

## PURPLE CONEFLOWER

*Echinacea angustifolia* DC.

Plant Symbol = ECAN2

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### Alternative Names

Kansas snakeroot, echinacea, snakeroot, narrow-leaved purple coneflower, scurvy root, comb flower, black susans, and hedge hog

### Uses

**Ethnobotanic:** The purple coneflower, *Echinacea angustifolia*, was and still is the most widely used medicinal plant of the Plains Indians (Kindscher 1992). It was used as a painkiller and for a variety of ailments, including toothache, coughs, colds, sore throats, and snake bite. *Echinacea angustifolia* was used as an analgesic by the Cheyenne, the Dakota, the Fox, and the Winnebago (Moerman 1986). Purple coneflower is used as an antidote for poisonous conditions, snake bite, and other poisonous bites by the Winnebago, Ponca, Pawnee, Omaha, Dakota, and by most Montana tribes (Gilmore 1977). The root was used to relieve toothache by the Dakota, Omaha, Pawnee, Ponca, Teton Sioux, and Winnebago (Moerman 1986). The Cheyenne chewed the root to stimulate the flow of saliva, which was especially useful for Sun Dance participants as a thirst preventative (Hart 1981). A wash was used as

a dressing for burns to relieve pain by the Dakota, Winnebago, Omaha, Pawnee, and Ponca.

The Fox used purple coneflower as an anti-convulsive and gastro-intestinal aid. The Kiowa chewed coneflower root for coughs and sore throats. The Omaha and Pawnee used a smoke treatment as a remedy for headache. A poultice of smashed roots were applied as an anesthetic to arms and hands by the Omaha, and a poultice was applied to enlarged glands as a treatment for diseases such as mumps by the Pawnee, Ponca, Dakota, and Winnebago. Purple coneflower was used to increase endurance in the sweat lodge ceremony by the Dakota, Pawnee, Ponca, and Winnebago. The Lakota ate the root and green fruit when they were thirsty or perspiring (Rogers 1980, Munson 1981). The Teton Sioux used coneflower to cure tonsillitis. The Omaha and Ponca used the plant as eyewash. When the roots were mixed with blazing star (*Mentzelia laevicaulis*) and boiled, the resulting tea was drunk for smallpox (Kindscher 1992). Purple coneflower roots mixed with puffball (*Lycoperdon* species) spores and skunk oil were used in the treatment of boils. The smoke from burning purple coneflower was used as a treatment for distemper in horses by the Ponca, Dakota, Pawnee, and Winnebago.

The Omaha, the Lakota, and the Ponca sometimes used the seed heads to comb their hair (Kindscher 1992). Purple coneflower stalks were used in play by Pawnee children. They would whirl two flower stalks one around the other, the two stalk touching by the flower heads.

The purple coneflower was the only native prairie plant popularized as a medicine by folk practitioners and doctors, and was used extensively as a folk remedy (Kindscher 1992). The use of the purple coneflower root was used by early settlers in Oklahoma as an aid in nearly every kind of sickness. If a cow or a horse did not eat well, people administered *Echinacea* in its feed.

*Echinacea* is widely used as an herbal remedy today, primarily as an immuno-stimulant. *Echinacea angustifolia* root was found to possess mild antibiotic activity against *Streptococcus* and *Staphylococcus aureus* (Stoll et al. 1950). A pentane-oil extracted from the root was found to be inhibitory to Walker carcinosarcoma 256 and P-388 lymphocytic leukemia

(Voaden and Jacobson 1972). Italian investigators found the wound-healing effects of *Echinacea* to be attributable to echinacin B (Bonadea et al. 1971). Perhaps the most important finding so far is the discovery of large, highly active polysaccharide molecules in *E. angustifolia* that possess immunostimulatory properties (Wagner and Proksch 1985, Wagner et al. 1985). Stimulation of the immune system appears to be strongly influenced by dose level. Recent pharmacological studies indicate that a 10-mg/kg daily dose of the polysaccharide over a ten-day period is effective as an immuno-stimulant. Increases in the daily dosage beyond this level, however, resulted in "markedly decreased pharmacological activity" (Wagner and Proksch 1985, Wagner et al. 1985). Other research has shown that the purple coneflower produces an anti-inflammatory effect and has therapeutic value in urology, gynecology, internal medicine, and dermatology (Wagner and Proksch 1985).

*Echinacea angustifolia* also contains chemical compounds that are insecticidal. One such compound is toxic to mosquitoes and houseflies; another substance, echinolone, disrupts insect development (Hartzell 1947, Jacobson 1954, Voaden and Jacobson 1972). Researchers in the Horticulture Department of South Dakota State University are currently attempting to identify the *Echinacea angustifolia* germplasm containing the highest level of echinolone. It will be used in manufacturing and insecticide for sunflower crops (Foster 1991).

*Ornamental:* The purple coneflower is often grown simply for its ornamental value, especially for its showy flowers. The best possibility for obtaining a new cultivar is in the hybrids between *Echinacea purpurea* and *Echinacea angustifolia* var. *angustifolia*, whose progeny are compact, rounded, and bushy plants about two feet in diameter (M<sup>c</sup>Gregor 1968).

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

### Description

*General:* Sunflower family (Asteraceae). Purple coneflower is a perennial herb 1.5-6 dm (0.5-2 ft) tall, with a woody taproot. The plant has one to several rough-hairy stems, mostly unbranched. Leaves are alternate, simple, and narrowly lance-shaped 5-30 cm (2-12 in) long, 1.5-4 cm (0.5-1.5 in) wide, with entire margins. Flowers look like

lavender sunflowers with the heads 4-7.5 cm wide (1.5-3 in) wide, at the ends of long stalks. Flowers bloom from June to July. Ray flowers are 2-4 cm (0.75-1.5 in) long, spreading or drooping, light pink to pale purple. The disk flowers are 5-lobed, brownish-purple, and situated among stiff bracts. Pollen grains are yellow. Fruits are small, dark, 4-angled achenes.

### Distribution

The purple coneflower grows in open rocky prairies and plains. It is found primarily in the Great Plains, east of the Rocky Mountains from Texas to Montana and Saskatchewan, to eastern Oklahoma, western Iowa, and western Minnesota. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

### Establishment

Native *Echinacea* species are dwindling in the wild from loss of habitat and over-harvesting. *Echinacea angustifolia* is threatened on one hand by conversion of native habitat, and on the other hand by heavy harvesting to serve the herbal pharmaceutical industry. It takes three to four years for roots to reach harvestable size (Foster 1991). Yields for cultivated, dried roots of three-year-old *Echinacea purpurea* grown at Trout Lake, Washington, were 131 kg/ha (1,200 lbs/acre) (Foster 1991). According to Richo Cech (1995), a mature two-year old *E. purpurea* plant yields 2.25 pounds of fresh flowering aerial portions and 0.5 pounds of fresh root per plant. Yield for the purple coneflower is not available, but probably would be less because the plant is smaller.

### Propagation from Cuttings

Purple coneflower can be propagated by division of the crowns. This technique results in stronger plants initially and eliminates the tedious nurturing and tending of the slow-growing seedlings (Kindscher 1992). Harvest roots when plants are dormant, when leaves begin to turn brown. Wash roots and remove most for use. Then carefully divide the crown by hand to make one to five "plantlets." Replant the divisions as soon as possible. It is important that they don't dry out, so if replanting is delayed a couple of hours, dip the plants briefly in water and keep them in a sealed plastic bag in a cool, shady place until you are ready to replant them. When replanting, ensure that the remaining fine roots are well spread out in the planting hole and the soil is pressed firmly around the plant. These plantlets can be grown in flats in the greenhouse during the winter to re-establish their root systems, then replanted in the field the following spring for another round of production.

## Seed Propagation

- *Echinacea angustifolia* has a reputation for poor germination. Actually, when the proper steps are taken, it has extremely dependable germination. The following information is provided by Richo Cech (1995).
- Seeds require a 12-week period of cold conditioning, or cold stratification, to germinate.
- Outdoors, scatter seed thinly on well-limed, weed-free, open beds in the fall or early winter, covering the seed with a light sifting of potting soil. The seed is thereby subjected to the optimal conditions of oscillating temperatures, an extremely important pre-germination environment for *Echinacea* seed.
- An acceptable alternative to outdoor cold conditioning is to mix the seeds with damp sand and switch between the refrigerator and freezer several times over a period of 12 weeks. This seed may then be sown directly in the garden or field. The conditioned seed may also be sown in flats and placed in the greenhouse or outside.
- Another method of cold stratification is to wrap the seeds in wet peat moss and place them in a plastic bag in the refrigerator for two to four months. Plant seeds in deep plug trays; this allows the taproot to develop straight down to a depth of six or eight inches prior to transplanting. Seeds should be barely covered with soil when planted.
- *E. angustifolia* seedlings have a tendency toward transplant shock and slow growth, especially if the development of the taproot is compromised by keeping seedlings in the flats or plots too long. Seedlings have little vigor and must be carefully weeded and watered.
- For field cultivation, close spacing of the plants allows for optimal root yield per area planted. Plants may be thinned to 6-12 inch spacing in the row or bed. Keep relatively free of weeds and water occasionally during dry spells. Over-watering should be avoided, for the root crowns are subject to rotting. A sparing side dressing of organic compost, usually in the mid-spring, will assist this sometimes slow-growing herbaceous perennial in outranking competitive weeds.

An ounce of well-cleaned *E. angustifolia* seed contains approximately 8,000 seeds. A pound contains around 128,000 seeds. Given a very tight spacing of six inches between the plants and one foot between the rows, an acre would contain 87,200 plants. Given a 68% germination rate, a pound of good seed could produce an acre of plants. This same acre, dormant harvested for the roots at the end

of the second year of growth, would produce (at ¼ lb. per root) 21,800 lbs of fresh root.

## Harvesting and Processing the Seed

- Seed can be harvested during the fall of the second year. Harvest the seed in autumn when seeds are ripe, before the fall rains set in. Seed should be from the largest and most vital plants.
- Stop watering when the seeds begin to mature – excessive watering at this stage is not needed and it may damage the seed crop.
- Snip the coneheads off and put them in buckets. If the seed is still a little green, dry the coneheads in the sun.
- Separate the seed from the chaffy debris. It is important to break up the coneheads without damaging the seed. Run the seed through a hammermill or compost chopper at low RPM through a one-inch screen. Then pass the seed and chaff through a ¼ inch stationary screen. Shake the remaining seed and chaff through a screen that is too small for the seed to pass. What you have left is the seed with only the chaff that is the same size as the seed.
- Lay out a flannel sheet and pour a cupful of your seed/chaff along the edge. Lift the top edge of the sheet and roll the seed to the other end where your partner is waiting to carefully funnel the seed into a bowl.
- Make sure the seed is thoroughly dry. Store in plastic bags in a cool, dry, and dark place. Plastic bags allow the seed to respire, while glass does not. Seed thus stored remains viable for about three years.

## Management

Herbivores such as insects and deer are not a problem with *Echinacea*. Gophers and moles can be a problem, eating the roots. Goldfinches love the *Echinacea* seed crop and can clear out all the seed in a few days.

## Cultivars, Improved and Selected Materials (and area of origin)

ECAN2 is readily available from native plant nurseries and seed companies throughout its range. Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

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Revised 05dec00 jsp; 01may03 ahv; 05jun06 jsp

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