

Echinacea purpurea (L.) Moench

Standardized Common Name: *Echinacea purpurea*

Other Common Names: Missouri Snakeroot, Purple Coneflower

Family: Asteraceae (Compositae)

Parts in Commerce: Whole herb (small stems, leaves and flowers, avoiding large stems), usually fresh, and/or roots, often with rhizome; fruits (“seeds”) also sometimes used

Identification:

Whole herb

- Stems variable in color, longitudinally ridged or striated, in upper portion of plant often pubescent with short stiff hairs; whole stems branching
- Leaves lanceolate to broadly ovate, quite variable in size, the larger leaves usually ovate and >5 cm broad
- Larger basal leaves long-petioled; uppermost stem leaves sessile
- Leaf base rounded to cordate in large leaves, sometimes with acutely tapering extension of blade down petiole, or rounded to tapering in small leaves
- Leaf apex acute to narrowly acute
- Leaf margins toothed in all but the smallest leaves, with at least a few shallow, widely spaced teeth
- Main leaf veins 3 or 5 (rarely 1 in small leaves), with branching secondary veins
- Both leaf surfaces bearing short stiff 2-celled hairs, feeling rough especially when stroked toward base
- Heads terminal, the receptacle conical to ovoid or hemispherical, rarely flat-topped at maturity, often flattened in early flowering
- Receptacular bracts (phyllaries) at base of head in usually 4 overlapping whorls, often recurved, usually pubescent at least on margins
- Ray florets purple to pink or rarely whitish, in 1 series, usually reflexed or parallel to stem, occasionally spreading outward
- Ray florets (2.5–)3.5–5.0(–6.0) cm long, mostly over 5 mm broad, with 2- or rarely 3-toothed apex, pubescent on outer surface with short inconspicuous hairs
- Stiff awned receptacular bracts (paleae) subtending individual disk florets longer than disk florets; awn tip straight, reddish or orange
- Mature fruit (3–)4.5–5.5(–6.0) mm long, without colored striations, with pappus usually of 4 teeth

at apex (or 3 teeth in fertile ray florets), rarely of 1 large tooth or absent

- Odor weak, aromatic
- Taste weak, initially sweetish, then slightly bitter

Roots

- Rhizome shorter than roots, irregularly shaped and wrinkled, usually 5–10 mm thick
- Roots fibrous, numerous, to 15 cm long, 1–3 mm thick, deeply longitudinally wrinkled when dry, sometimes spirally twisted
- Rhizome and roots light or reddish brown to dark brown or black
- Root tough when fresh, fibrous when dried
- Root in cross-section shows very thin cork or epidermis; ring of cortex (containing orangish resin canals); large vascular tissue with xylem in a few broad wedges containing strands of parenchyma, separated by distinct parenchyma rays or forming a nearly solid cylinder; very small area of central parenchyma
- Rhizome hard; fracture tough, externally fibrous
- Rhizome in cross-section shows very thin cork; narrow cortex (containing stone cells surrounded by black pigment); dense ring of xylem; large cream-colored pith (containing orangish resin canals and stone cells surrounded by black pigment)
- Odor weak, aromatic and acrid, characteristic
- Taste weak, initially sweet, then bitter, causing a tingling sensation and salivation when chewed

Adulterants: Roots of *Parthenium integrifolium* L. (legitimately sold as Prairie Dock) have repeatedly been sold as *E. purpurea*. Both are members of the aster family and are sometimes called Missouri Snakeroot, which may have been the historical cause of substitution. However, the two are easily distinguished, and any such substitution at the present time can only be attributed to deliberate fraud. Several characters distinguish *P. integrifolium*, including:

- Outer surface black (occasionally seen in *E. purpurea* also)
- Irregularly shaped taproot with several tapering branches emerging from lower surface; taproot and main branches >3 mm thick
- Black pigment present in roots; in cross-section, at least one ring of small black spots can be seen near outside of root

- Xylem in numerous narrow radial wedges
- Large taproots have vascular tissue that contains several rings of parenchyma interspersed with pigment deposits, giving the appearance of concentric circles of light and dark spots
- Taste bitter, not causing tingling or salivation

Other species of *Echinacea* have traditional uses as well. Current commercial practice favors using only the taproots of *E. angustifolia* DC. and *E. pallida* (Nutt.) Nutt. (cf.), which are easily distinguished from the roots of *E. purpurea* if examined before excessive processing has occurred. Aboveground parts from these and related species are likewise easily distinguished by their narrow leaves with unbranched veins and entire leaf margins (see illustration in the treatment of those species).

Echinacea laevigata (C. L. Boynton & Beadle) S. F. Blake, which is an uncommon southeastern species, is probably the species most easily confused with *E. purpurea* in the field, as its leaves are up to 6 cm broad with serrate margins. It may be distinguished by several features:

- Leaves glabrous, not rough, with unbranched main veins and with nearly entire margins above
- Involucral bracts (phyllaries) in 1–3 series and usually lacking stalked hairs
- Ray florets as long as in *E. purpurea*, but usually only 3–5 mm broad
- Receptacular bracts (paleas) with frequently incurved rather than straight awns
- Fruits usually have horizontal colored striations and a pappus of 1 large tooth

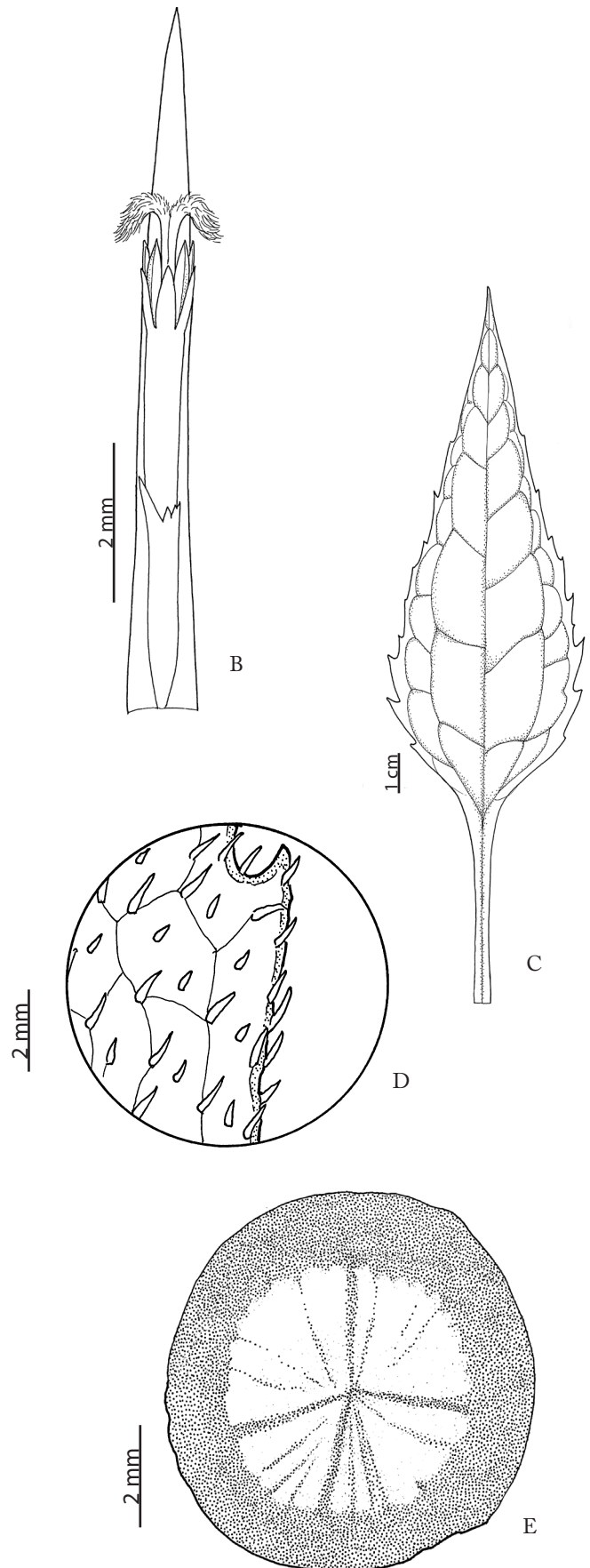
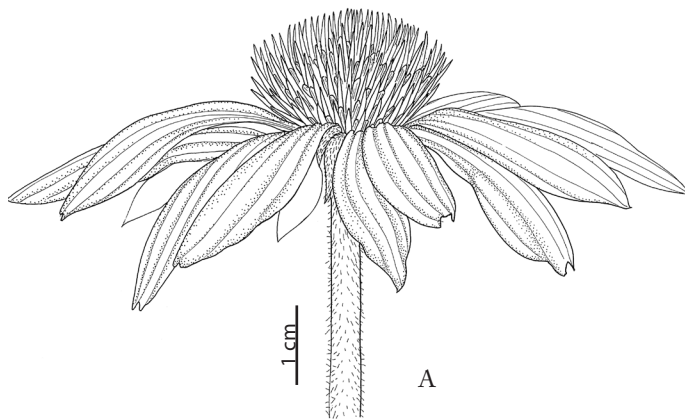


Figure 23: a–e, *Echinacea purpurea* head, disc floret, leaf, close-up of lower surface of leaf, and root cross-section.

Taxonomy: *Echinacea* includes nine or four species of North American perennial herbs, depending upon which treatment is accepted. *Echinacea purpurea* is defined identically by either treatment, as it is quite distinct from other members of the genus, being placed in its own subgenus by Binns et al. (2002). The basionym is *Rudbeckia purpurea* L. A technical taxonomic problem with the application of the name *E. purpurea* has been identified, but because of the economic importance of this species, it is expected that the name will be formally conserved in order to preserve its current meaning.

Description: Perennial herb with fibrous roots; stems 50–80(–180) cm high, branching, usually pubescent on upper portion. Leaves alternate, mostly petiolate; basal leaves long-petioled, ovate to lanceolate, (5–)15–22(–30) cm long, (1–)5–10(–15) cm broad; stem leaves narrowly to broadly lanceolate or rarely ovate, (4–)11–17(–24) cm long, (1–)2–7(–11) cm broad, the upper leaves sessile; base rounded to tapering, cordate, or rounded and abruptly tapering at petiole, sometimes asymmetrical, the petiole of cauline leaves sometimes appressed to the stem; apex acute; margins usually serrate to dentate or undulate; main veins branching, 3 (or 1 or 5); both surfaces, especially the upper, pubescent with short 2-celled stalked hairs. Inflorescence a capitulum (head); receptacle 1.5–3.0(–3.5) cm high, conical to hemispherical or flattened; involucre bracts (phyllaries) in 4 series, (8–)10–15(–20) mm long, green, usually recurved, usually pubescent on outer surface; receptacular bracts (paleae) 9–13(–15) mm long, reddish, straight-awned; awn golden with red or orange tip.

Ray florets ligulate, usually sterile, (2.5–)3.5–5.0(–6.0) cm long, (3–)5–13(–19) mm broad, dark pink to purple or rarely pinkish white, parallel to stem or reflexed to spreading, pubescent at least on outer surface. Disk florets symmetrical, tubular; corolla tube 4.5–5.5 mm long, 5-lobed; corolla lobes usually green and pink, rarely purple or orange, with stalked or sessile trichomes; anthers 5; style 2-branched, usually purple, rarely pale. Fruit a cypsela, 3–6 mm long; pappus of 4 equal teeth in disk florets (3-toothed in ray florets), or of 1 large tooth, or rarely absent.

References:

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- Binns SE, Baum BR, Arnason JT. A taxonomic revision of *Echinacea* (Asteraceae: Heliantheae). *Syst Bot*. 2002;27:610–632.
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