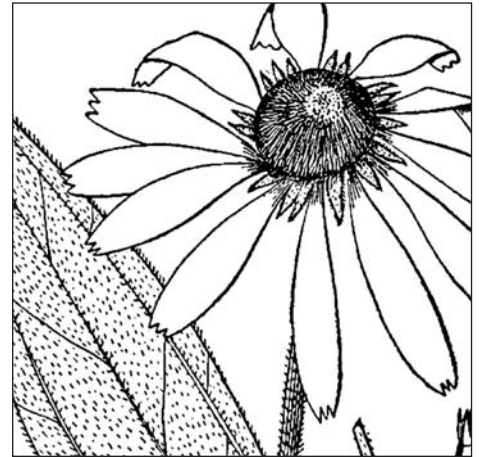


A Grower's Guide

Narrow-Leaved/Pale Purple Coneflower

Echinacea angustifolia and *Echinacea angustifolia* var. *pallida*

For years taxonomists have debated about whether these are two species or one. The morphology of the two species is quite different. The *E. angustifolia* is shorter with shorter flower petals. The plant is found in the drier regions of the Great Plains (western Kansas, Nebraska, Dakotas, etc.). *E. pallida* is much taller with a larger root, long drooping petals, and grows in the wet regions of the Great Plains, including eastern and southeastern Kansas. The chemical markers in the two species provide some distinguishing characteristics. The *E. angustifolia* has more isobutylamide, which is the tongue-numbing component that is often used to distinguish this root. However, other compounds in the plant appear to be responsible for the medicinal qualities, including polysaccharides. Currently, taxonomists have named *E. pallida* a sub-species of *E. angustifolia*, but these will be abbreviated in this fact sheet as if they were two species.



Family: *Asteraceae*

Life cycle: Herbaceous perennial (Zone 3)

Native: Great Plains, North America

Height: 2 feet for *E. angustifolia*, 2 to 4 feet for *E. pallida*

Sun: Full sun

Soil: Any soil, can survive on poor soil.

Water: Low to moderate

Flowering: Pink/purple flowers bloom from mid- to late summer

Propagation: Seed must be stratified for one to three months to germinate, or sow outdoors in the fall or winter for natural stratification. Germination is erratic and can take several weeks. Germination rates will vary and are usually less than 50 percent.

E. angustifolia and *E. pallida* seed have a light requirement to germinate and should not be covered with soil.

Harvesting: Roots are harvested in the fall or spring of the second or third year. Both have taproots, and the top 6 to 12 inches are easy to harvest. It is difficult to get the entire root. In some cases, root remnants can resprout, so don't abandon the field immediately. Use a needle-nose spade to dig roots, or special digging tool that resembles a flattened crow-bar. A chisel plow or lister can also be used to loosen and expose roots, which are then picked up by hand and washed with a power sprayer or root washer. Occasionally the tops of these plants are marketed, but most of the market is for the roots or seed. If harvesting seed, keep other species of *Echinacea* at least ½ mile away, to avoid cross pollination.

In Kansas, these species are often harvested in the wild. In years of high prices, this leads to overharvesting. However, these species are also in danger of becoming rare from the use of broad-leaved herbicides and overgrazing. A sustainable harvest has been estimated as about 5 per-

cent of the adult plants, with the rest left to reseed. We recommend growing this crop as a cultivated species.

Parts used: Fresh or dried root

Used as: Infusion, decoction, tincture, syrup, compress, poultice, elixir, lozenge, ointment, salve, cream. Root can also be simply chewed, fresh or dry.

Medicinal benefits: *Echinacea pallida* has been approved by European physicians for use against fevers and colds. *E. angustifolia* is more in demand and has been more extensively used historically. Much of the research done on *Echinacea* in Europe before 1988 was done on *E. pallida*, which had been misidentified as *E. angustifolia*. All three species (*E. angustifolia*, *E. pallida*, and *E. purpurea*) stimulate the immune system and have wound-healing properties. Some of the more rare *Echinacea* species (*E. paradoxa*, *E. atrorubens*, or *E. tennesseensis*) may also share these traits, but have not been researched.

Market potential: Moderate to very high. Root price is \$20 to \$99.99 per pound (lb) dry weight for *E. angustifolia*, and \$14 to \$22.47/lb dry weight for *E. pallida*. *Echinacea* is one of the top-selling herbs in the United States, but the supply side of the market is becoming very competitive, with large players entering the market.

Summary of field trial data: The market sometimes pays a premium price for *E. angustifolia*, and there are fewer buyers and less name recognition for *E. pallida* (only two of the nine retailers in Appendix B listed it). However, based on our field data, we cannot recommend planting, or at least transplanting *E. angustifolia* at this time. Survival was poor, with 53 percent the first year (86 percent for *E. pallida*), and only 30 per-

cent survival by year three, compared to 54 percent for *E. pallida*. Yields were also low, with 23 g/root dry weight in year three for *E. angustifolia*, compared to 60 g/root dry weight for *E. pallida* and 59 g/root dry weight for *E. purpurea*.

E. angustifolia prefers high pH soils and well-drained, even stony sites. All of our sites had neutral to high pH, and all soils were well drained. Because it is taprooted, it may suffer from transplant shock and never fully recover. In discussions with colleagues from western Kansas and from North Dakota, one of the possible reasons those areas report larger plants than the ones from our plots is not just due to optimal pH and drainage, but also cooler night temperatures on the high plains.

In two observations not included in these data sets, strips of plots were broadcast seeded at Olathe and Wichita at the experiment fields in January of 2001. Preliminary data suggests that if seed germination is successful and weeds are moderately controlled, yields from direct seeding may equal or exceed yields from transplanted, weeded and coddled plots. Germination can be successful with direct seeding, but controlling weeds is difficult or impossible because this species does not compete well with weeds. Future research will address some of these questions, but for now, we recommend that growers only try *E. angustifolia* on a small scale. *E. pallida* and *E. purpurea* show some promise if the price can justify the harvest and labor costs.

K-State Field Trial Data 2000-2002 *Echinacea angustifolia*

				Average	Comments
Age of plants in years	1	2	3		
Number of test sites¹	6	4	1		
Survival rate (%)	53.2	26.3	30.0	36.5	Apparently some root re-sprouting between years 2 and 3.
Vigor rating²	2.0	2.2	1.8	2.0	A vigor rating below 3 is below average.
Height (cm)	11.5	28.0	47.0	28.8	
Dry weight herb (g/plant)	6.6	19.7	33.4	—	
Dry weight root (g/plant)	3.3	7.8	23.0	—	
Maturity rating³	1.1	4.2	5.5	3.6	The plants appeared to flower earlier each year.
Insect damage rating⁴	1.2	1.3	0.8	1.1	Observed some misc. leaf feeding, but no specific pests.
Disease rating⁵	0.5	1.7	1.3	1.1	
Estimated planting density (number of plants/A)	—	21,780	21,780	—	1- by 2-ft. spacing.
Plant density⁶	—	5,728	6,534	—	
kg/A dry weight (g/plant x plant number) – roots	—	45	150	—	
Estimated marketable yield (dry weight lbs/A) – roots	—	98	331	—	
Yield x ½ of low price¹	—	\$980	\$3,310	—	There is a huge price range out there for <i>E. angustifolia</i> roots, which makes budgeting difficult.
Yield x ½ of high price¹	—	\$4,900	\$16,550	—	

¹ See "How Data Were Collected," on page 3.

² Vigor rating (1=very poor, 3=slightly above average, 5=very good, well adapted)

³ Maturity rating (1=vegetative, 2=early bud, 3=early flower, 4=full flower, 5=seed production, 6=senescence)

⁴ Insect damage rating (scale of 0 to 5; 0=no damage and 5=severe damage)

⁵ Disease rating (scale of 0 to 5 with 0=no damage and 5=severe damage)

⁶ Calculated as starting plant density x survival rate.

K-State Field Trial Data 2000-2002 *Echinacea angustifolia* var. *pallida*

				Average	Comments
Age of plants in years	1	2	3		
Number of test sites¹	3	2	2		
Survival rate (%)	86.0	55.5	54.0	65.2	
Vigor rating²	3.0	3.3	3.9	3.4	
Height (cm)	25.0	81.0	91.5	65.8	
Dry weight herb (g/plant)	9.4	62.3	128.4	—	
Dry weight root (g/plant)	5.3	35.1	59.9	—	Root weights similar to <i>E. purpurea</i> in year 3, but easier to clean.
Maturity rating³	1.1	5.0	5.5	3.9	
Insect damage rating⁴	1.0	2.2	1.0	1.4	
Disease rating⁵	0.1	1.7	1.7	1.2	
Estimated planting density (number of plants/A)	—	21,780	21,780	—	1- by 2-ft. spacing.
Plant density⁶	—	12,088	11,761	—	
kg/A dry weight (g/plant x plant number) – roots	—	424	704	—	
Estimated marketable yield (dry weight lbs/A) – roots	—	935	1,552	—	
Yield x ½ of low price¹	—	\$6,545	\$10,864	—	
Yield x ½ of high price¹	—	\$10,509	\$17,444	—	

¹ See "How Data Were Collected," on page 3.

² Vigor rating (1=very poor, 3=slightly above average, 5=very good, well adapted)

³ Maturity rating (1=vegetative, 2=early bud, 3=early flower, 4=full flower, 5=seed production, 6=senescence)

⁴ Insect damage rating (scale of 0 to 5; 0=no damage and 5=severe damage)

⁵ Disease rating (scale of 0 to 5 with 0=no damage and 5=severe damage)

⁶ Calculated as starting plant density x survival rate.

How Data Were Collected

The plants described in this fact sheet were grown in K-State test plots in Hays, Colby, Wichita, or Olathe, Kan. Generally, four replications of each species were included at a site. Not all species were screened at each site or each year. The number of locations is noted in the table. Depending on the location and year, either five or 10 plants per plot were established in each of the replications. Details can be found at www.oznet.ksu.edu/ksherbs. Plants were grown from seed in the greenhouse and transplanted in the field in May or June.

All plants at each location were used to determine survival percentage, vigor rating, insect damage rating, and disease rating as described above. Three plants per plot were measured for height, and only one plant per plot was harvested to measure yield each year. Cultivating four plots allowed us to estimate yield from four plants per species at each location per year.

Plants were dried, and top and root weights recorded in grams. Grams per plant were converted to kilograms per acre (kg/A) and pounds per acre (lb/A) to estimate field-scale yield. The population density used to calculate field yields was the optimal population density (determined by the average size of the plants) times the actual percentage survival as measured in the field. There was generally some loss due to transplant shock and, for some species, significant winter loss as well.

Plant spacing recommendations on each fact sheet are for spacing within a row. Distance between rows will depend on the particular farming operation and equipment used. The minimum row spacing will be the same as the plant spacing recommendation. For example, if the recommendation is to set plants 12 inches apart, rows should be a minimum of 12 inches apart as well. However, if cultivator or root-harvesting equipment is on 5-foot centers, plant rows 5 feet apart to facilitate cultivating and harvesting. Adjust estimated plant density per acre on the worksheets to estimate gross yield and net income.

Prices were taken from Appendix B of K-State Research and Extension publication S-144 *Farming a Few Acres of Herbs: An Herb Growers Handbook*. To calculate a rough gross income potential for each herb, estimated yield was multiplied by the lowest and the highest retail price, divided by two. This is a rough estimate of wholesale price. Actual prices would be determined based on a contract obtained from a buyer.

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Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

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