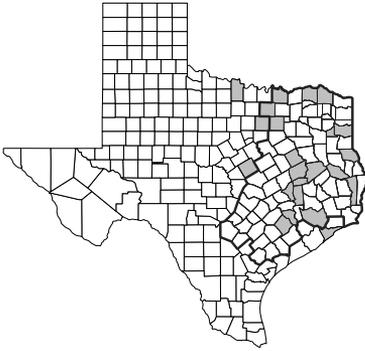
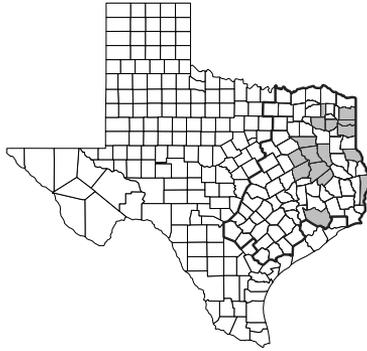
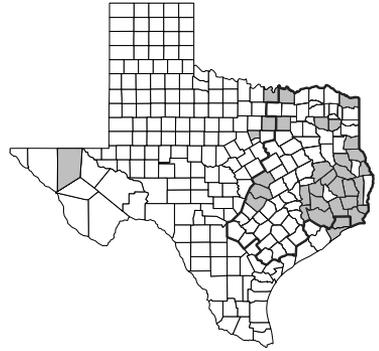
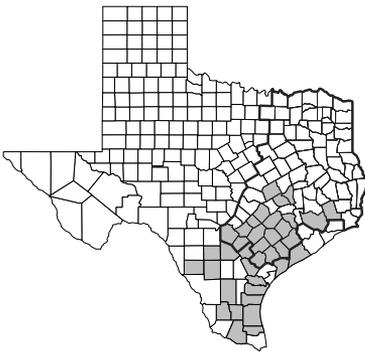
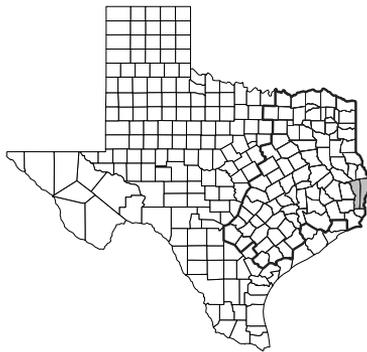
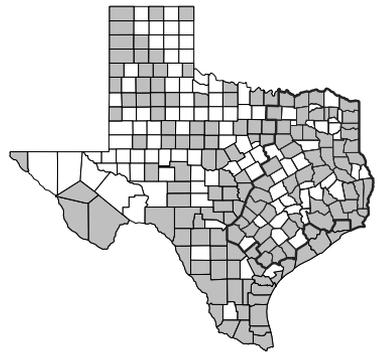
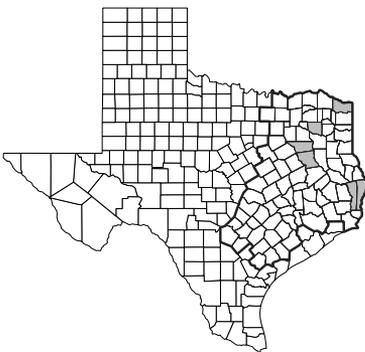
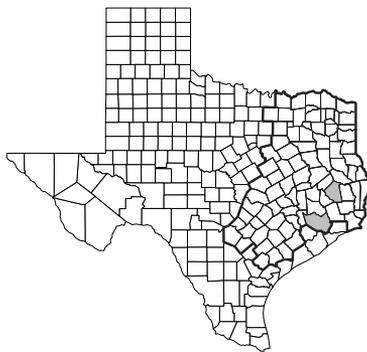
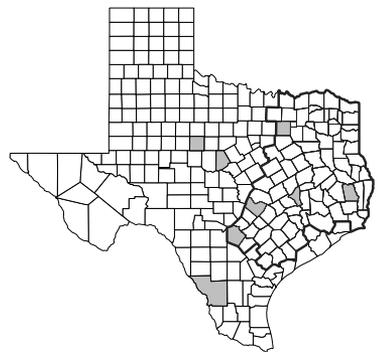
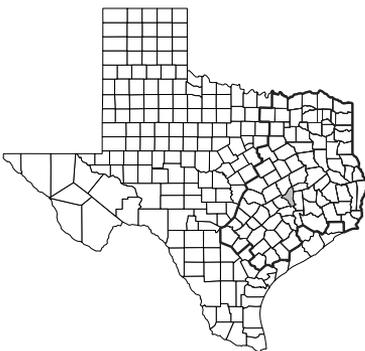
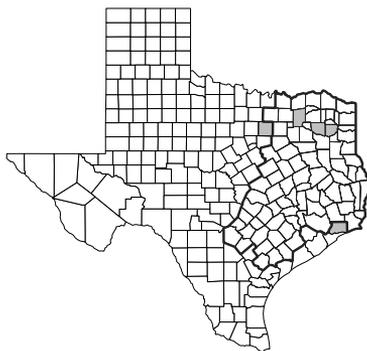
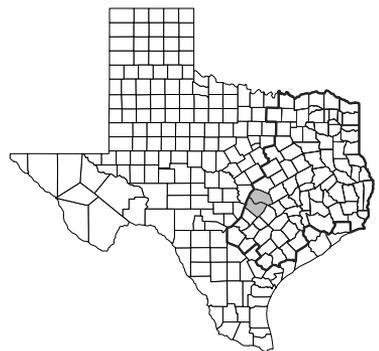
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*Chaptalia texana**Chaptalia tomentosa**Chloracantha spinosa* var. *spinosa**Chromolaena ivifolia**Chromolaena odorata**Chrysactinia mexicana**Chrysopsis mariana**Cichorium intybus**Cirsium altissimum**Cirsium carolinianum**Cirsium engelmannii**Cirsium horridulum*

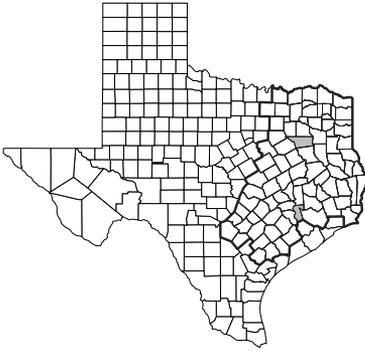
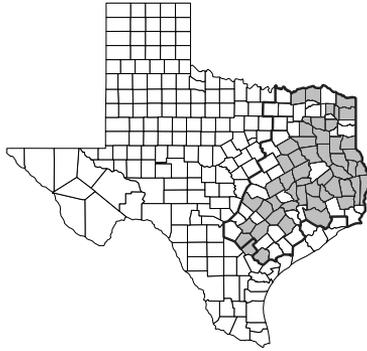
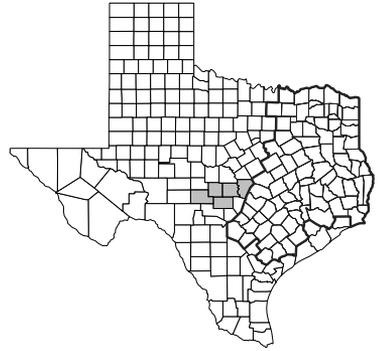
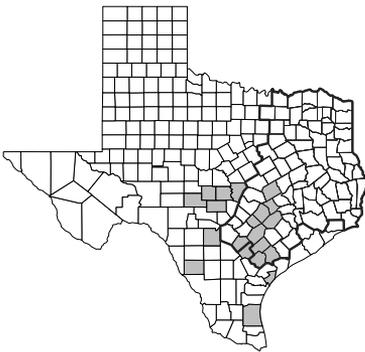
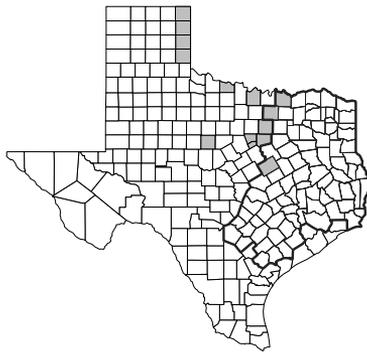
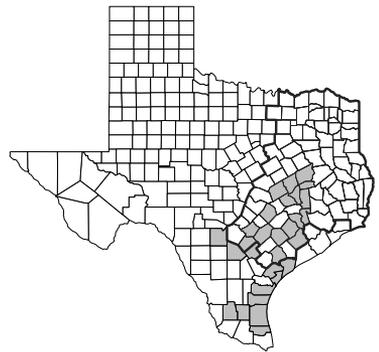
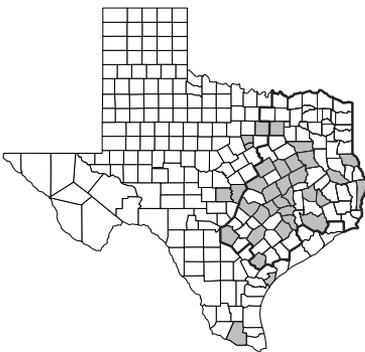
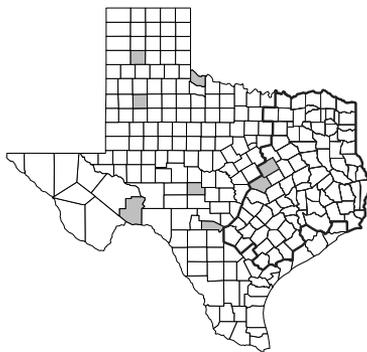
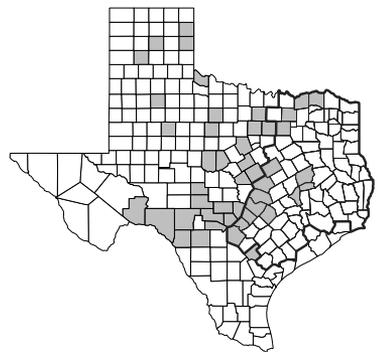
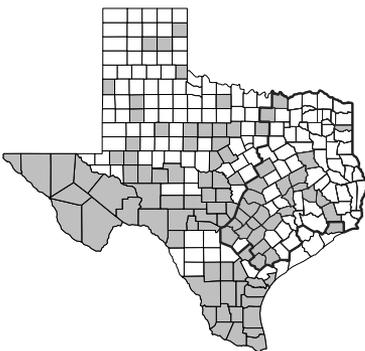
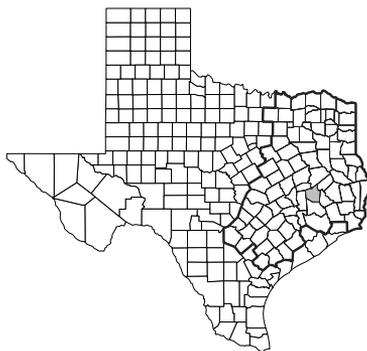
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*Cirsium muticum**Cirsium ochrocentrum* var. *ochrocentrum**Cirsium texanum**Cirsium undulatum**Cirsium vulgare**Conoclinium coelestinum**Conyza bonariensis**Conyza canadensis**Conyza ramosissima**Conyza sumatrensis**Coreopsis basalis**Coreopsis gladiata*

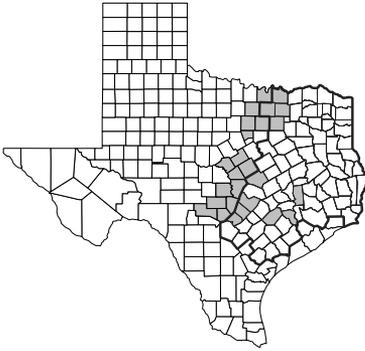
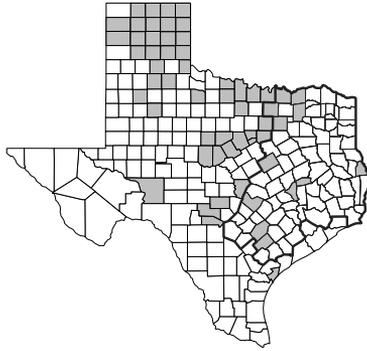
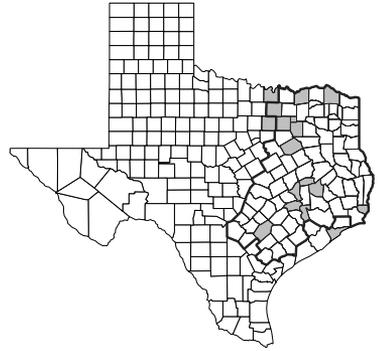
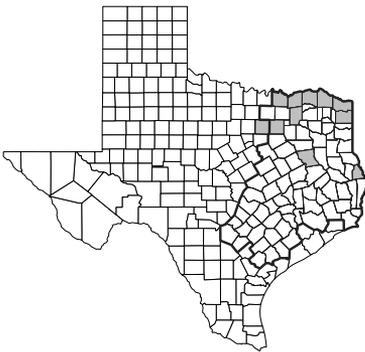
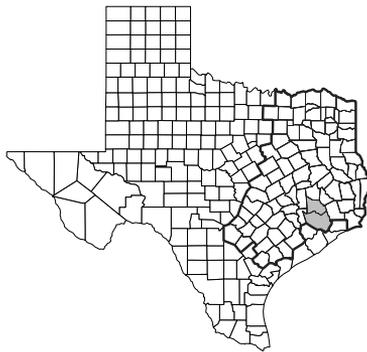
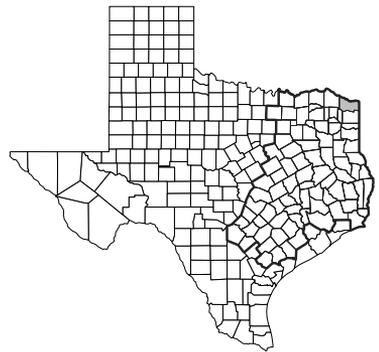
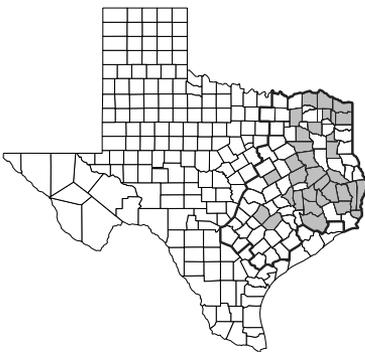
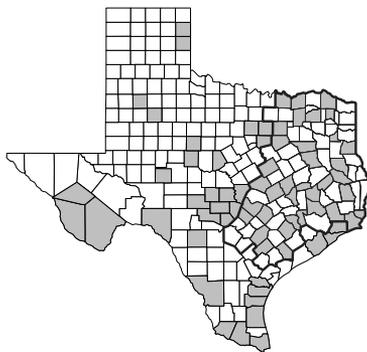
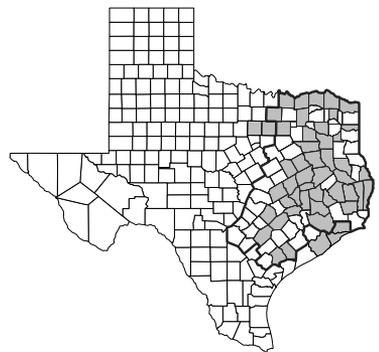
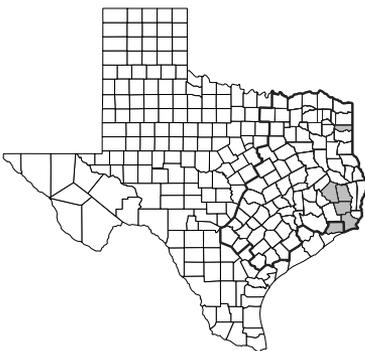
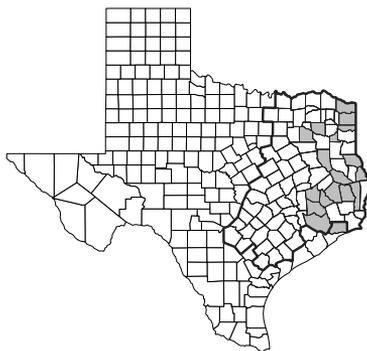
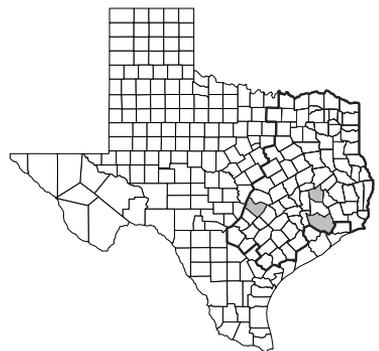
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*Coreopsis grandiflora**Coreopsis intermedia**Coreopsis lanceolata**Coreopsis nucensis**Coreopsis pubescens**Coreopsis tinctoria**Coreopsis tripteris**Cosmos bipinnatus**Cosmos sulphureus**Cotula australis**Crepis pulchra**Crepis setosa*

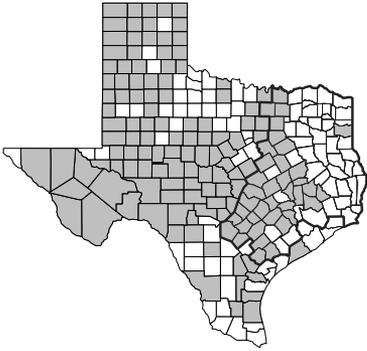
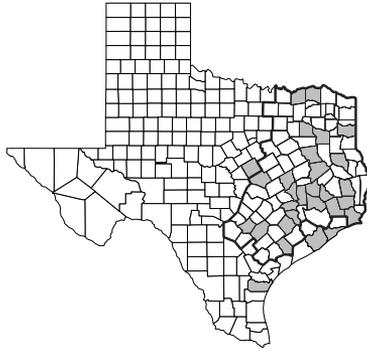
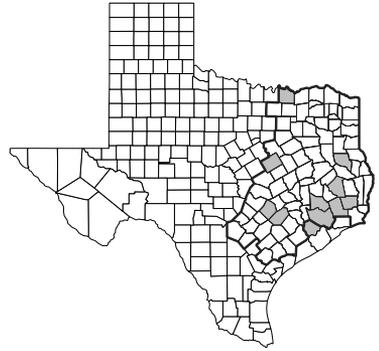
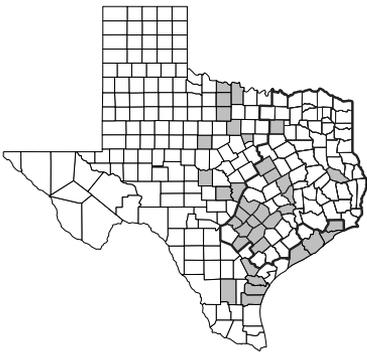
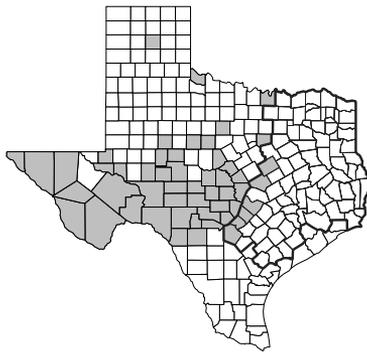
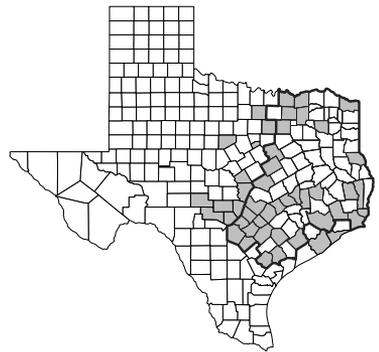
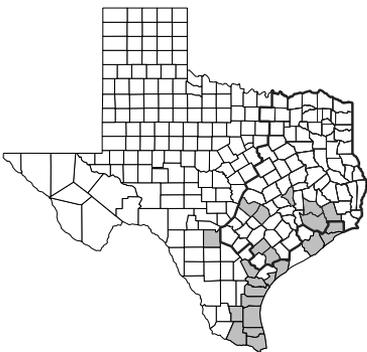
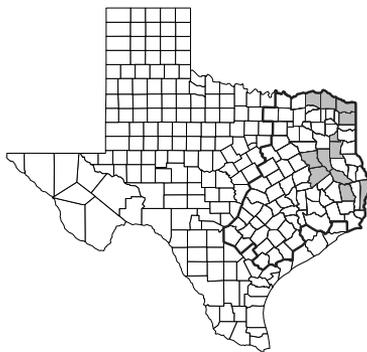
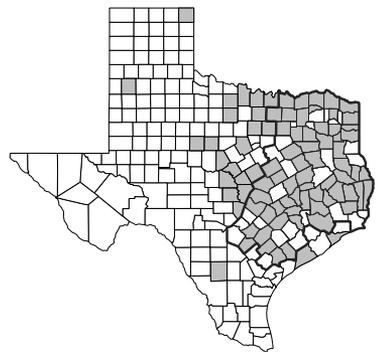
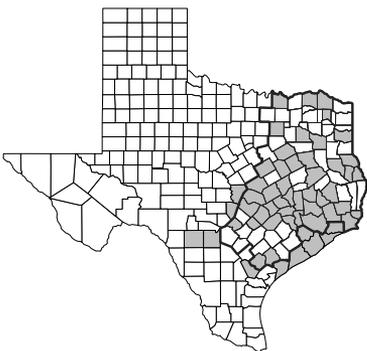
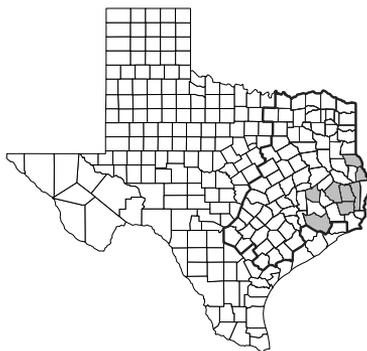
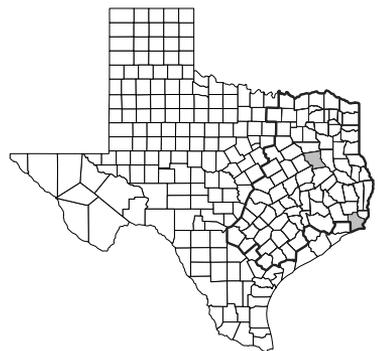
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*Crepis zacintha**Croptilon divaricatum**Croptilon hookerianum* var. *graniticum**Croptilon hookerianum* var. *hookerianum**Croptilon hookerianum* var. *validum**Croptilon rigidifolium**Diaperia candida**Diaperia prolifera* var. *barnebyi**Diaperia prolifera* var. *prolifera**Diaperia verna* var. *verna**Dimorphotheca sinuata**Doellingeria sericocarpoides*

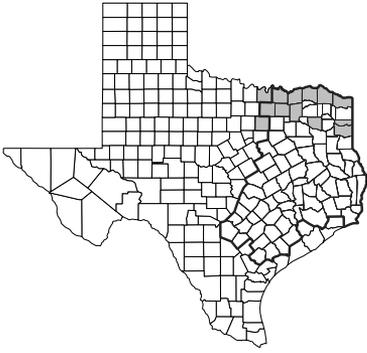
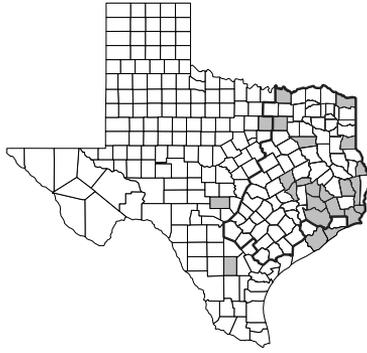
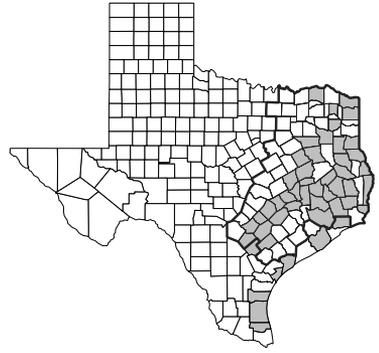
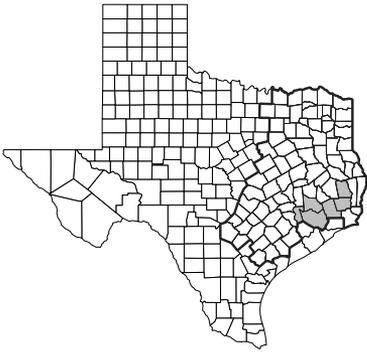
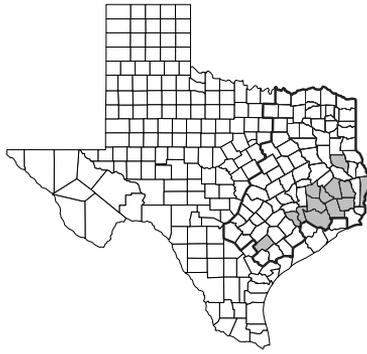
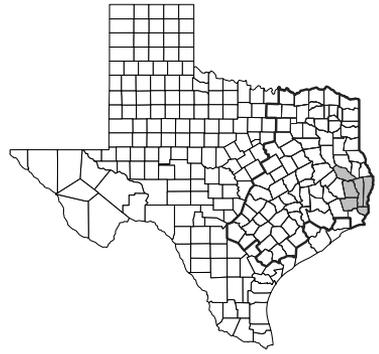
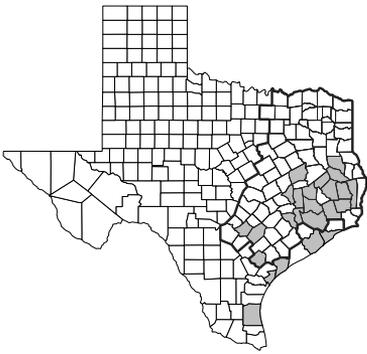
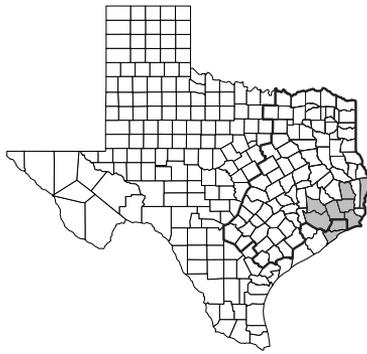
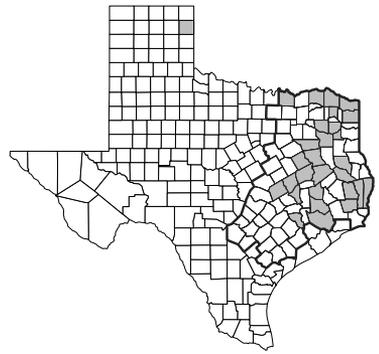
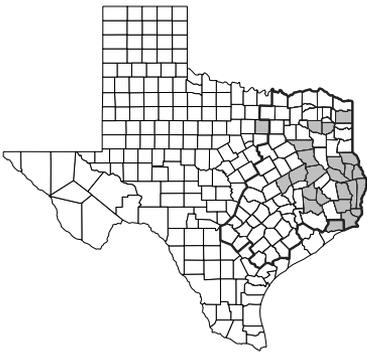
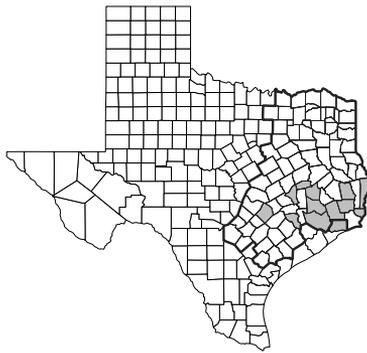
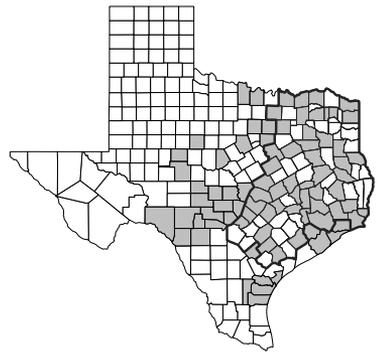
DRAFT

*Dysodiopsis tagetoides**Echinacea angustifolia**Echinacea atrorubens**Echinacea pallida**Echinacea paradoxa* var. *neglecta**Echinacea purpurea**Echinacea sanguinea**Eclipta prostrata**Elephantopus carolinianus**Elephantopus nudatus**Elephantopus tomentosus**Emilia fosbergii*

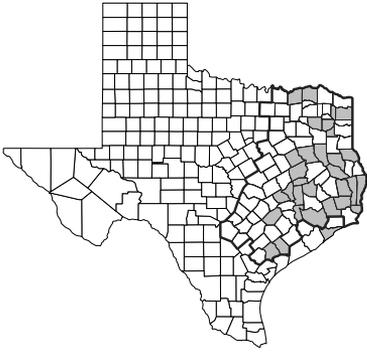
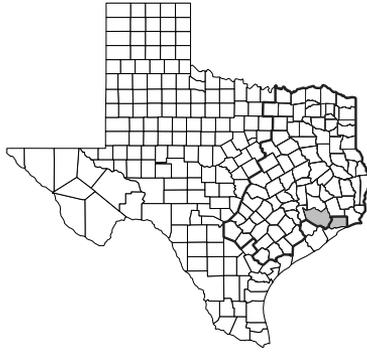
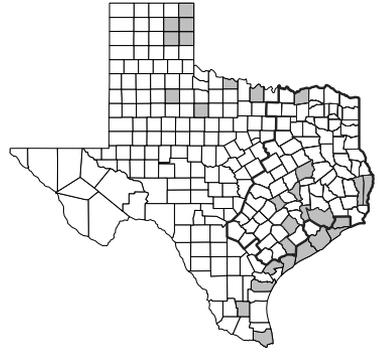
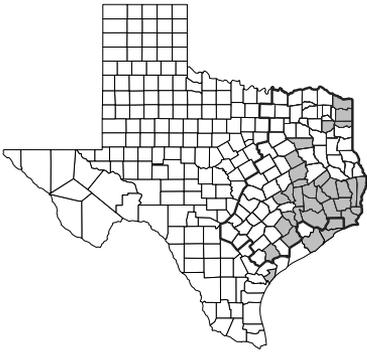
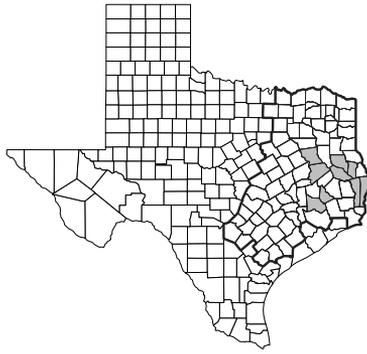
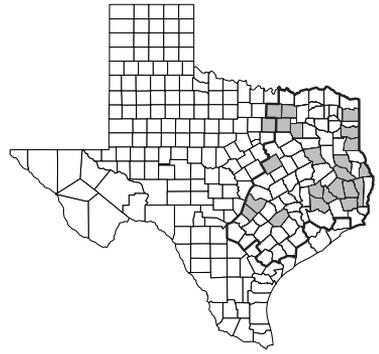
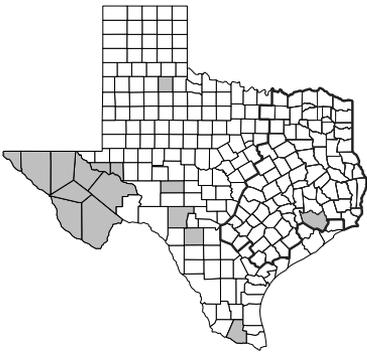
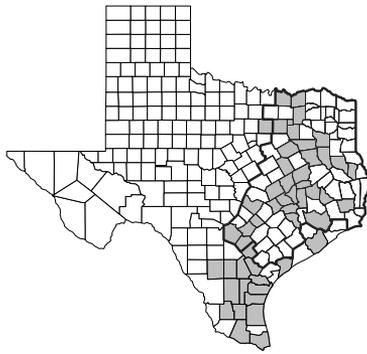
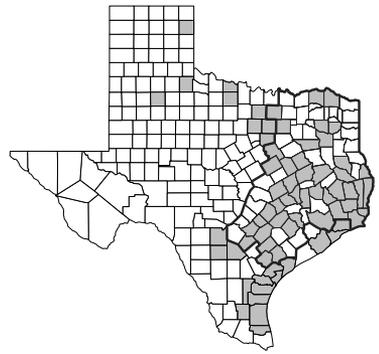
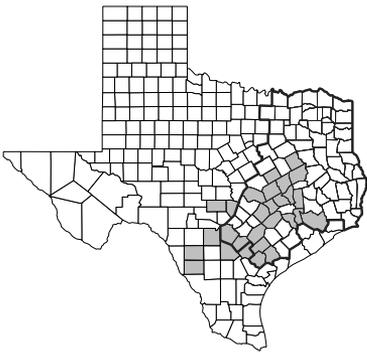
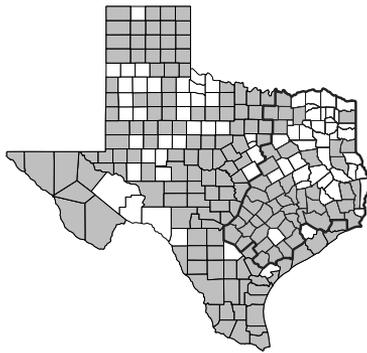
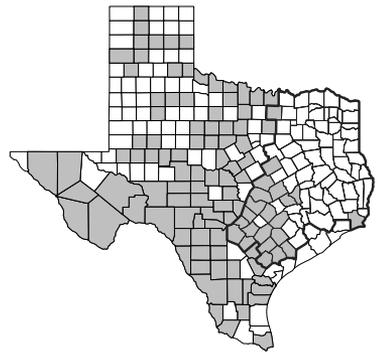
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*Engelmannia peristenia**Erechites hieraciifolius* var. *hieraciifolius**Erigeron annuus**Erigeron geiseri**Erigeron modestus**Erigeron philadelphicus* var. *philadelphicus**Erigeron procumbens**Erigeron pulchellus* var. *pulchellus**Erigeron strigosus* var. *strigosus**Erigeron tenuis**Eupatorium* × *pinnatifidum**Eupatorium album* var. *album*

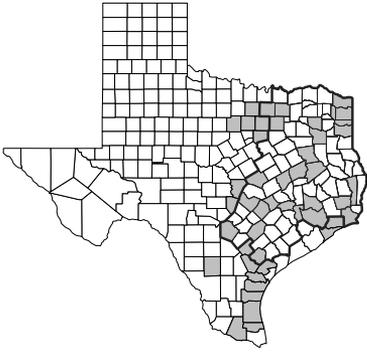
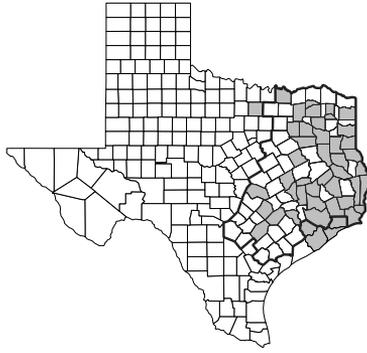
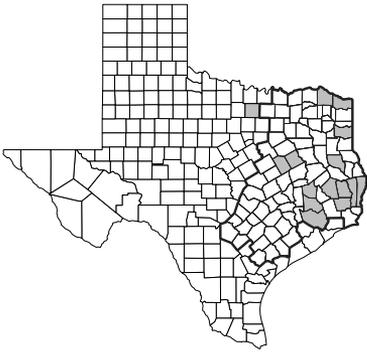
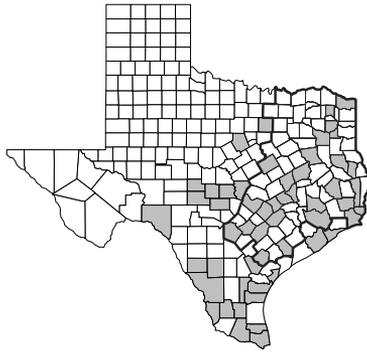
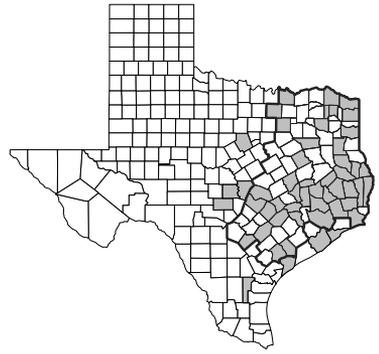
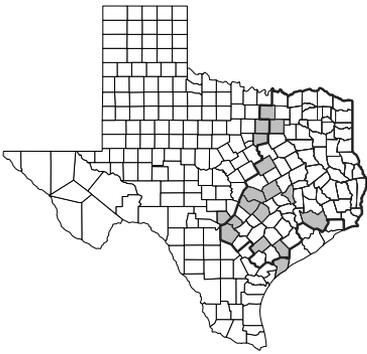
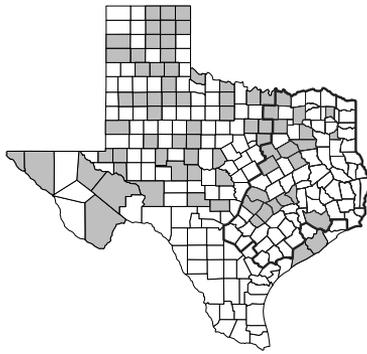
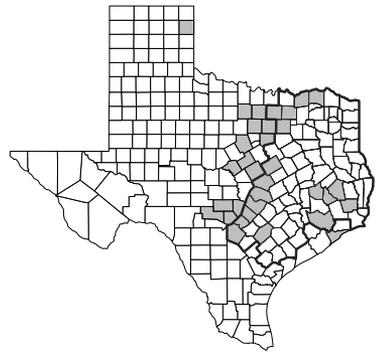
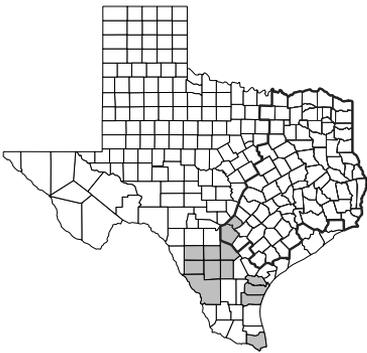
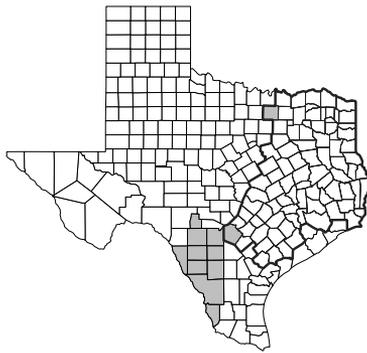
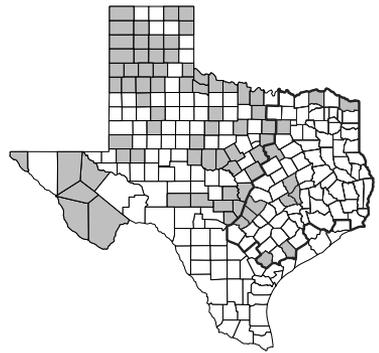
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*Eupatorium altissimum**Eupatorium capillifolium**Eupatorium compositifolium**Eupatorium hyssopifolium*
var. *hyssopifolium**Eupatorium lancifolium**Eupatorium leucolepis* var. *leucolepis**Eupatorium linearifolium**Eupatorium mohrii**Eupatorium perfoliatum**Eupatorium rotundifolium*
var. *rotundifolium**Eupatorium semiserratum**Eupatorium serotinum*

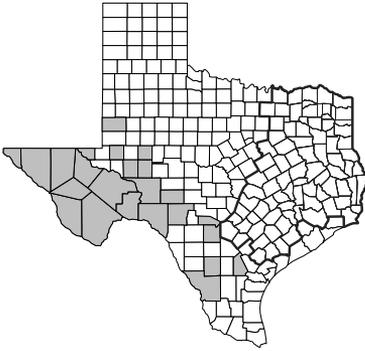
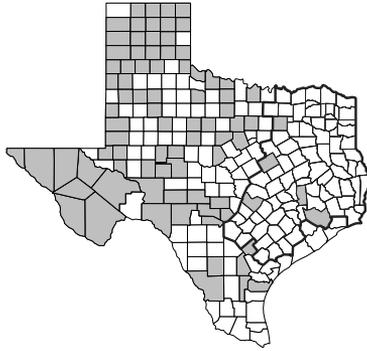
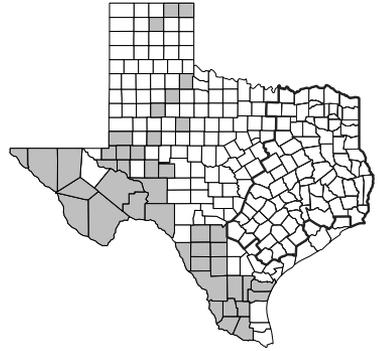
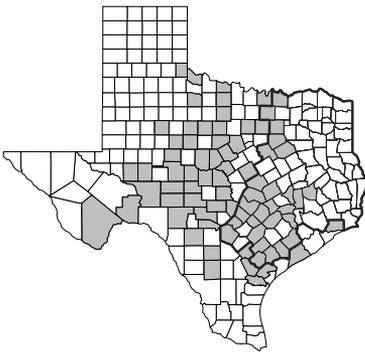
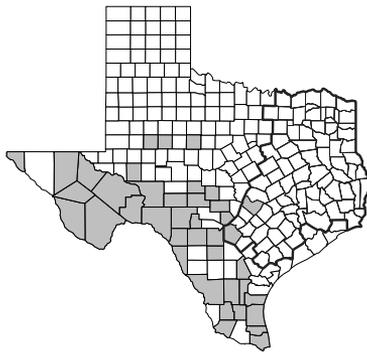
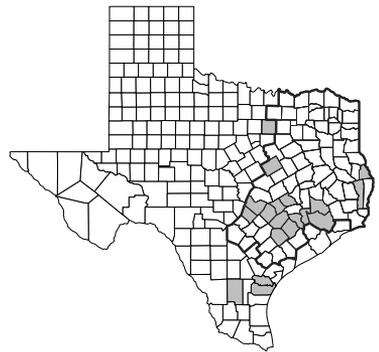
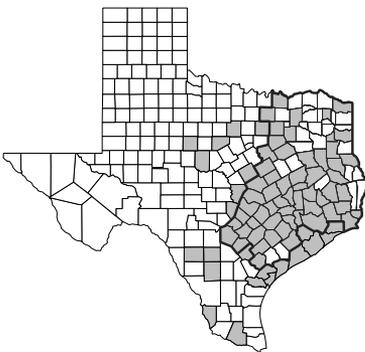
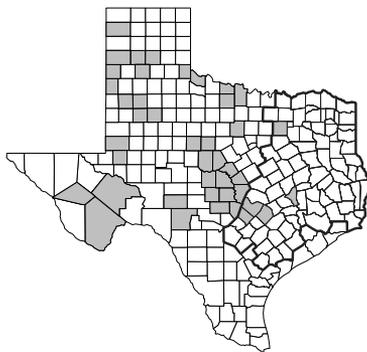
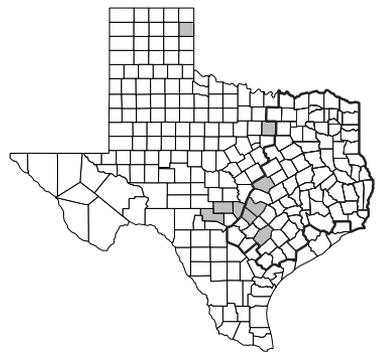
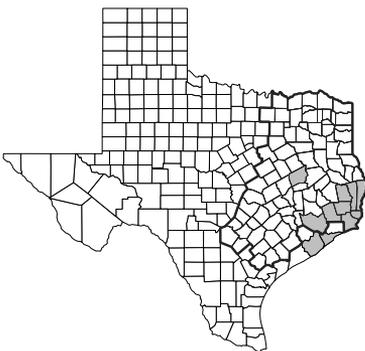
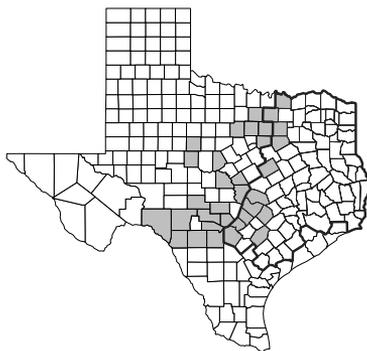
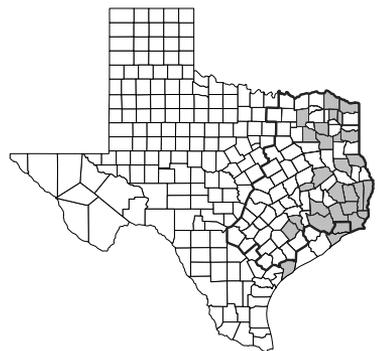
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*Eurybia hemispherica**Euthamia caroliniana**Euthamia gymnospermoides**Euthamia leptocephalo**Eutrochium fistulosum**Facelis retusa**Flaveria trinervia**Fleischmannia incarnata**Gaillardia aestivalis**Gaillardia amblyodon**Gaillardia pulchella**Gaillardia suavis*

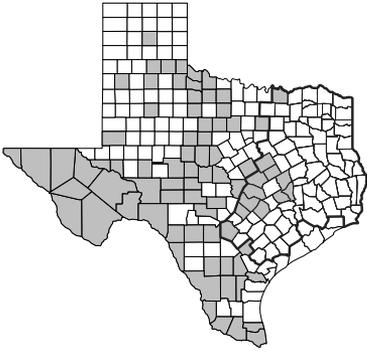
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*Gamochaeta antillana**Gamochaeta argyrea**Gamochaeta calviceps**Gamochaeta coarctata**Gamochaeta pensylvanica**Gamochaeta purpurea**Grindelia adenodonta**Grindelia ciliata**Grindelia lanceolata**Grindelia microcephala**Grindelia pusilla**Grindelia squarrosa*

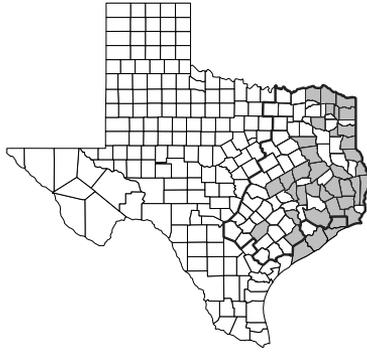
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*Gutierrezia microcephala**Gutierrezia sarothrae**Gutierrezia sphaerocephala**Gutierrezia texana* var. *texana**Gymnosperma glutinosum**Hedyopsis cretica**Helenium amarum* var. *amarum**Helenium amarum* var. *badium**Helenium autumnale* var. *autumnale**Helenium drummondii**Helenium elegans* var. *elegans**Helenium flexuosum*

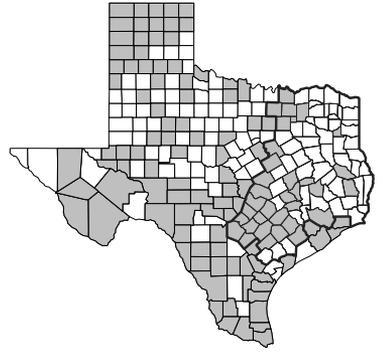
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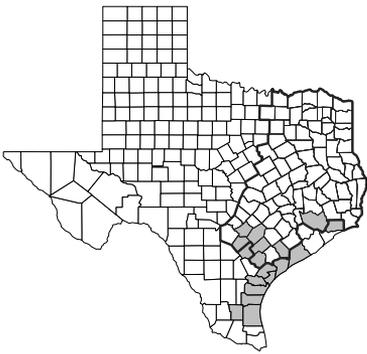
Helienium microcephalum
var. *microcephalum*



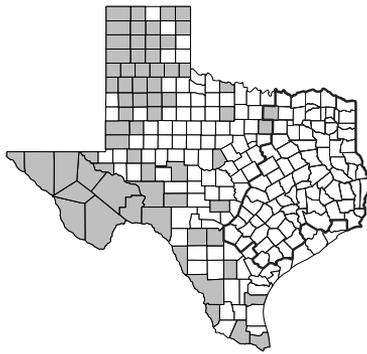
Helianthus angustifolius



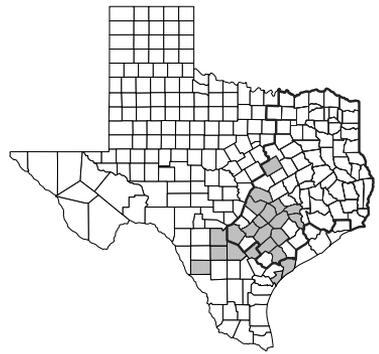
Helianthus annuus



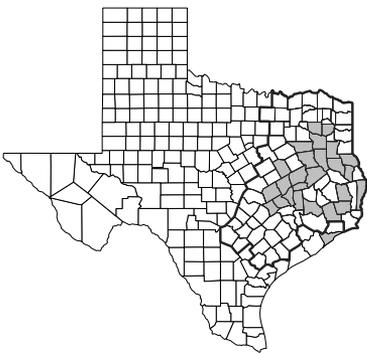
Helianthus argophyllus



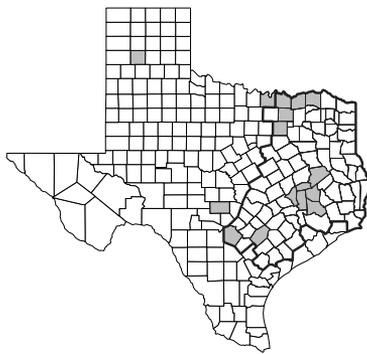
Helianthus ciliaris



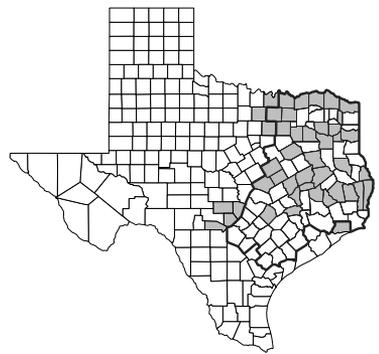
Helianthus debilis subsp. *cucumerifolius*



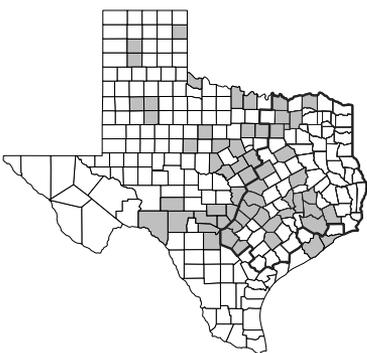
Helianthus debilis subsp. *silvestris*



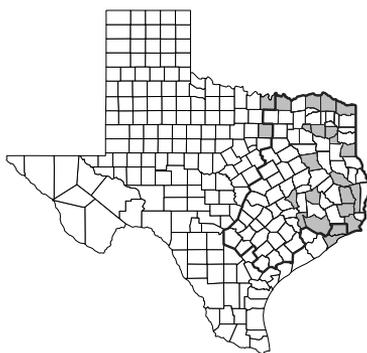
Helianthus grosseserratus



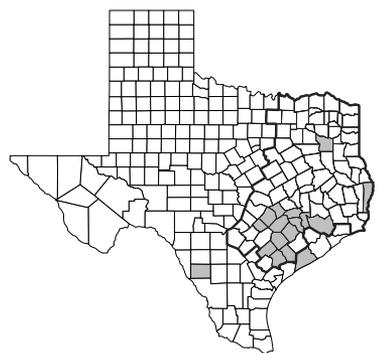
Helianthus hirsutus



Helianthus maximiliani

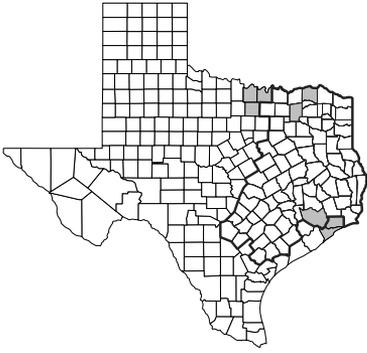
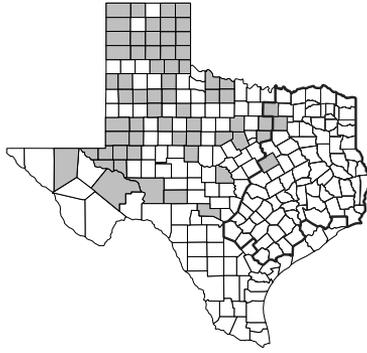
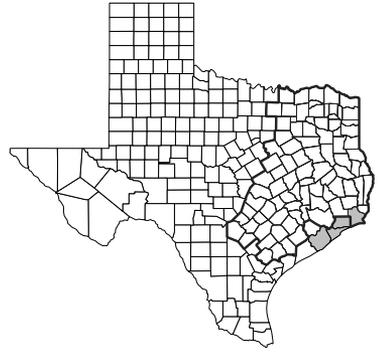
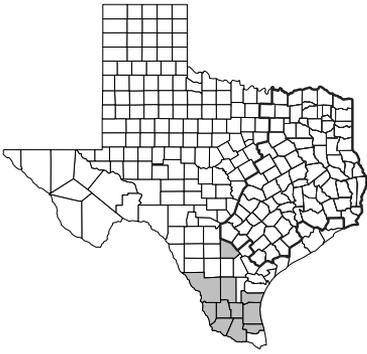
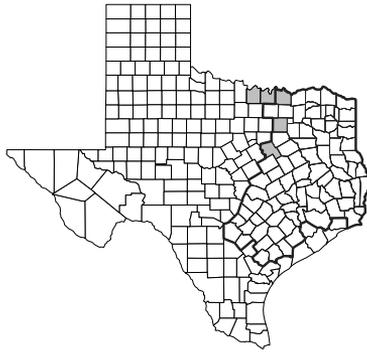
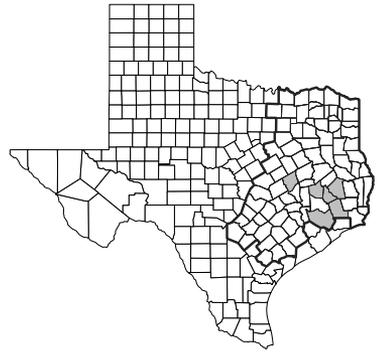
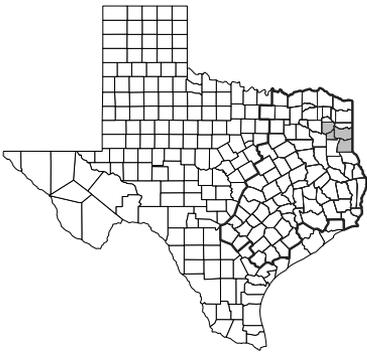
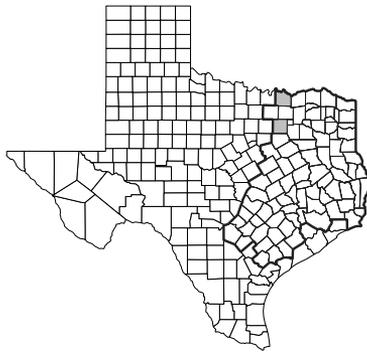
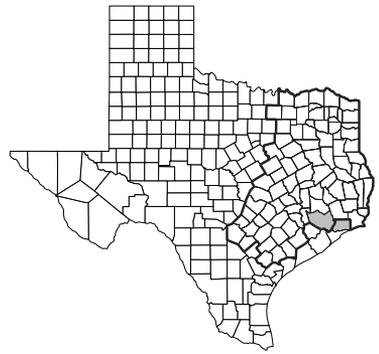
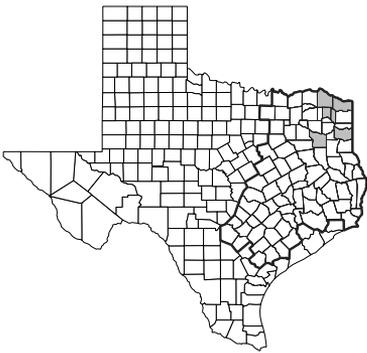
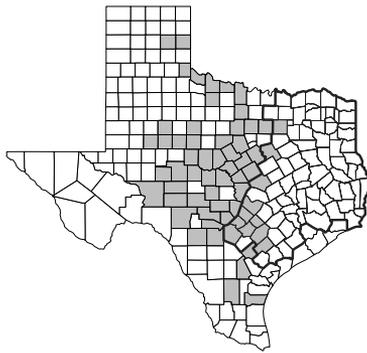
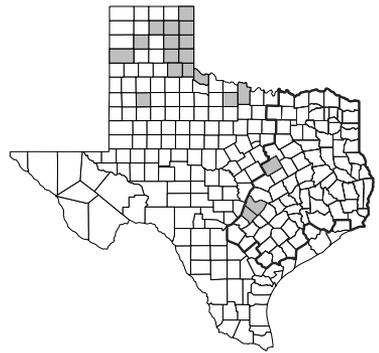


Helianthus mollis

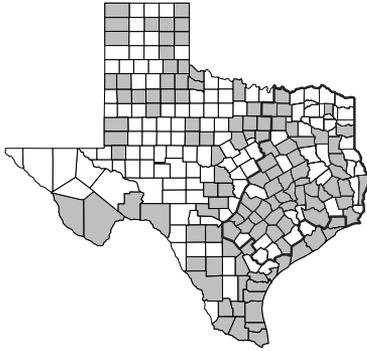
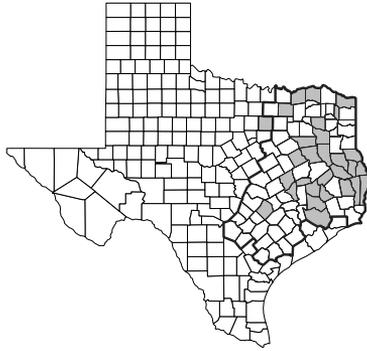
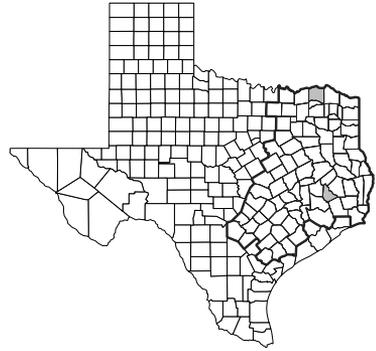
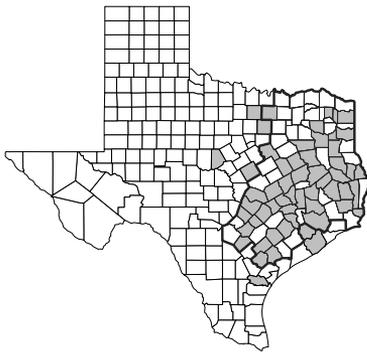
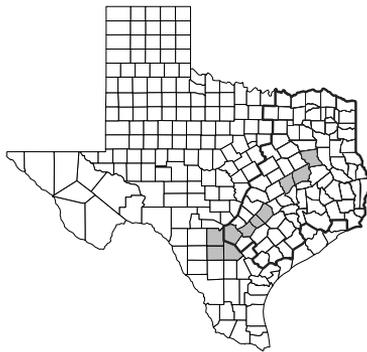
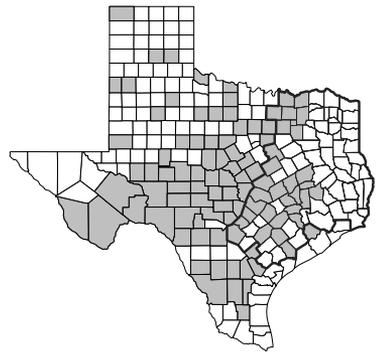
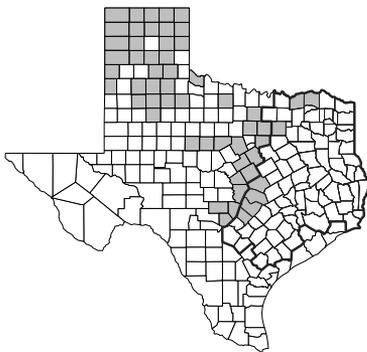
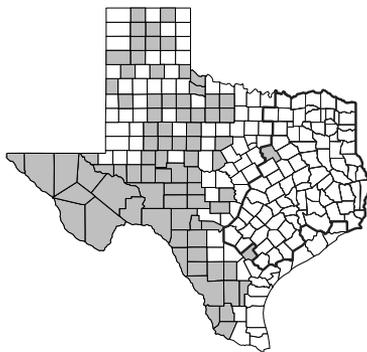
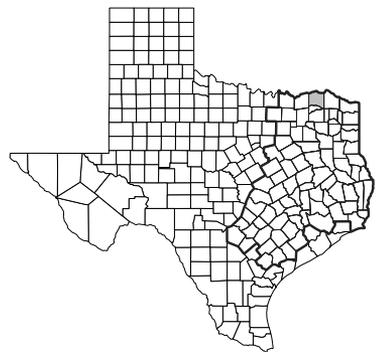
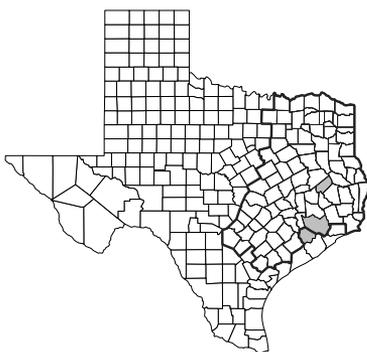
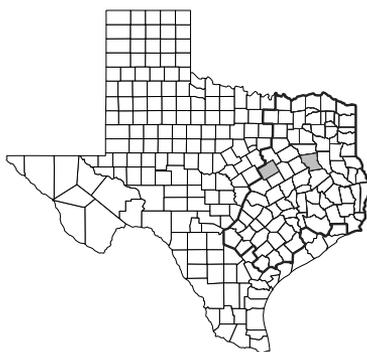
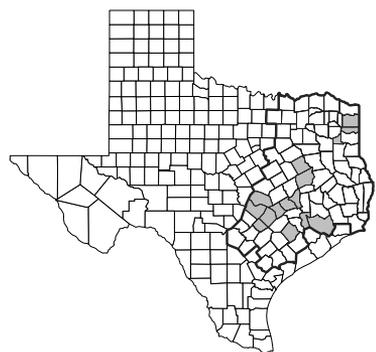


Helianthus occidentalis subsp. *plantagineus*

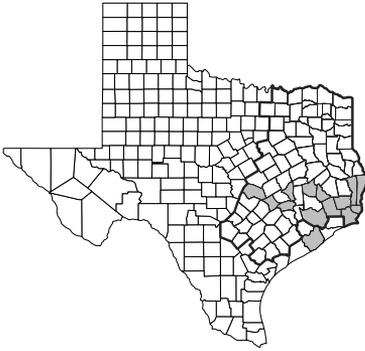
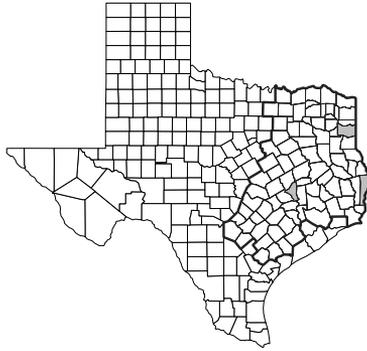
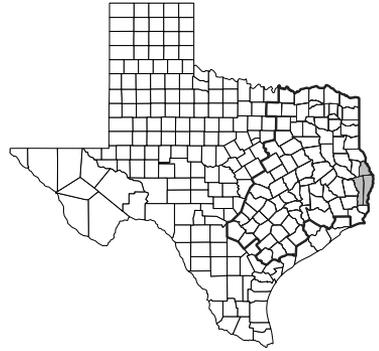
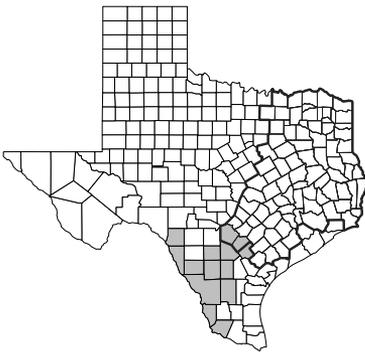
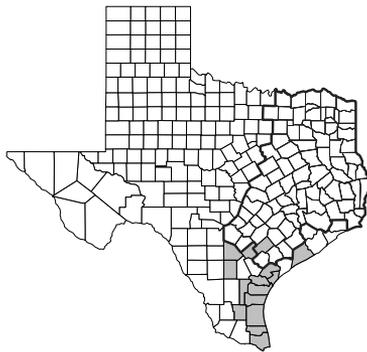
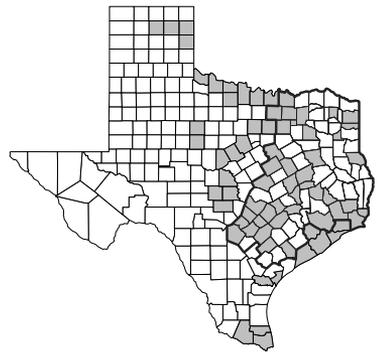
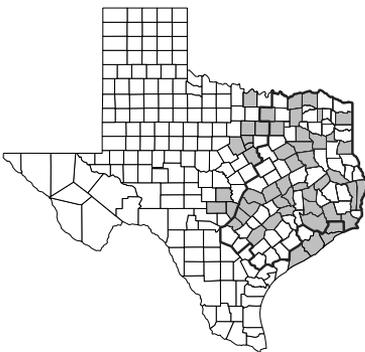
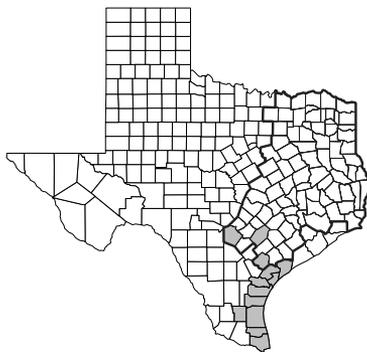
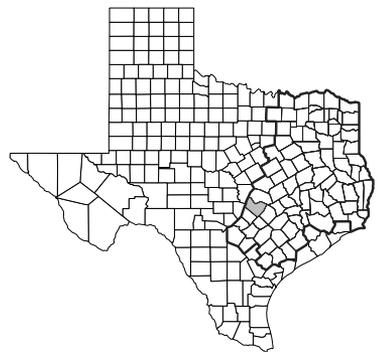
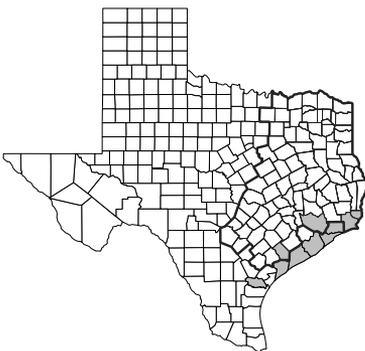
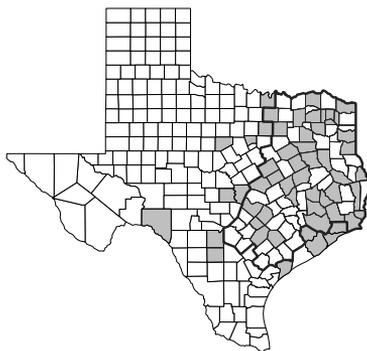
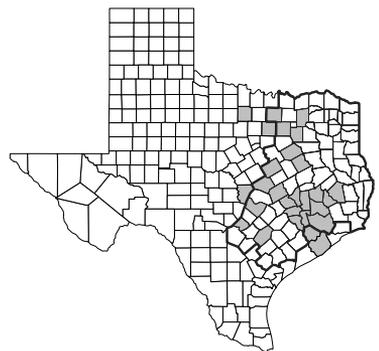
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*Helianthus pauciflorus* subsp. *pauciflorus**Helianthus petiolaris* subsp. *petiolaris**Helianthus praecox* subsp. *praecox**Helianthus praecox* subsp. *runyonii**Helianthus salicifolius**Helianthus simulans**Helianthus strumosus**Helianthus tuberosus**Heliopsis gracilis**Heliopsis helianthoides* var. *scabra**Heterotheca canescens**Heterotheca stenophylla*

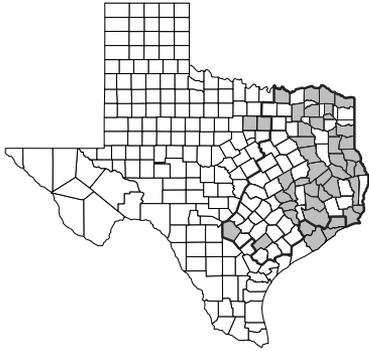
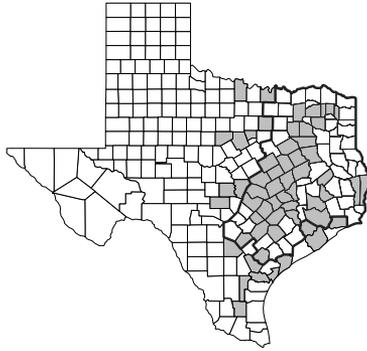
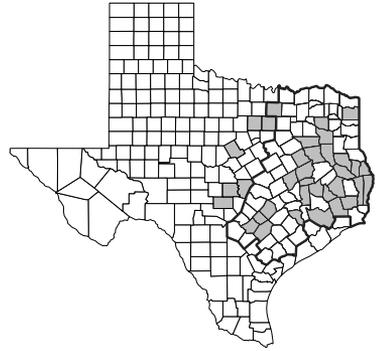
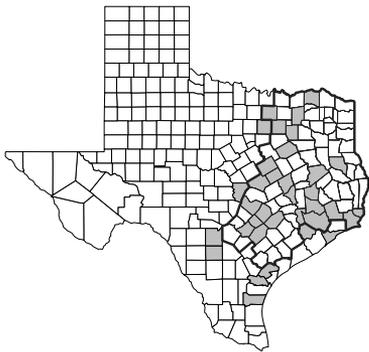
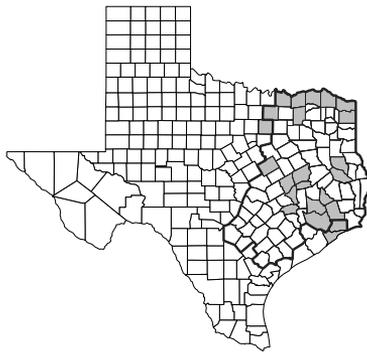
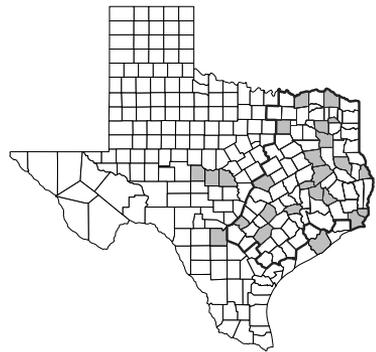
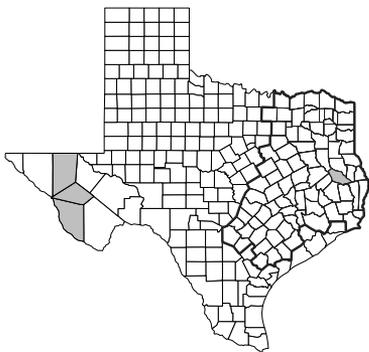
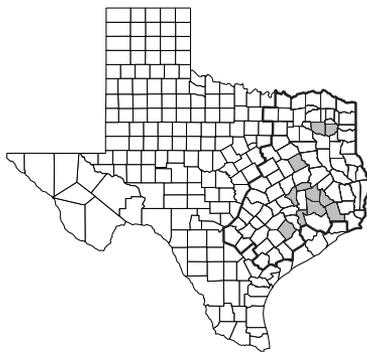
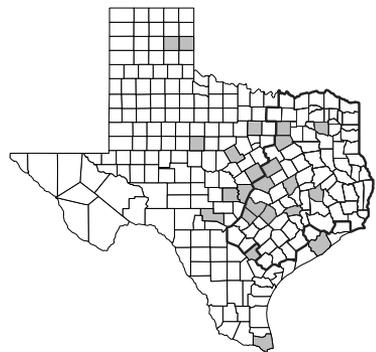
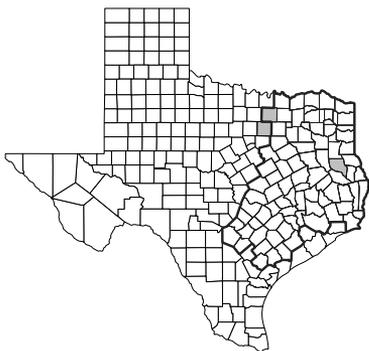
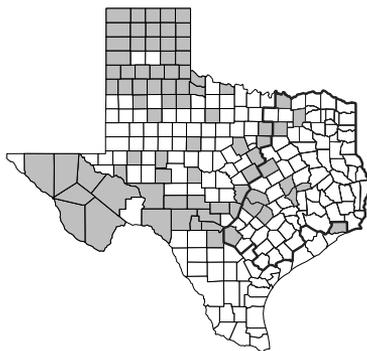
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*Heterotheca subaxillaris**Hieracium gronovii**Hieracium longipilum**Hymenopappus artemisiifolius*
var. *artemisiifolius**Hymenopappus carrizoanus**Hymenopappus scabiosaeus*
var. *corymbosus**Hymenopappus tenuifolius**Hymenoxys odorata**Hymenoxys perpygmaea**Hymenoxys texana**Hypochaeris chillensis**Hypochaeris glabra*

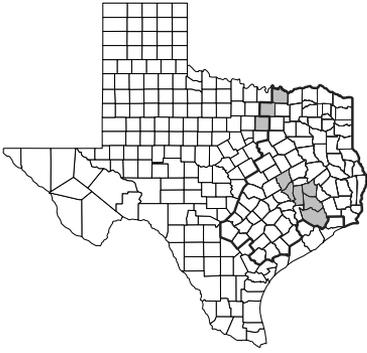
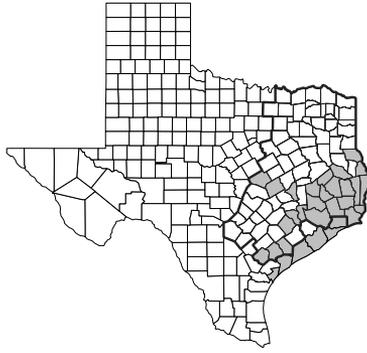
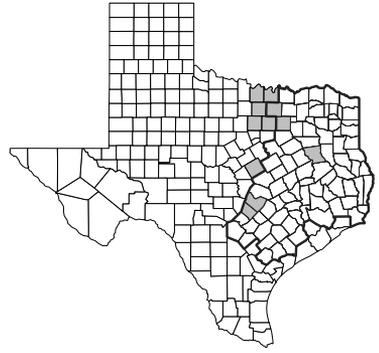
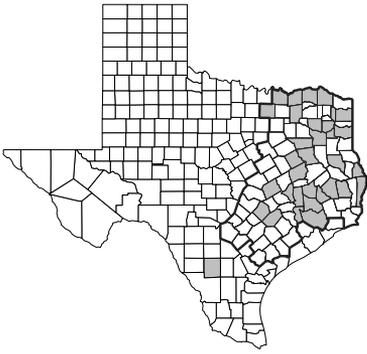
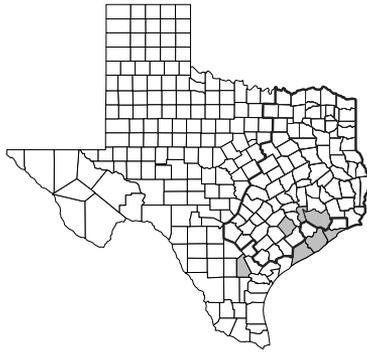
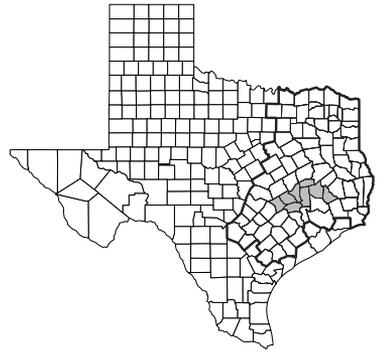
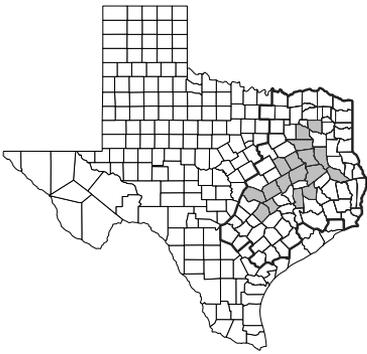
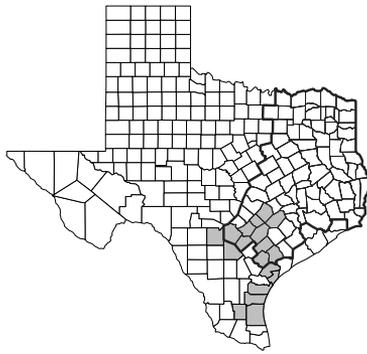
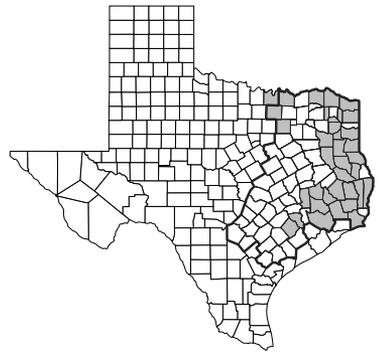
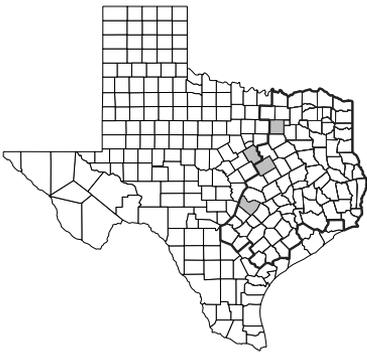
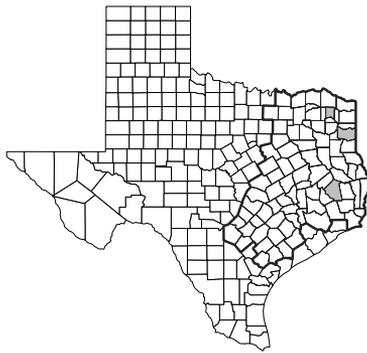
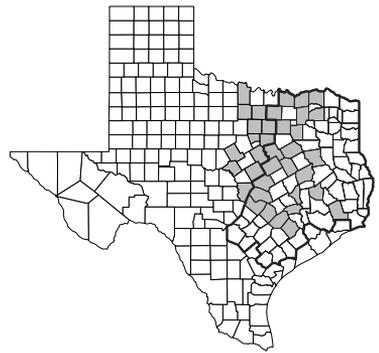
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*Hypochaeris microcephala* var. *albiflora**Hypochaeris radicata**Ionactis linariifolia**Isocoma coronopifolia**Isocoma drummondii**Iva annua**Iva asperifolia* var. *angustifolia**Iva asperifolia* var. *latior**Iva corbinii**Iva frutescens**Krigia cespitosa* var. *cespitosa**Krigia cespitosa* var. *gracilis*

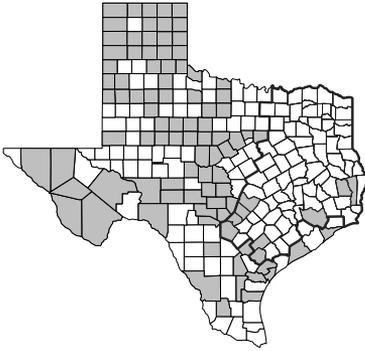
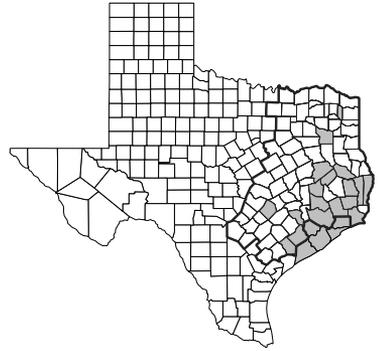
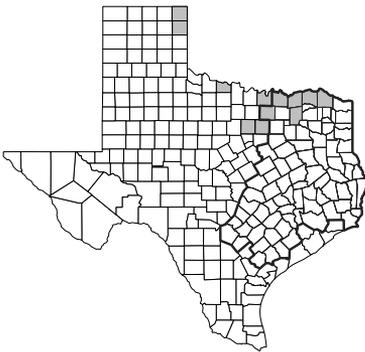
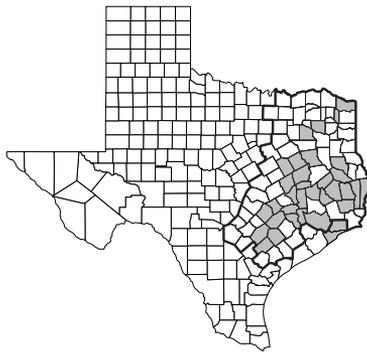
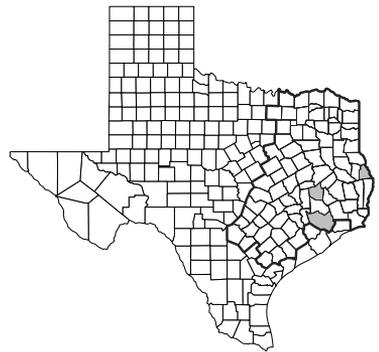
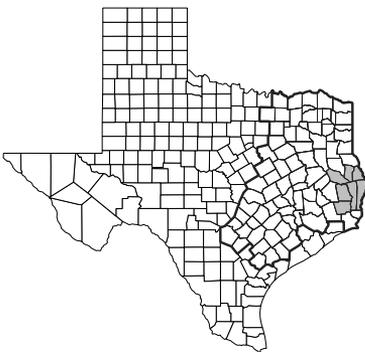
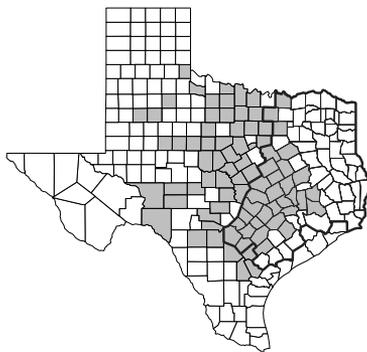
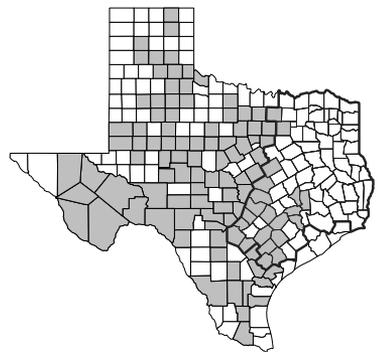
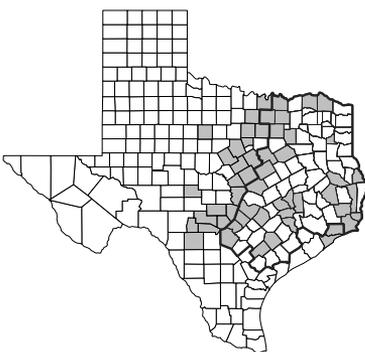
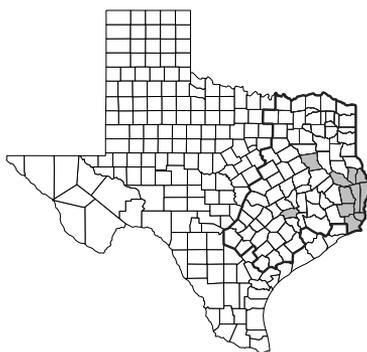
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*Krigia dandelion**Krigia occidentalis**Krigia virginica**Krigia wrightii**Lactuca canadensis**Lactuca floridana**Lactuca graminifolia**Lactuca hirsuta**Lactuca ludoviciana**Lactuca saligna**Lactuca serriola**Leontodon hispidus*

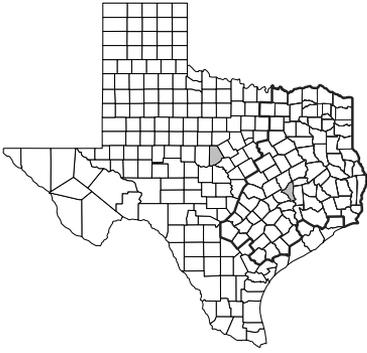
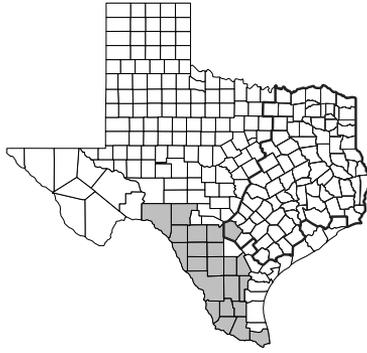
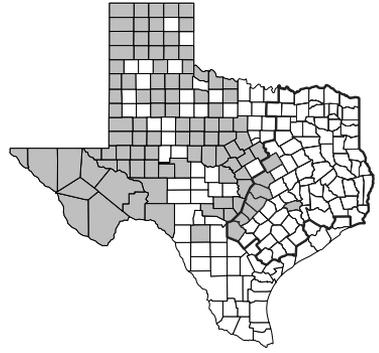
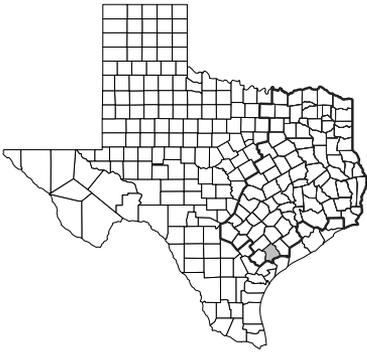
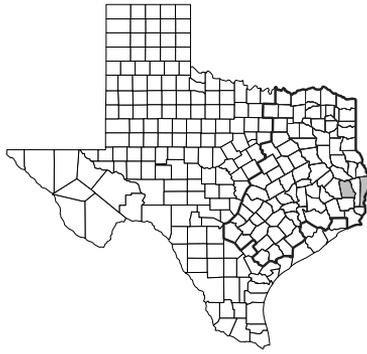
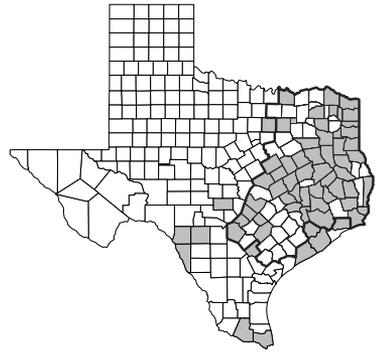
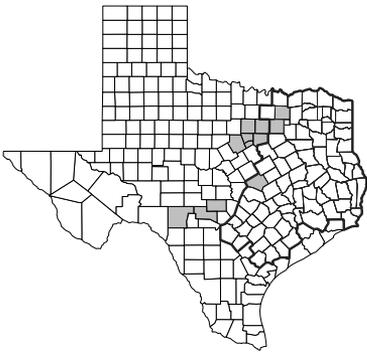
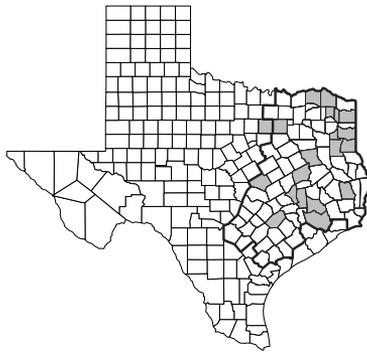
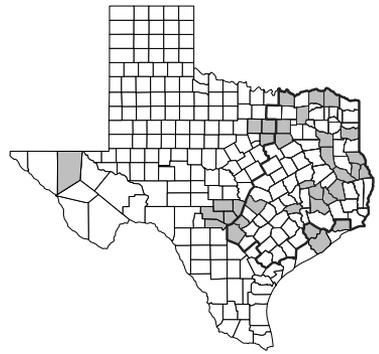
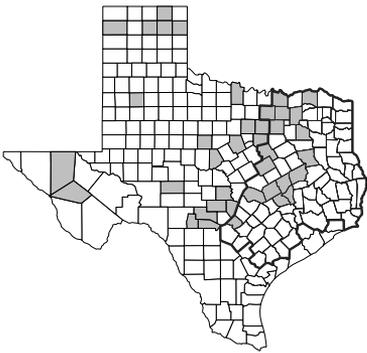
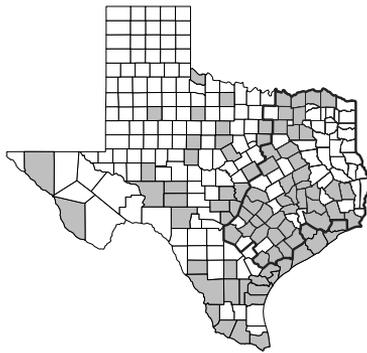
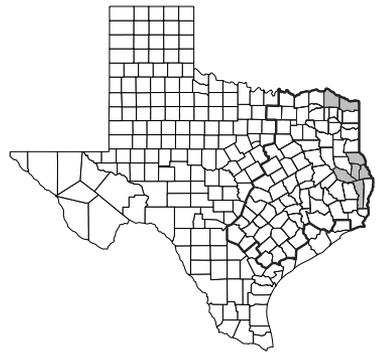
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*Leucanthemum vulgare**Liatris acidota**Liatris aestivalis**Liatris aspera**Liatris bracteata**Liatris cymosa**Liatris elegans* var. *bridgesii**Liatris elegans* var. *carizzana**Liatris elegans* var. *elegans**Liatris glandulosa**Liatris hirsuta**Liatris punctata* var. *mucronata*

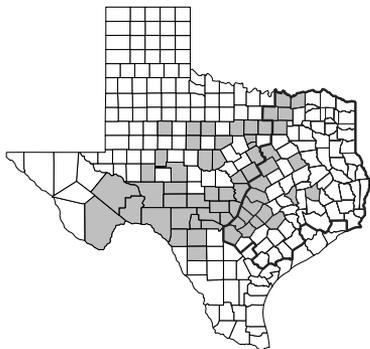
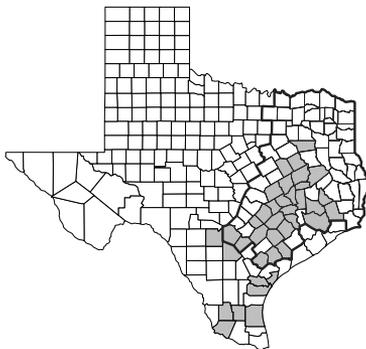
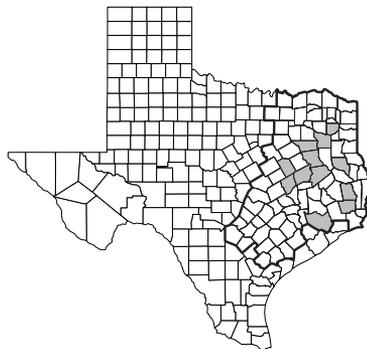
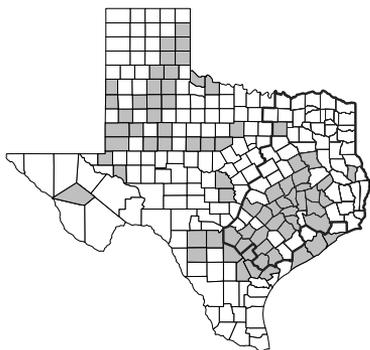
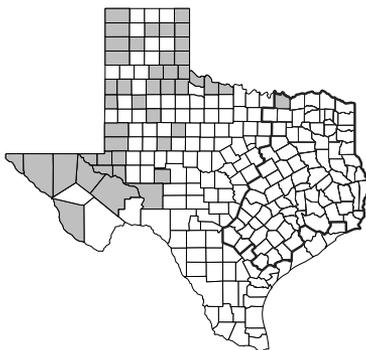
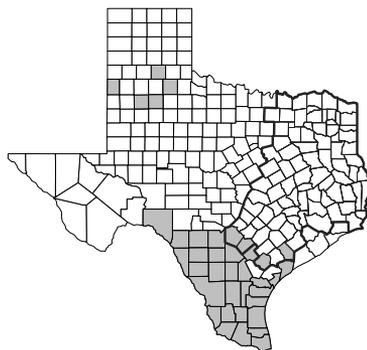
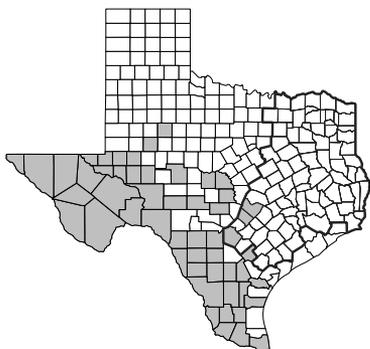
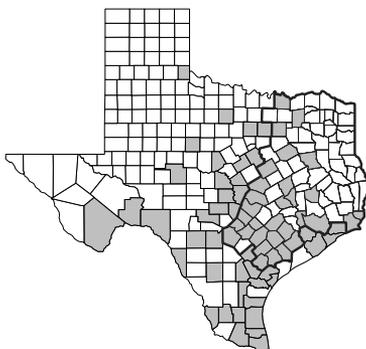
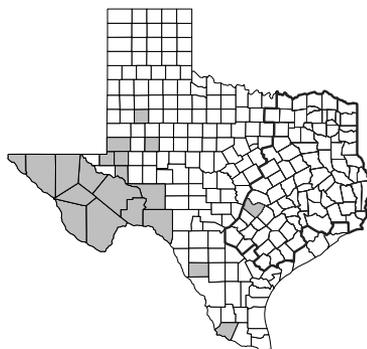
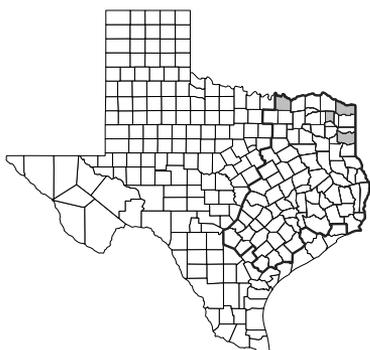
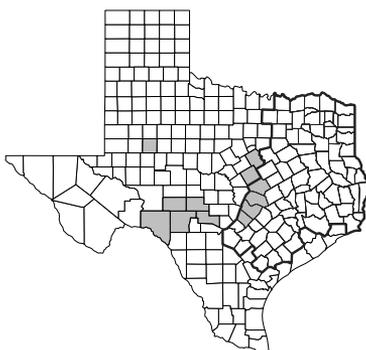
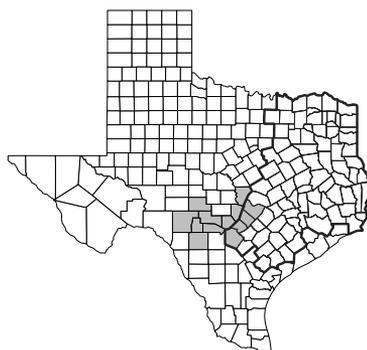
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*Liatris punctata* var. *punctata**Liatris pycnostachya* var. *lasiophylla**Liatris pycnostachya* var. *pycnostachya**Liatris squarrosa* var. *glabrata**Liatris squarrosa* var. *squarrosa**Liatris squarrosula**Liatris tenuis**Lindheimeria texana**Lygodesmia texana**Marshallia caespitosa**Marshallia graminifolia**Matricaria chamomilla*

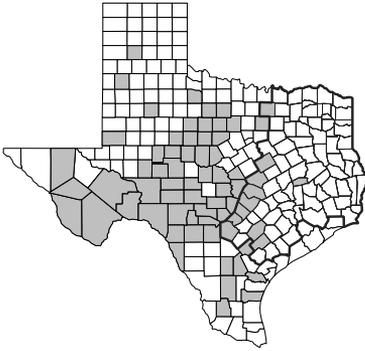
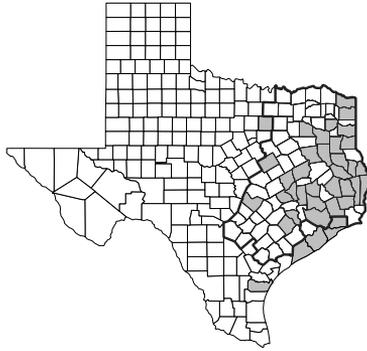
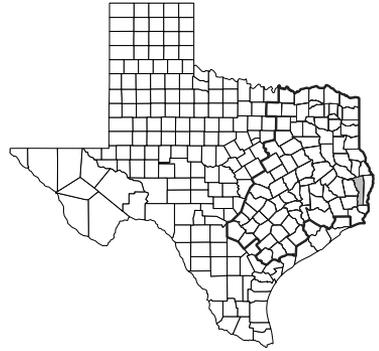
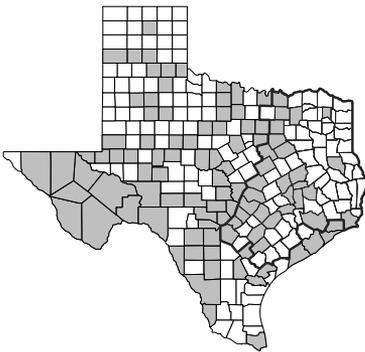
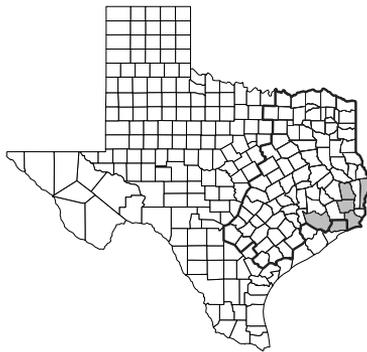
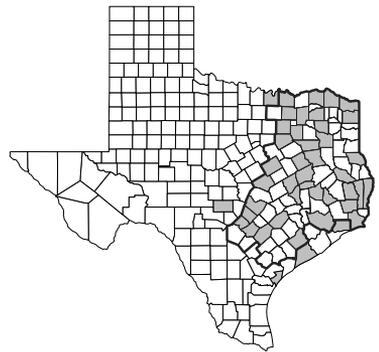
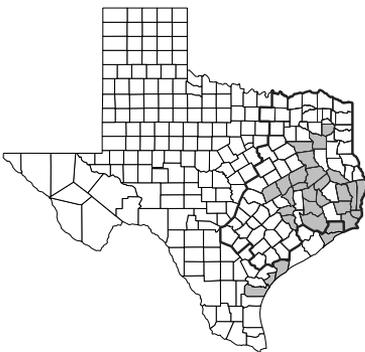
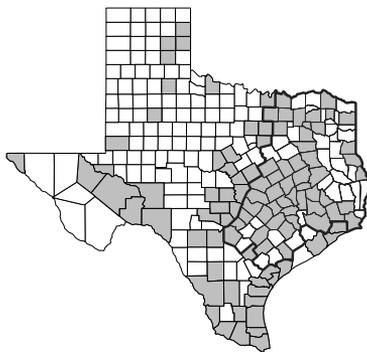
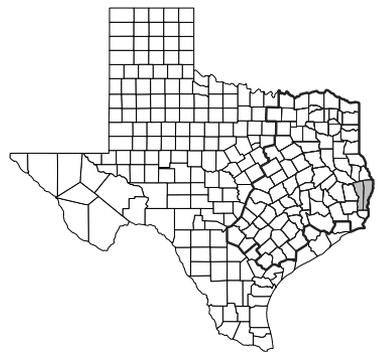
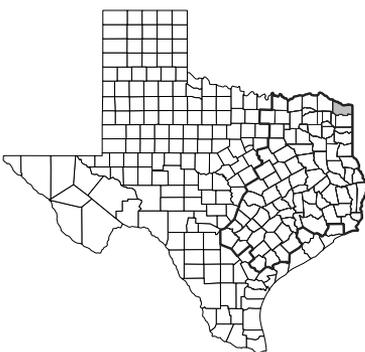
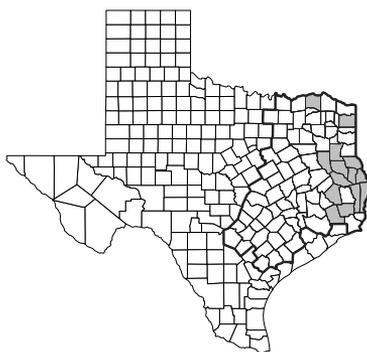
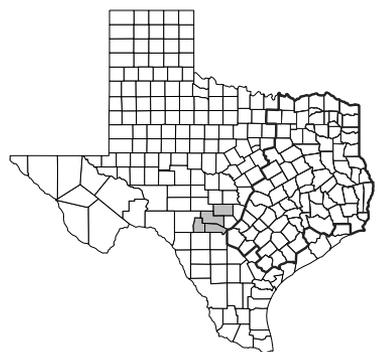
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*Matricaria discoidea**Melampodium cinereum**Melampodium leucanthum**Micropsis dasycarpa**Mikania cordifolia**Mikania scandens**Onopordum acanthium**Packera glabella**Packera obovata**Packera plattensis**Packera tampicana**Packera tomentosa*

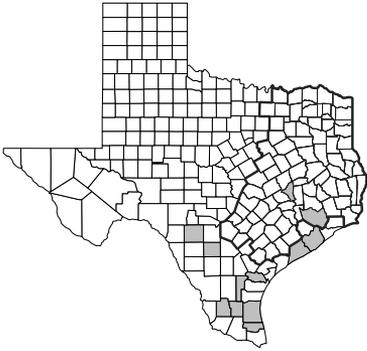
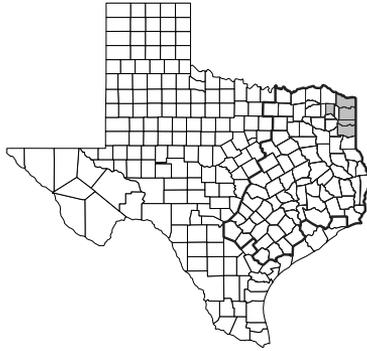
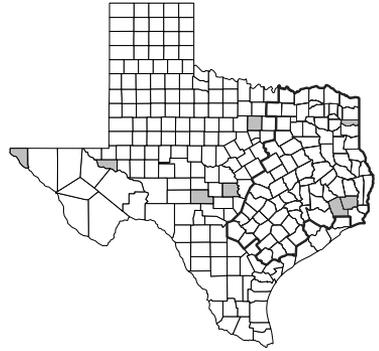
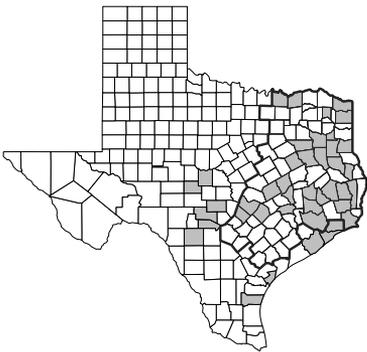
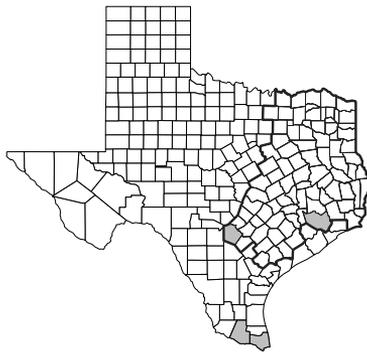
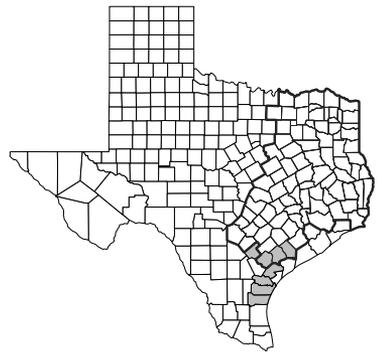
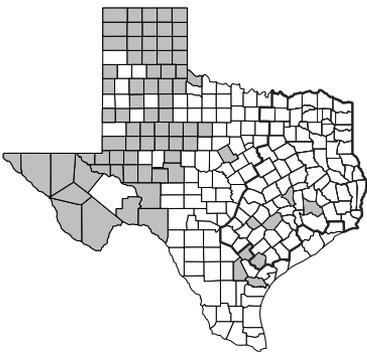
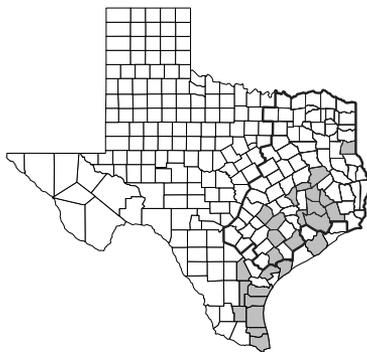
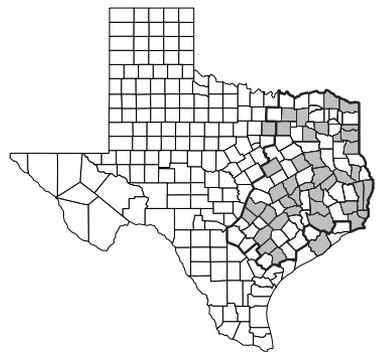
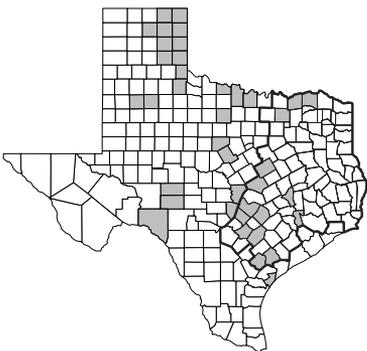
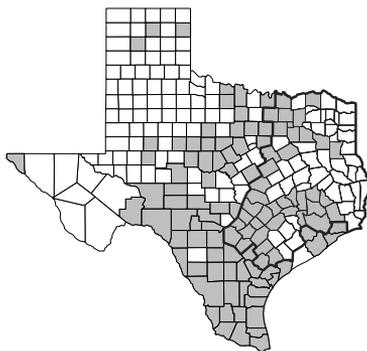
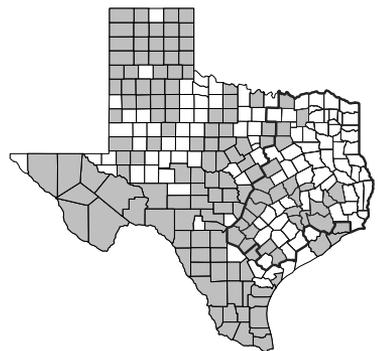
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*Palafoxia callosa**Palafoxia hookeriana**Palafoxia reverchonii**Palafoxia rosea**Palafoxia sphacelata**Palafoxia texana**Parthenium confertum**Parthenium hysterophorus**Parthenium incanum**Parthenium integrifolium**Pectis angustifolia* var. *fastigiata**Perityle lindheimeri* var. *lindheimeri*

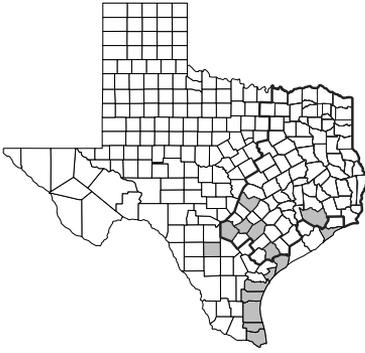
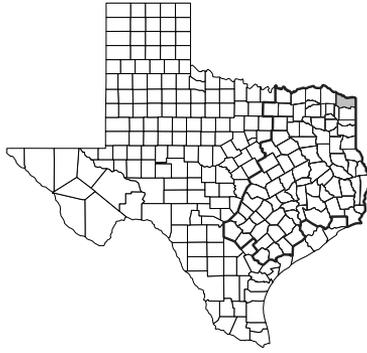
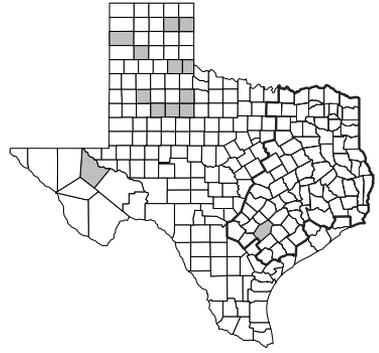
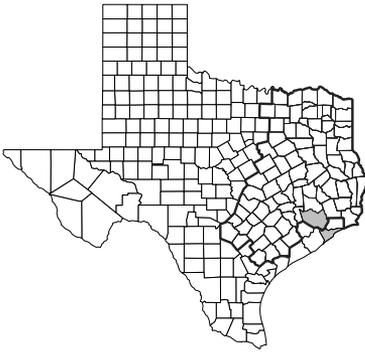
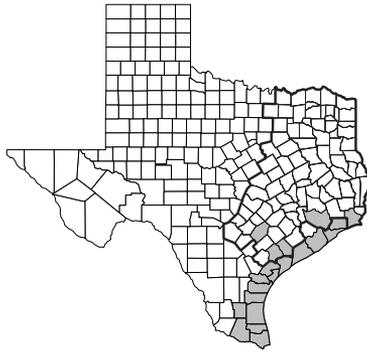
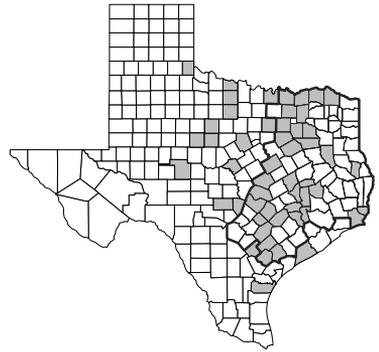
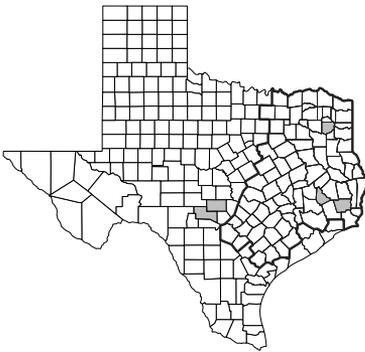
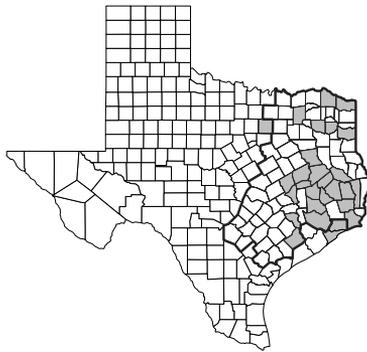
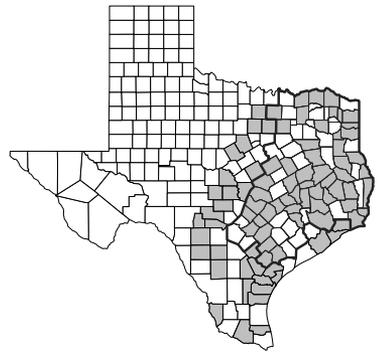
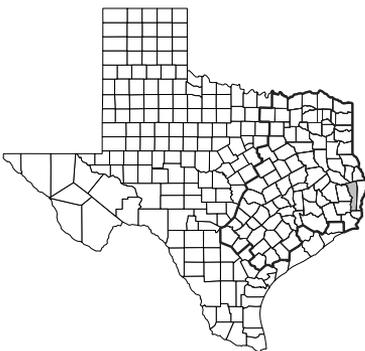
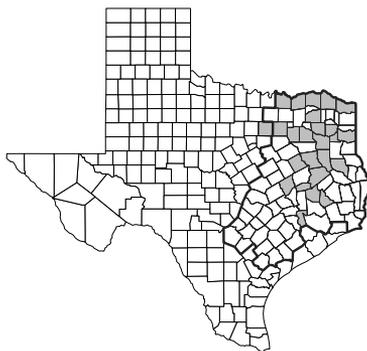
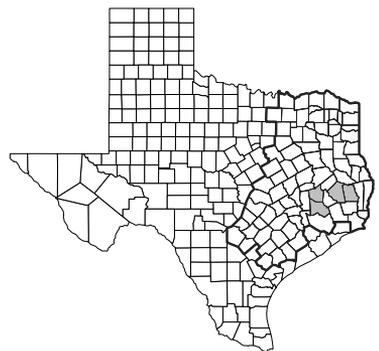
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*Pinaropappus roseus**Pityopsis graminifolia**Pityopsis oligantha**Plectocephalus americanus**Pluchea baccharis**Pluchea camphorata**Pluchea foetida**Pluchea odorata* var. *odorata**Prenanthes altissima**Prenanthes aspera**Prenanthes barbata**Prenanthes carrii*

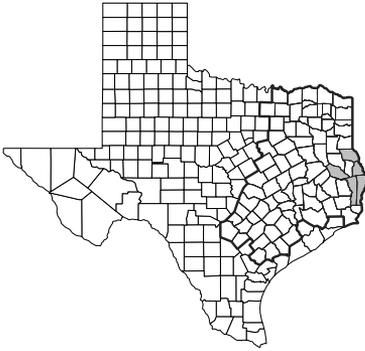
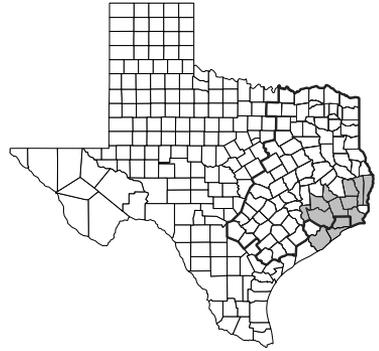
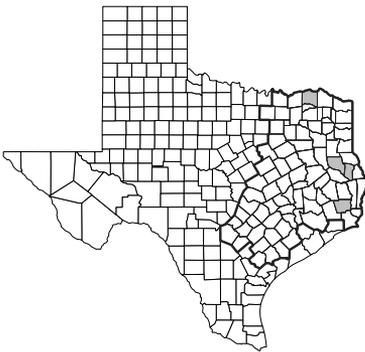
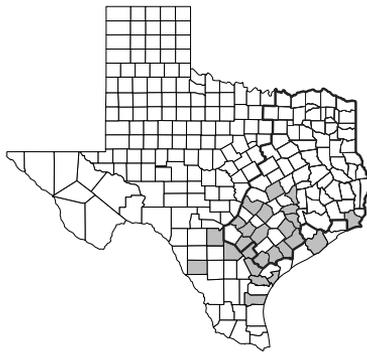
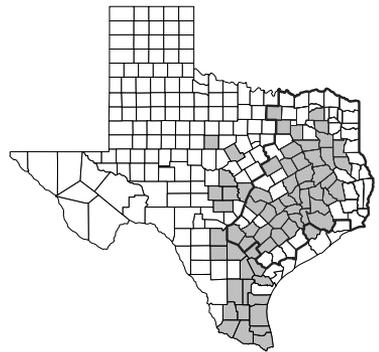
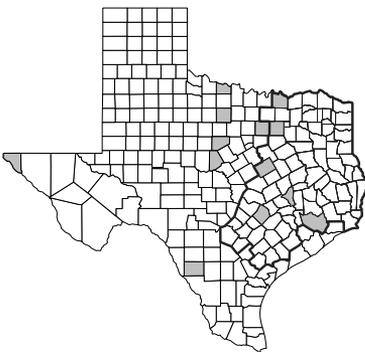
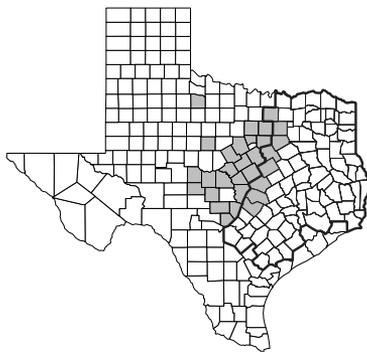
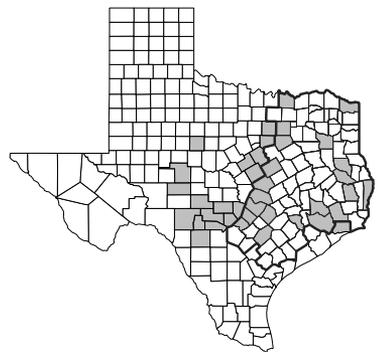
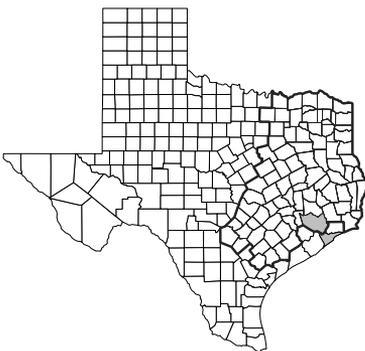
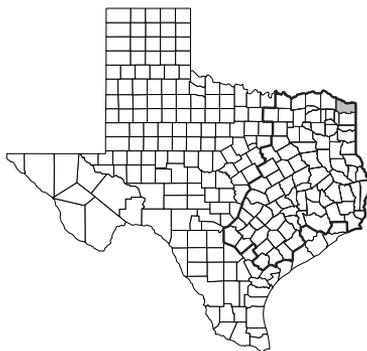
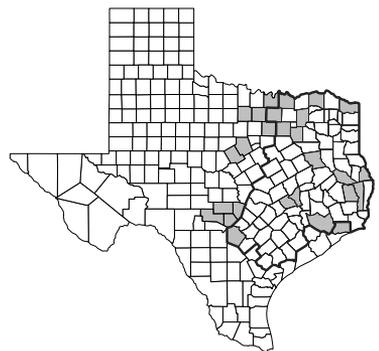
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*Pseudognaphalium austrotexanum**Pseudognaphalium helleri**Pseudognaphalium luteoalbum**Pseudognaphalium obtusifolium**Pseudogynoxys chenopodioides**Psilactis heterocarpa**Psilostrophe villosa**Pterocaulon virgatum**Pyrrhopappus carolinianus**Pyrrhopappus grandiflorus**Pyrrhopappus pauciflorus**Ratibida columnifera*

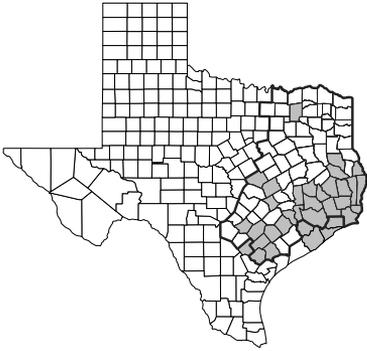
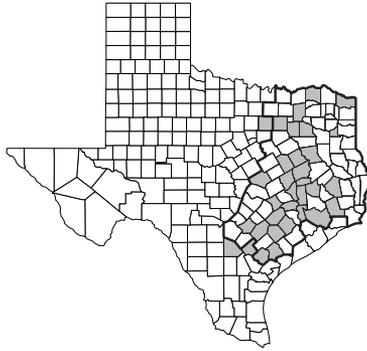
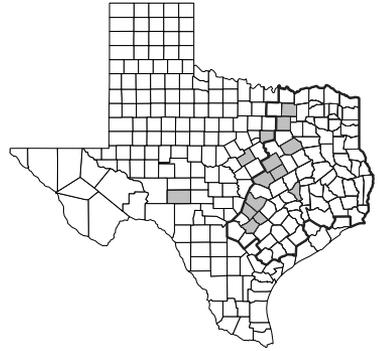
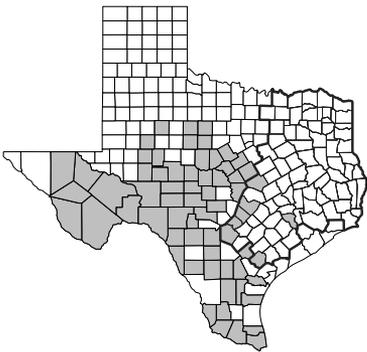
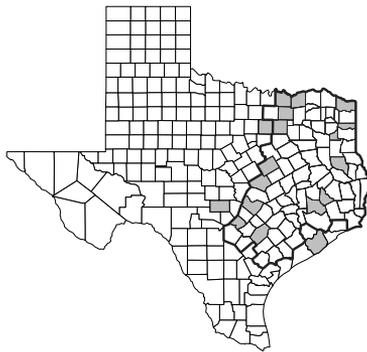
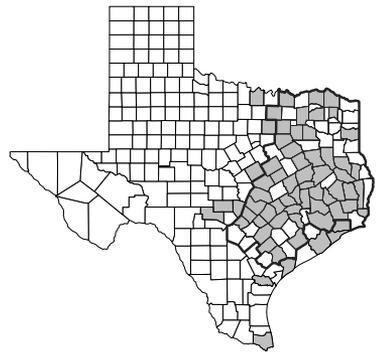
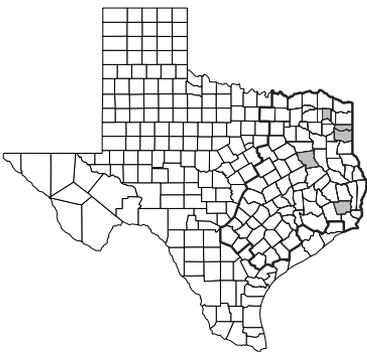
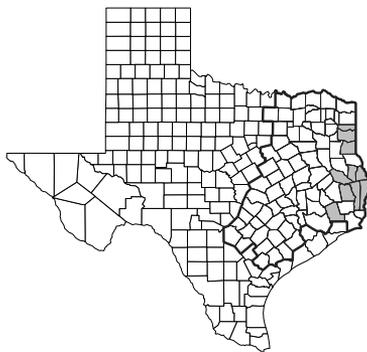
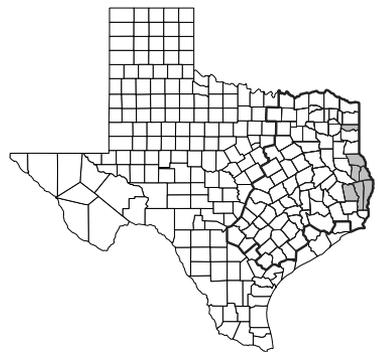
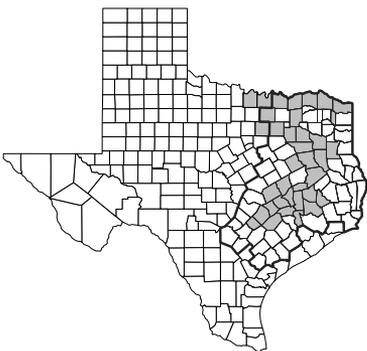
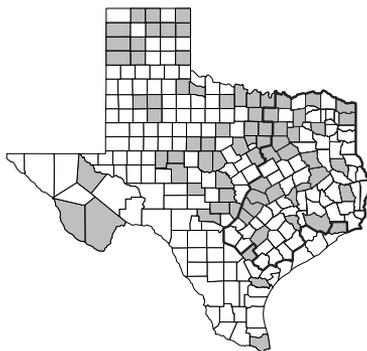
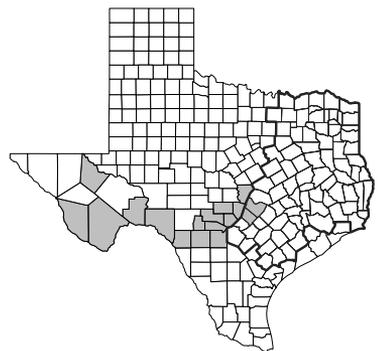
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*Ratibida peduncularis**Ratibida pinnata**Rayjacksonia annua**Rayjacksonia aurea**Rayjacksonia phyllocephala**Rudbeckia amplexicaulis**Rudbeckia fulgida* var. *palustris**Rudbeckia grandiflora**Rudbeckia hirta**Rudbeckia laciniata* var. *laciniata**Rudbeckia maxima**Rudbeckia missouriensis*

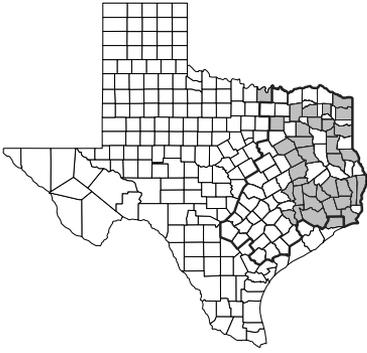
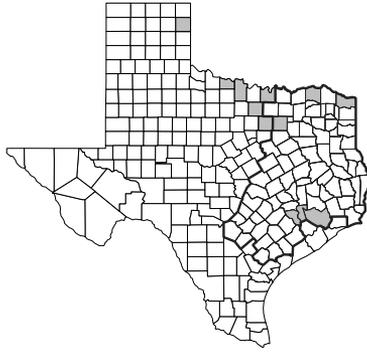
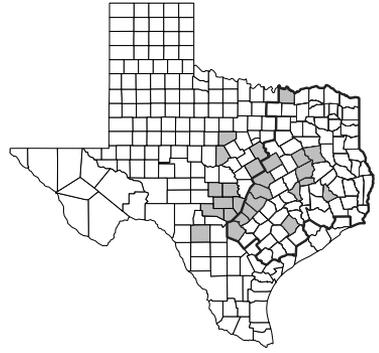
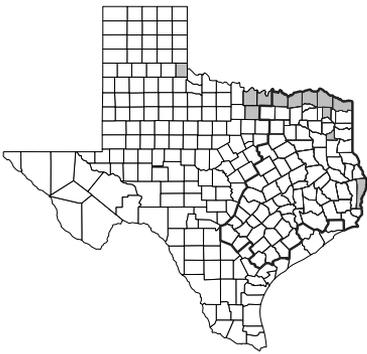
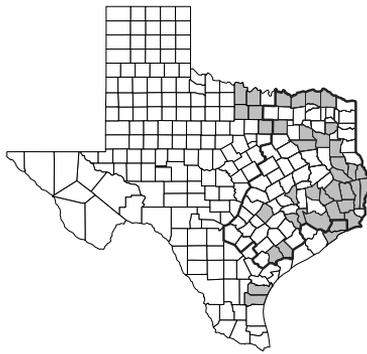
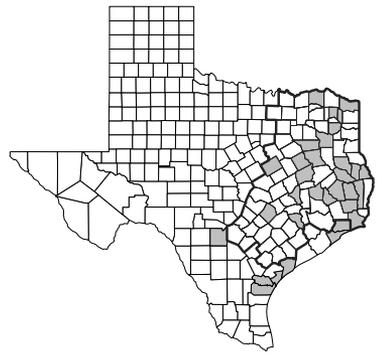
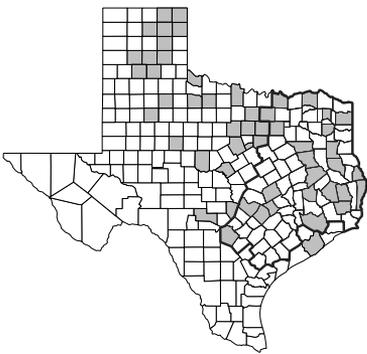
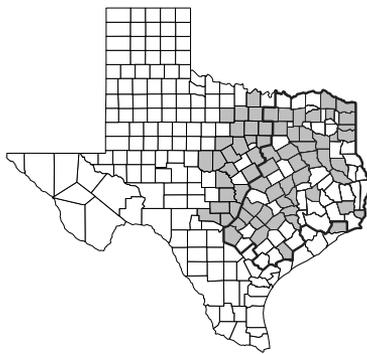
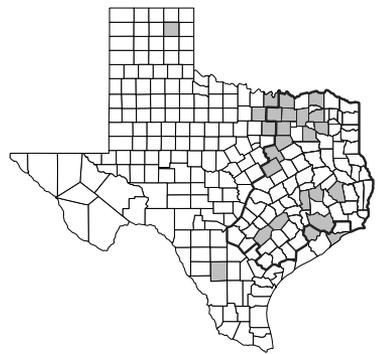
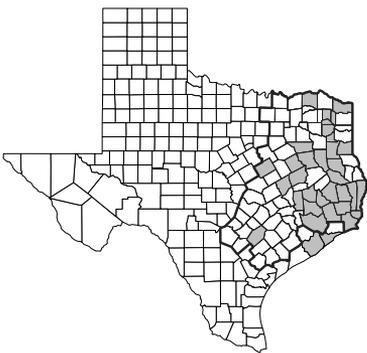
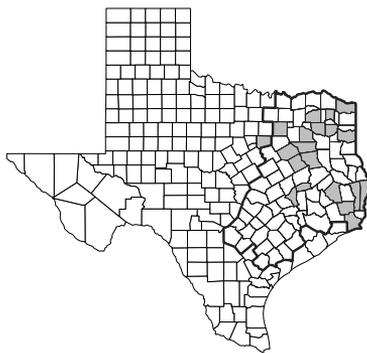
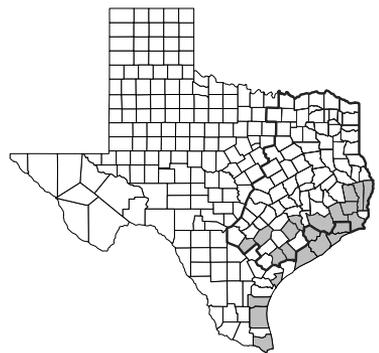
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*Rudbeckia scabrifolia**Rudbeckia subtomentosa**Rudbeckia texana**Rudbeckia triloba* var. *triloba**Sclerocarpus uniserialis* var. *uniserialis**Senecio ampullaceus**Senecio vulgaris**Silphium albidiflorum**Silphium asteriscus* var. *asteriscus**Silphium asteriscus* var. *simpsonii**Silphium integrifolium**Silphium laciniatum*

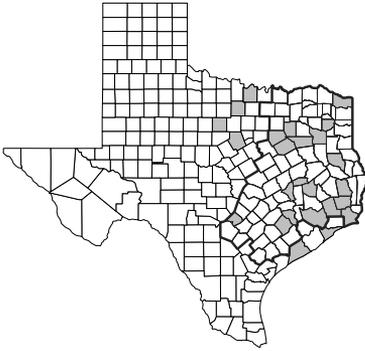
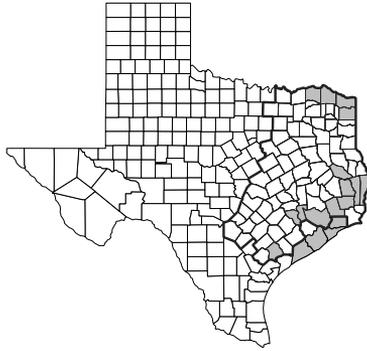
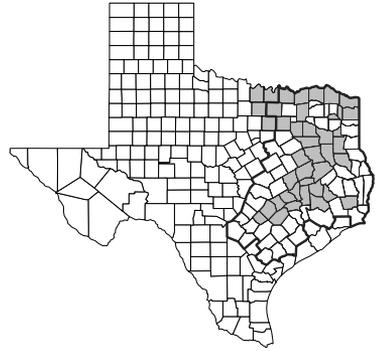
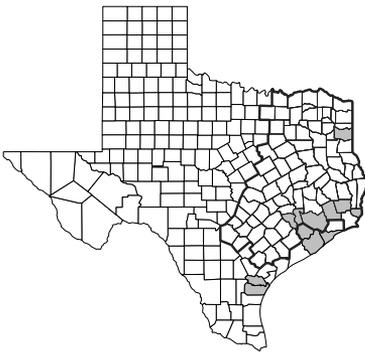
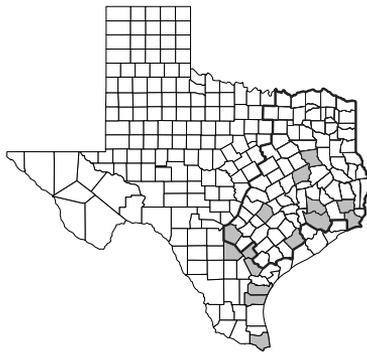
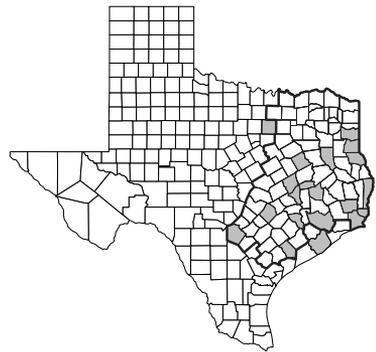
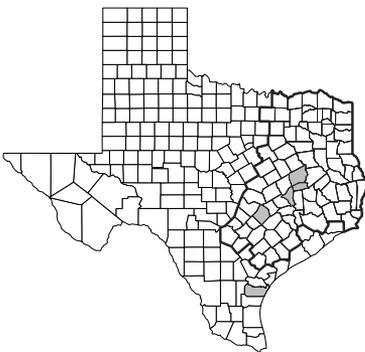
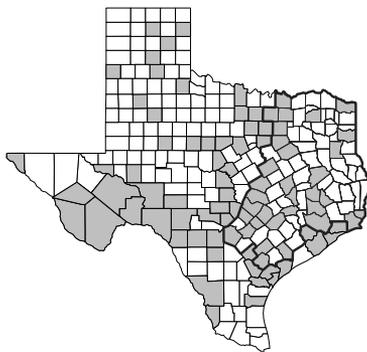
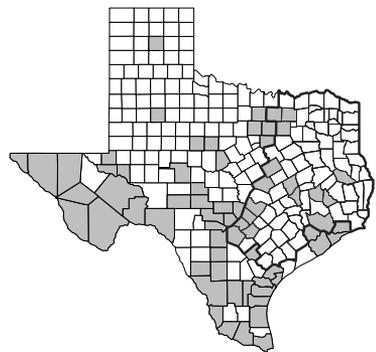
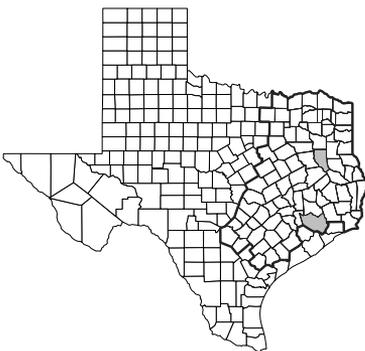
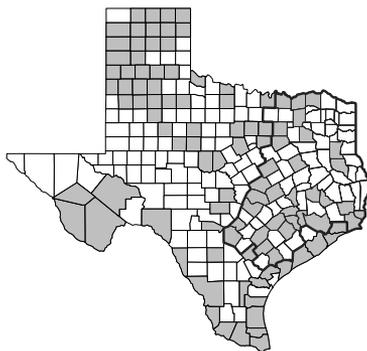
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*Silphium radula* var. *gracile**Silphium radula* var. *radula**Silybum marianum**Simsia calva**Smallanthus uvedalia**Solidago altissima* subsp. *altissima**Solidago arguta* var. *bootii**Solidago auriculata**Solidago caesia* var. *caesia**Solidago delicatula**Solidago gigantea**Solidago juliae*

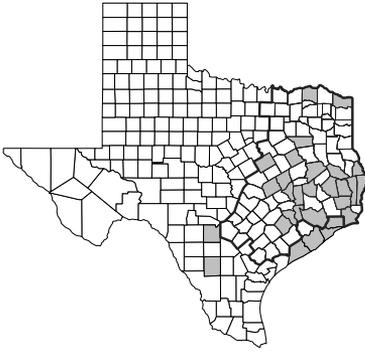
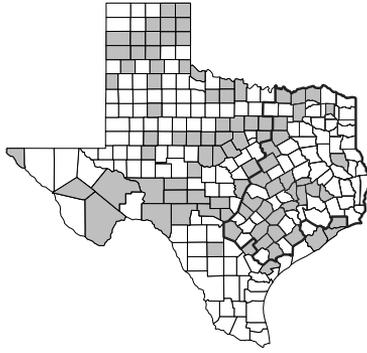
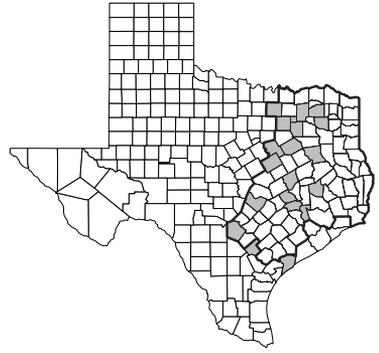
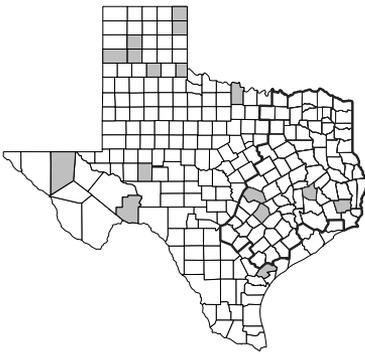
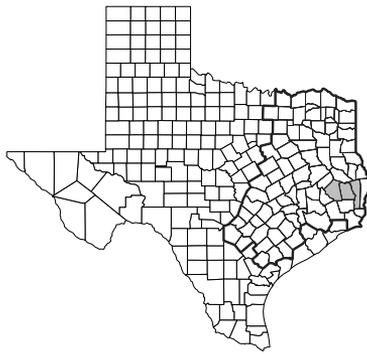
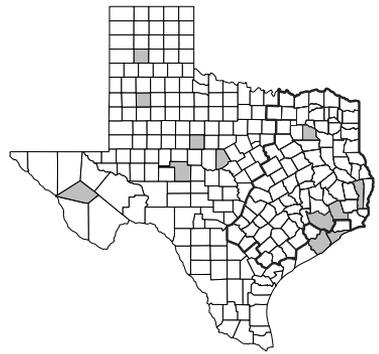
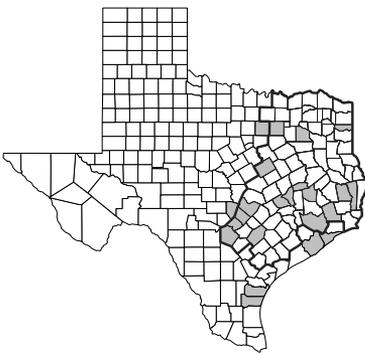
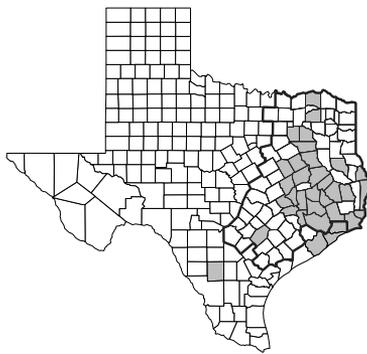
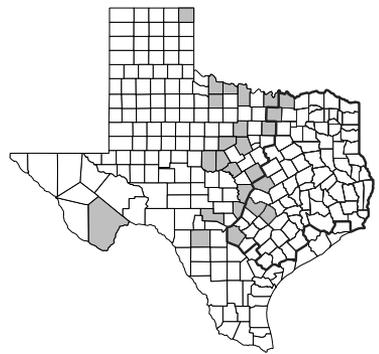
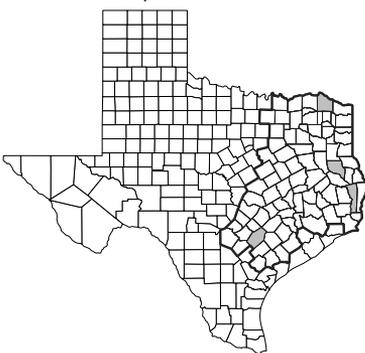
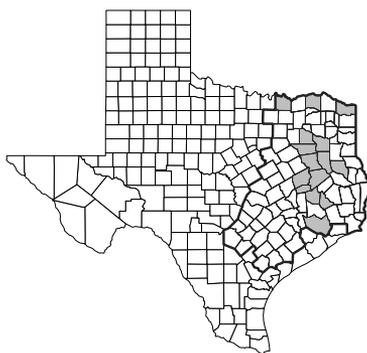
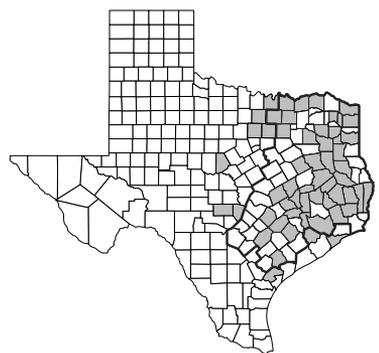
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*Solidago ludoviciana**Solidago missouriensis**Solidago nemoralis* subsp. *decemflora**Solidago nemoralis* subsp. *nemoralis**Solidago nitida**Solidago odora* subsp. *odora**Solidago petiolaris**Solidago radula**Solidago rigida**Solidago rugosa* subsp. *aspera**Solidago salicina**Solidago sempervirens* var. *mexicana*

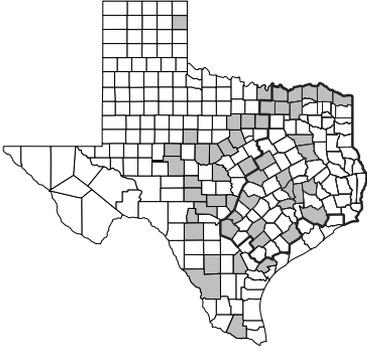
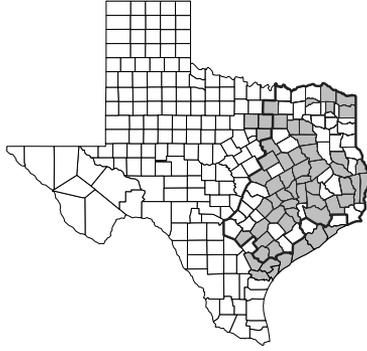
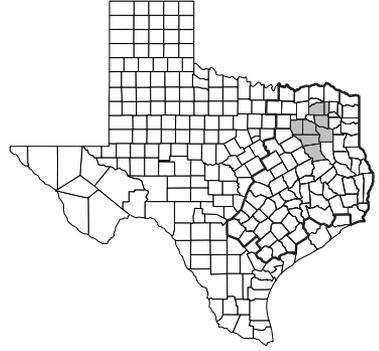
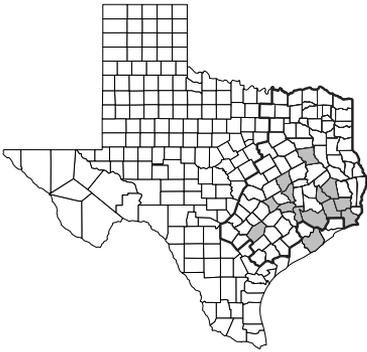
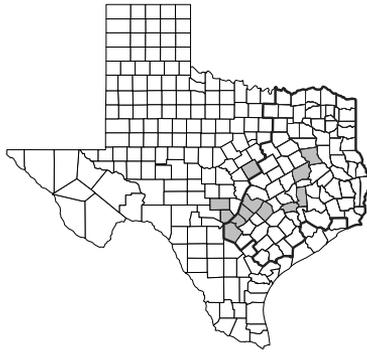
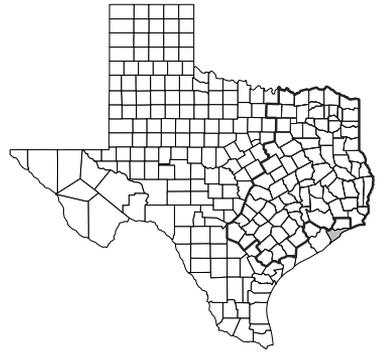
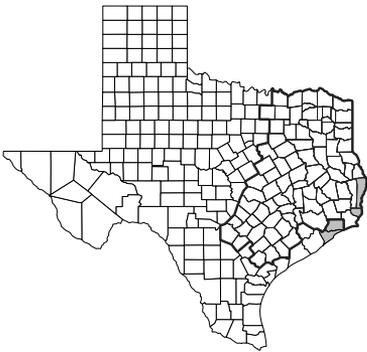
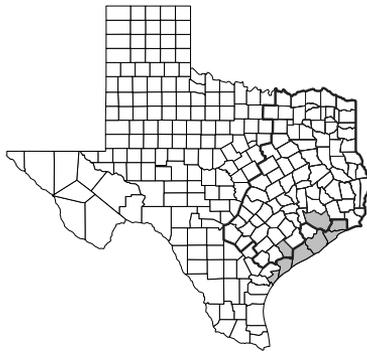
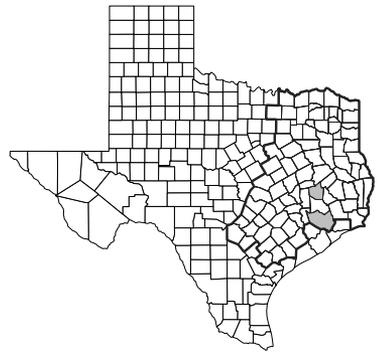
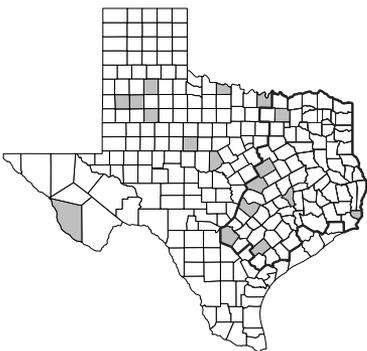
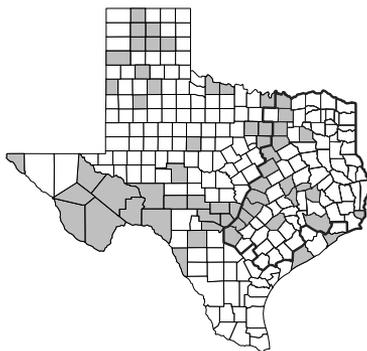
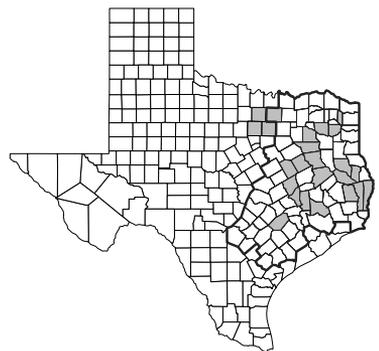
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*Solidago speciosa* var. *rigidiuscula**Solidago tortifolia**Solidago ulmifolia* var. *ulmifolia**Solidago virgata**Soliva anthemifolia**Soliva sessilis**Soliva stolonifera**Sonchus asper**Sonchus oleraceus**Sphagneticola trilobata**Symphyotrichum divaricatum**Symphyotrichum drummondii* var. *texanum*

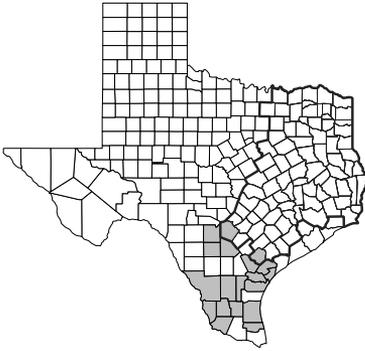
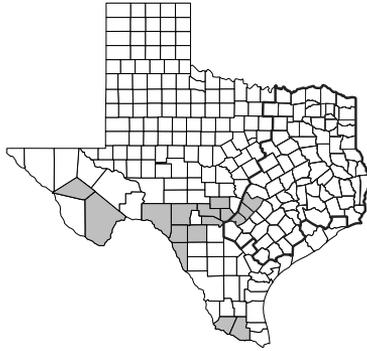
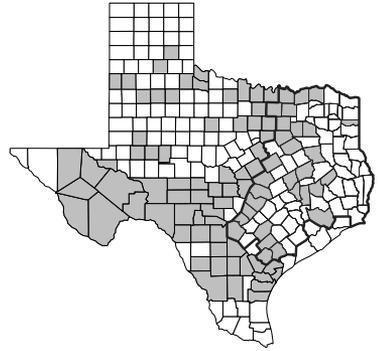
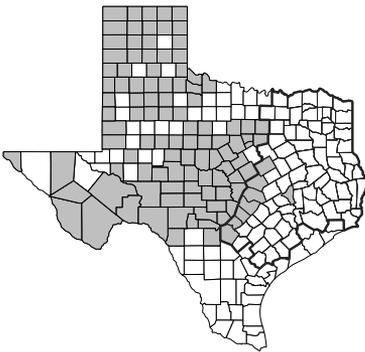
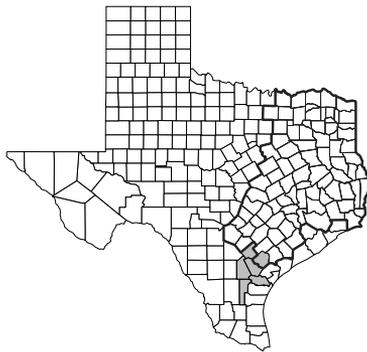
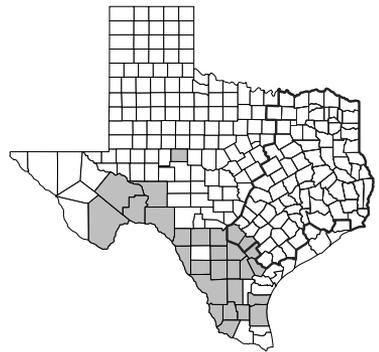
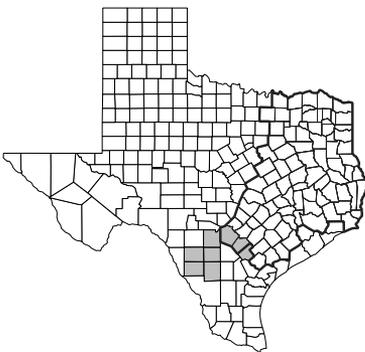
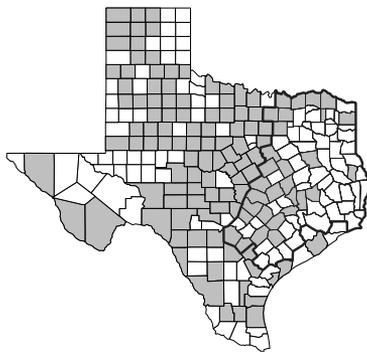
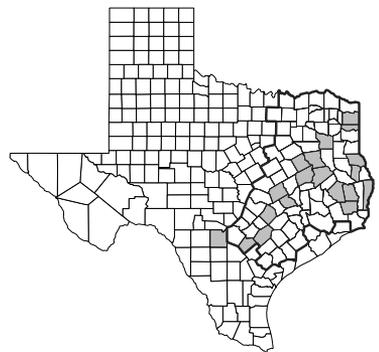
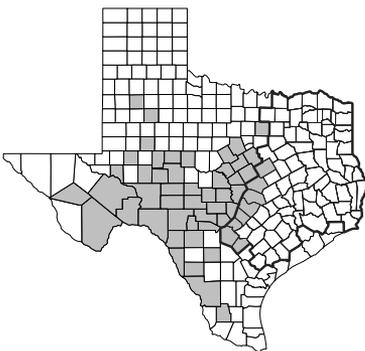
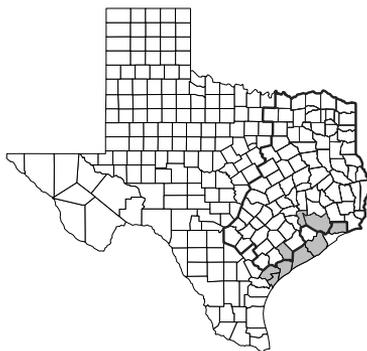
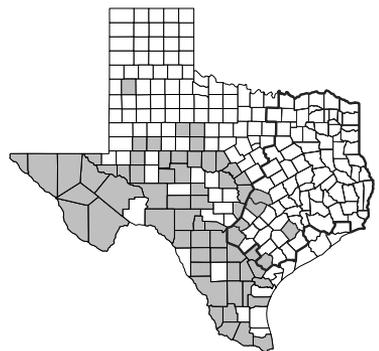
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*Symphyotrichum dumosum**Symphyotrichum ericoides* var. *ericoides**Symphyotrichum eulae**Symphyotrichum falcatum*
var. *commutatum**Symphyotrichum laeve* var. *purpuratum**Symphyotrichum lanceolatum*
subsp. *hesperium**Symphyotrichum lanceolatum*
subsp. *lanceolatum**Symphyotrichum lateriflorum**Symphyotrichum oblongifolium**Symphyotrichum ontarionis**Symphyotrichum oolentangiense**Symphyotrichum patens* var. *patens*

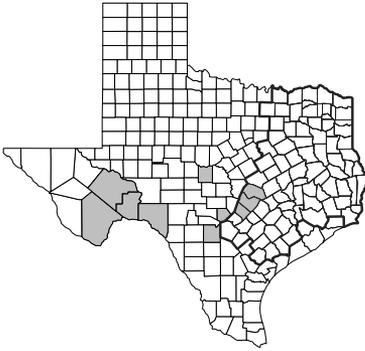
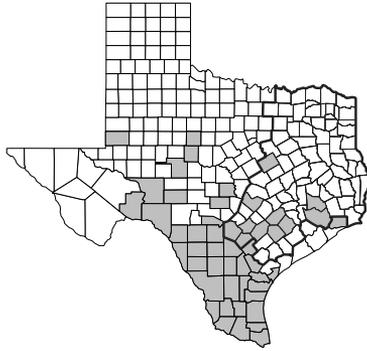
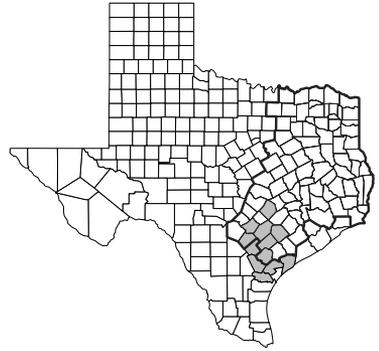
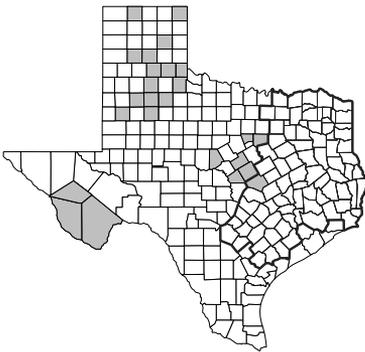
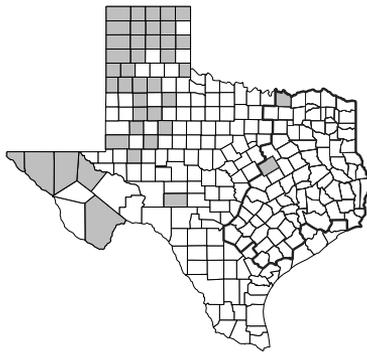
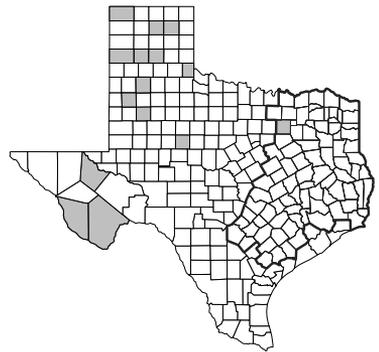
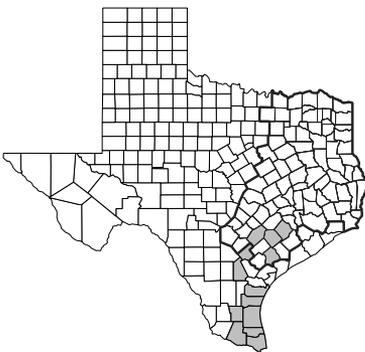
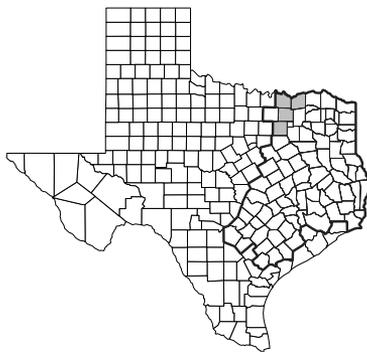
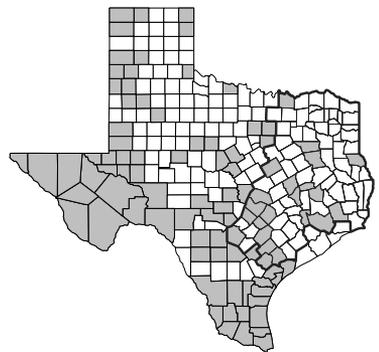
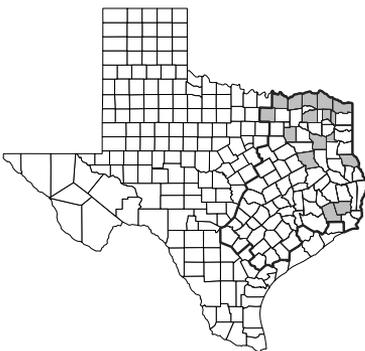
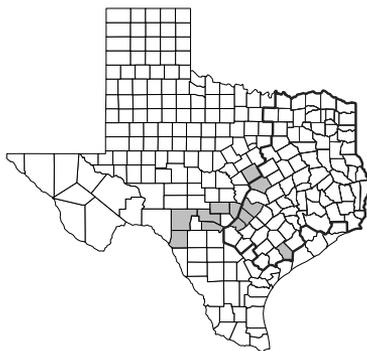
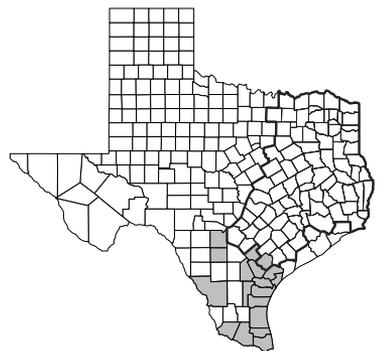
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*Symphyotrichum praealtum**Symphyotrichum pratense**Symphyotrichum puniceum* var. *scabicaule**Symphyotrichum racemosum**Symphyotrichum sericeum**Symphyotrichum squamatum**Symphyotrichum subulatum**Symphyotrichum tenuifolium*
var. *tenuifolium**Tagetes erecta**Taraxacum erythrospermum**Taraxacum officinale**Tetragonotheca ludoviciana*

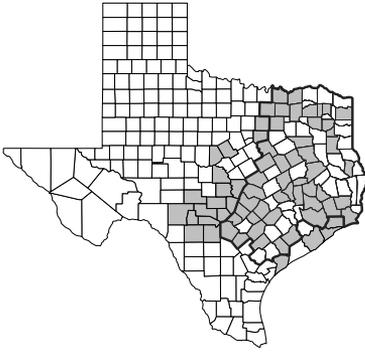
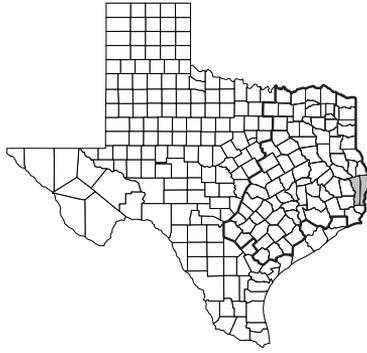
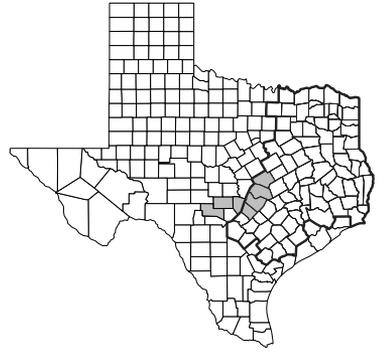
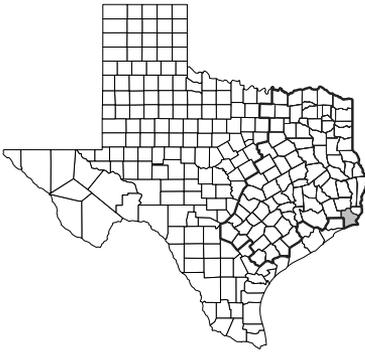
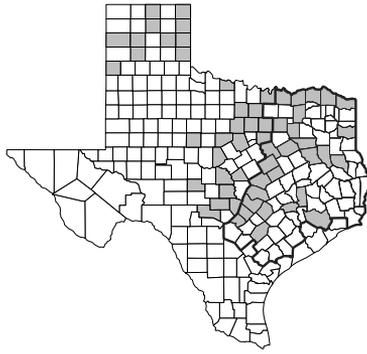
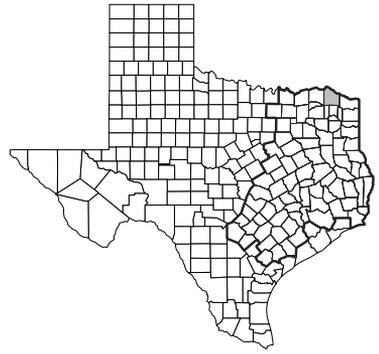
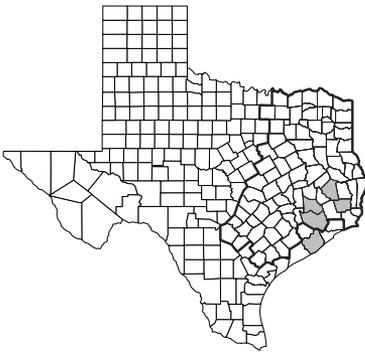
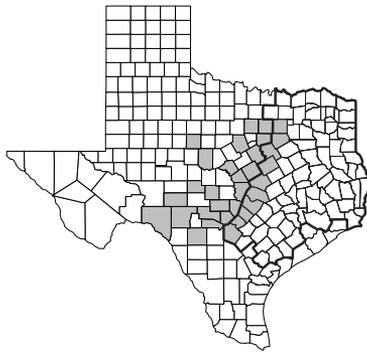
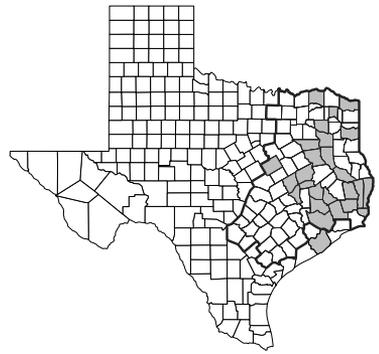
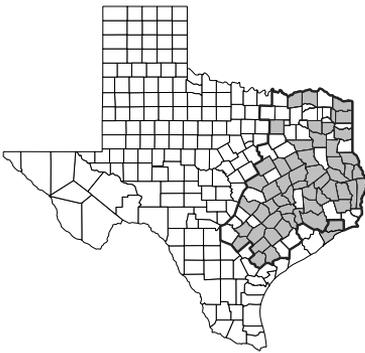
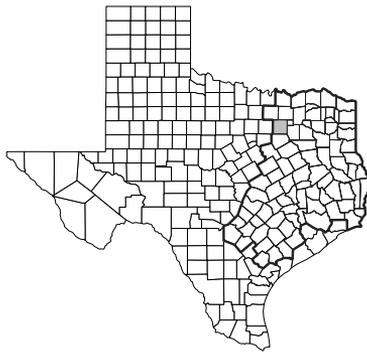
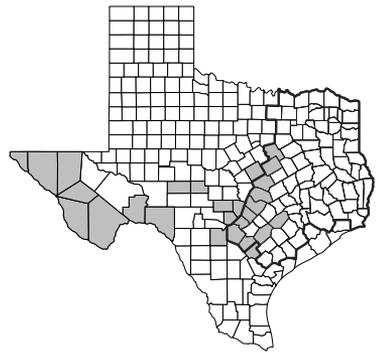
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*Tetragonotheca repanda**Tetragonotheca texana**Tetraneuris linearifolia* var. *linearifolia**Tetraneuris scaposa* var. *scaposa**Tetraneuris turneri**Thelesperma ambiguum**Thelesperma burridgeanum**Thelesperma filifolium**Thelesperma flavodiscum**Thelesperma simplicifolium**Thurovia triflora**Thymophylla pentachaeta*

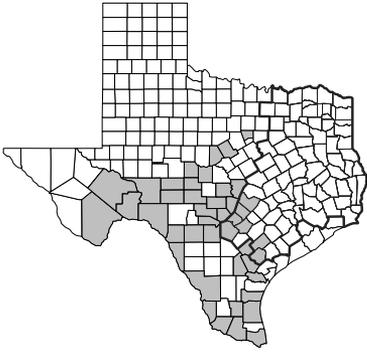
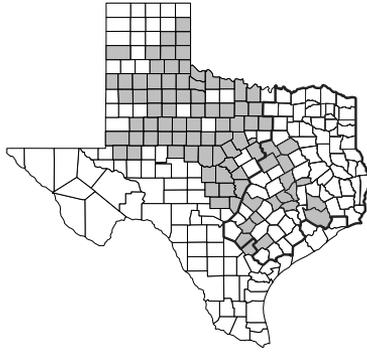
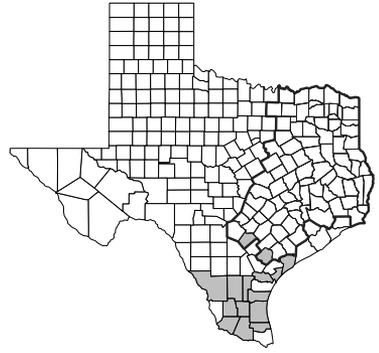
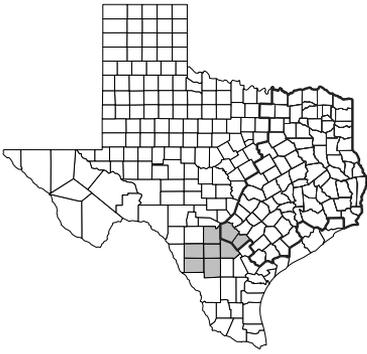
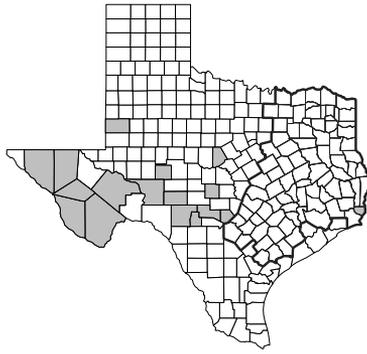
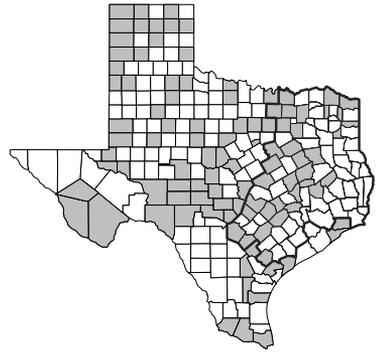
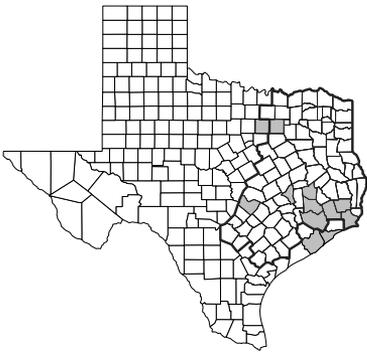
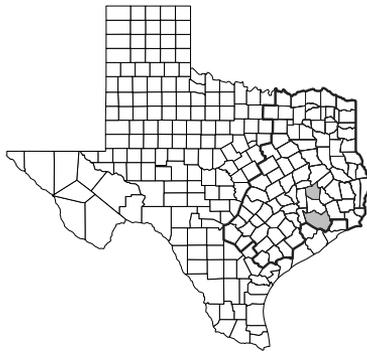
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*Thymophylla puberula**Thymophylla tenuiloba* var. *tenuiloba**Thymophylla wrightii**Townsendia exscapa**Tragopogon dubius**Tragopogon porrifolius**Trichocoronis wrightii* var. *wrightii**Verbesina alternifolia**Verbesina encelioides**Verbesina helianthoides**Verbesina lindheimeri**Verbesina microptera*

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*Verbesina virginica**Verbesina walteri**Vernonia x guadalupensis**Vernonia x illinoensis**Vernonia baldwinii**Vernonia fasciculata**Vernonia gigantea**Vernonia lindheimeri**Vernonia missurica**Vernonia texana**Vernonia vulturina**Viguiera dentata*

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*Wedelia acapulcensis**Xanthisma texanum* var. *drummondii**Xanthisma texanum* var. *orientale**Xanthisma texanum* var. *texanum**Xanthium spinosum**Xanthium strumarium**Youngia japonica**Zinna violacea*

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