Echinacea angustifolia DC.

Echinacea Angustifolia Root

Echinaceae angustifoliae Radix

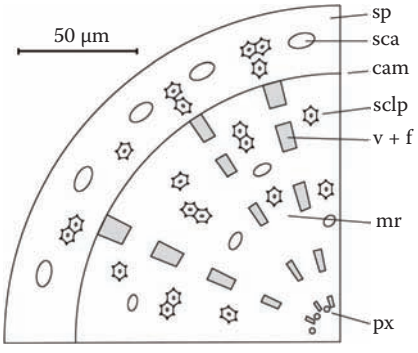
Asteraceae

Echinacea angustifolia is one of the three primary forms of *Echinacea* used in Western herbalism to stimulate immune function. Of the species, *E. angustifolia* is preferred by modern herbalists. It can be adulterated with the botanical *Parthenium integrifolium* (see separate entry for *Parthenium*) and other species of *Echinacea*.

Transverse section: Dark brown epidermis of polygonal cells is present in primary tissue; in older roots with secondary growth, cork is present; secondary phloem and xylem contain secretory cavities up to 200 µm diameter and sclereids up to 50 µm diameter, found singly or in groups of two or three (up to 10); secondary xylem consists of radial rows of vessels alternating with broad rays; sclereids are located in the rays only, whereas secretory cavities are scattered throughout the xylem parenchyma; black phytomelanin fills the triangular intercellular spaces around the sclereids, causing them to appear star shaped; vessels up to 60 µm diameter are arranged in small groups separated by parenchyma; fibers, usually without phytomelanin coating, are frequently attached to the vessels; small pith; exterior to the pith, a few groups of primary xylem with narrow vessels are found at the inner ends of the xylem rays.

Longitudinal section: Secondary phloem and xylem contain phytomelanin-coated sclereids 50–300 µm long that have numerous pit channels and a small lumen; fibers in secondary xylem have a less thickened cell wall and slender shape with pointed ends; reticulate, scalariform, or bordered-pitted vessels; radially elongated secretory cavities in secondary phloem and xylem.

Powder: Fragments of epidermis; colorless parenchyma; reticulate, scalariform, or bordered-pitted vessels; frequent sclereids coated with phytomelanin are mostly in elongated multiseriate groups; few bundles of fibers are found without phytomelanin.



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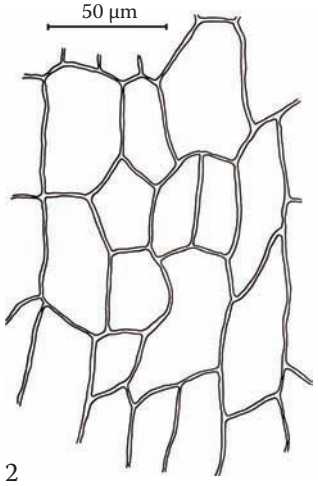

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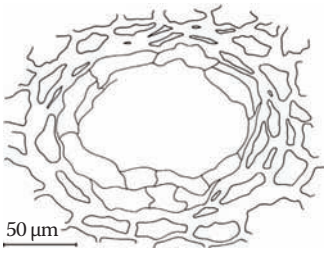

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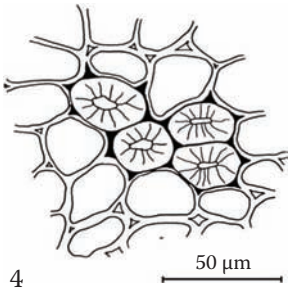

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