

# Medicinal Herb Production Guide

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## **Purple Coneflower** **[*Echinacea purpurea* (L.) Moench]**

### **Introduction**

#### Botanical Information

*Echinacea purpurea* (L.) Moench is an herbaceous perennial and a member of the Asteraceae family. Commonly called purple coneflower, it has a natural range extending from Michigan, Ohio, Illinois, and Iowa, to southeastern United States and west to Texas. *E. purpurea* grows at a rate of twelve to eighteen inches a year to a mature height of two to four feet. The leaves are ovate to lanceolate and the flowers are cone-shaped disks adorned with deep pink to purple ray flowers. Flowers bloom from June to August. Of the three species of *Echinacea* used for medicinal purposes (*E. purpurea*, *E. angustifolia*, and *E. pallida*), *E. purpurea* is the hardiest, with the ability to withstand large temperature and soil moisture variations in its habitat. Unlike *E. angustifolia* and *E. pallida*, which possess a taproot system, *E. purpurea* has a fibrous root system. The root is harvested two-to-four years after planting from seed. *E. purpurea* is well known for its medicinal qualities and is also used extensively as an ornamental in the landscape. *Echinacea* flowers attract a variety of butterflies and bees to the garden.

#### Bioactive Components

Bioactive components of *E. purpurea* include polysaccharides, glycoproteins, alkamides and polyynes. The polysaccharide components have drawn the most attention of medical experts, as they are believed to possess immunostimulatory properties.

#### Uses and Treatments

*E. purpurea* has a long, well-established tradition of medicinal use in North America and Europe. In modern cultures, it is believed to stimulate the immune system, preventing or reducing the severity of colds and flu. In Europe, *E. purpurea* is the most widely accepted species of *Echinacea* used for medicinal purposes. Germany's *Commission E* endorses *E. purpurea* as a treatment option for a number of ailments, including the common cold, fevers, urinary tract infections and burns. Table 1 summarizes *E. purpurea*'s uses.

**Table 1. Modern and traditional uses of echinacea purpurea.**

| <u>Modern Uses</u>                 | <u>Traditional/Folk Uses</u> |
|------------------------------------|------------------------------|
| - Stimulate the immune system      | - Treat fevers               |
| - Prevent colds, coughs and fevers | - Skin infections            |
| - Heal wounds and burns            |                              |
| - Insect bites and stings          |                              |

# Cultivation Practices

## Site Selection

*E. purpurea* can be grown almost anywhere within the temperate zones and is being cultivated in most of these areas. It prefers a well-drained alkaline soil in a sunny location. Recommendations for pH range from 6.0 to 7.0. *E. purpurea* will tolerate light or dappled shade and can withstand hot and dry conditions. Raised beds are highly recommended, especially for moist or clay soils. Poorly drained soils should be avoided.

## Planting

Propagation can be from seed, transplants, or divisions. Divisions can be done from the crowns of mature plants when the plants are dormant, in early spring or in fall. Cut the roots into several pieces making sure buds and fibrous roots are included in each division. Transplant immediately into well prepared, permanent, planting beds. Space divisions twelve to eighteen inches apart, making rows eighteen to thirty-six inches apart. Weed control is very important, as echinacea does not compete well with weeds. Plants will benefit from the use of straw or shredded bark mulch.

Johnny's Selected Seed Co., Winslow, Maine, recommends the following guidelines for starting seeds indoors. Echinacea requires light for seed germination. Using deep containers to allow for good root development, fill with a prepared soil mix, and plant seeds in flats or pots, pressing lightly into the soil and barely covering the seed with a sprinkling of soil. Moisten, cover, and refrigerate at 40-50°F. Johnny's has found that *E. purpurea* does not need pre-chilling to germinate, but germination will be enhanced if exposed to the cold temperatures for seven days. After chilling, move flats or pots to warmer temperatures (68°-77°F) to allow for emergence of the seedlings. Germination generally occurs ten to twenty days after seeds are exposed to warm temperatures. When plants are several inches tall (usually eight to twelve weeks after germination), transplant seedlings outdoors in late spring or early summer. Apply mulch to control weeds.

Seeds can be sown directly in the ground in fall or early spring, but a fine seedbed needs to be prepared. Plant seeds just under the soil surface spacing them two inches apart. Keep the bed moist and weed-free. When seedlings emerge, thin plants to the recommended spacing mentioned above.

## Insects and Diseases

Diseases that affect echinacea include the leaf spots *Cercospora rudbeckii* and *Septoria lepachydis* and can cause blackening of the leaves. A root rot, *Phymatotrichum omnivorum*, has also been identified. Another disease called "aster yellows disease" is a virus that is transmitted by a leafhopper feeding on echinacea. Other insects that feed on echinacea include Japanese beetles and thrips. Practicing four to five year crop rotations, planting in well-drained soil, and preventing over watering can prevent most disease problems.

### Harvesting, Cleaning, and Drying

Echinacea root is harvested in the fall after the plant has gone dormant, usually the second to fourth growing season, depending on which planting method is used. A spading fork or other hand digging tools can be used as well as a mechanized harvester, such as a modified potato digger. Shake the roots free of dirt and carefully remove roots that are not echinacea. It is not acceptable to include foreign material, whether weeds or rock, in with the Echinacea root. (Even echinacea stems are consider foreign material if you are selling the roots.) Put plants in the shade until harvesting is complete. When ready for processing, it is recommended to wash echinacea roots with a pressure hose. Richo Cech, author of *Growing At-Risk Medicinal Herbs*, recommends cutting the crowns to remove dirt and small stones that get lodged at the base of the crowns. Cech recommends processing the echinacea as soon as possible after washing to minimize oxidation.

Once the roots are cleaned, spread on non-aluminum screens for the drying process. The roots need a warm location with adequate airflow. If a drying unit is not available, a large dehydrator, converted greenhouse, or converted rooms in a barn are areas that can be used for drying. According to Cech, "Dry for one day at 70<sup>0</sup>F, then turn the temperature up to 110<sup>0</sup>F, drying the roots until they snap." Cech recommends "storing the dried root in plastic bags in light-proof sacks or drums, in a cool, dark, and dry location for up to one year." Reports of estimated yields of the dried root ranged from 1000 to 2500 pounds per acre after three growing seasons.

Currently, there is a limited market for the aerial parts (above ground) of *E. purpurea*. Great care must be taken to minimize the amount of soil that can splash up onto the leaves and stems during wet weather. (This crop will not be saleable if sand or dirt is embedded in the leaves.) With sufficient growth, the leaf can be harvested the first growing season and subsequent years to follow. In areas like the piedmont of North Carolina, two cuttings of the aerial parts are possible the first year if transplants are put into the field in May. Higher temperatures for drying aerial parts are required for *E. purpurea* if grown in high humidity regions. In the final growing season, the root can be harvested in the fall.

## **Marketing and Economics**

### Annual Consumption and Dollar Value

In 2001, consumption of *E. purpurea* was approximately 430,000 pounds, two and one half times the level of consumption in 1997 but only an increase of 2.7% over the level reached in the year 2000. The dollar value of consumption in 2001 was \$1.2 to \$1.3 million. This amount was about \$500,000 less than the value in 1997. It was also \$500,000 to \$600,000 less than consumption in 2000.

### Supply and Demand

For the past few years, this product has been over-supplied to the market in substantial quantities. Supply has leveled off but has put pressure on current prices. Many buyers are rejecting material stored from past harvests and are willing to pay a moderate premium for newly grown and harvested material. In early 2004, demand for *E. purpurea* finally started to rise again.

Most buyers of this product require high levels of polysaccharides, equating to a minimum or threshold level of 4% for total phenolic compounds. In addition, organic certification has become a major selling point among large, vertically integrated producers attempting to differentiate their products in the market to raise profit margins.

Competition in the echinacea market has spurred new research into this botanical. The results of this research will determine future growth prospects of *E. purpurea* as it relates to other echinacea strains competing for an increased share of the market. This factor will especially come into play in the less mature markets of North America.

### Pricing

Over the past few years, *E. purpurea* has been very low priced. Unsold material from previous harvests filtered into the marketplace until the beginning of 2004. During 2001, this botanical traded around \$3-\$4 per pound for dried root with prices declining to half this amount due to oversupply. With demand increasing, the price paid to growers is slowly starting to increase. Current prices quoted in summer of 2004 ranged from \$1.50 to \$2.50 for dried root and \$.50 to \$1.10 for dried aerial parts.

### Distribution Channels

This material has a worldwide customer base consisting of large, medium, and small processors. Demand for the product includes mainstream pharmaceutical companies that include *E. purpurea* in multi-constituent vitamin and mineral products. Most growers deal directly with processors and are vertically integrated with large processors. They also negotiate through cooperatives. Large growers of *E. purpurea* are located in the United States (Washington, Oregon, Colorado, Idaho, Iowa, Missouri, New Mexico and Wisconsin), Canada, Germany, Australia, New Zealand and Switzerland.

### Commercial Visibility

*E. purpurea* is the best-known strain of echinacea on world markets. Of the top nutraceutical/botanical companies in Europe and North America, 35% offer this material as a stand-alone product, while 70% offer it as either a stand-alone product or as part of a multi-constituent supplement.

According to ATTRA, National Sustainable Agriculture Information Service, European companies produce more than 280 different products made from *E. purpurea*, including ointments, lotions, creams, tinctures, liquid and dry extracts, and toothpastes.

## Conclusion

After a temporary slowdown in the market, *E. purpurea* is enjoying a comeback with increasing demand, especially for a certified organic product. The challenge to medicinal herb growers is finding a consistent source of seed true to the particular species, since echinacea can cross-pollinate easily. Growers should buy from a reliable seed source that specializes in selling seed for the medicinal herb industry. For North Carolina, *E. purpurea* is a good candidate for field grown production, but it is very important to arrange sale of your product, with a buyer, before you start harvesting - even better, before you put a seed or a plant in the ground. Supply and demand rules with medicinals. If there is an oversupply of product, the price per pound declines.

*This Medicinal Herb Production Guide includes excerpts from, Analysis of the economic viability of cultivating selected botanicals in North Carolina. Strategic Reports. 2002.*

## References

Adam, Katherine L. 2002. Echinacea as an alternative crop. ATTRA - National Sustainable Agriculture Information Service. <http://www.attra.org/attra-pub/echinacea.html>. 14 pp.

Cech, Richo. 2002. Growing At-Risk Medicinal Herbs. Horizon Herbs. Williams, Oregon. 314 pp.

Fernald, M. L. 1970. Gray's Manual of Botany. D. Van Nostrand Company, New York, NY. 1632 pp.

Davis, Jeanine. 2002. Pictures, information, and yield estimates of medicinal herbs researched at N.C. State University. North Carolina State University. Raleigh, NC. <http://www.ces.ncsu.edu/fletcher/staff/jmdavis/pics.html>

Hwang, Sheau-Fang, Chang, Kan-Fa, and Ron Howard. 2001. Yellows diseases of echinacea, monarda, and caraway. Agriculture, Food and Rural Development. Crown copyright. Alberta, Canada. 6 pp.  
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex616?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex616?opendocument)

Jensen, Beth. 2004. Johnny's Selected Seeds. Winslow, Maine. Personal communication.

Radford, Albert E., Harry E. Ahles, and C. Ritchie Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC. 1183 pp.

Strategic Reports. 2002. Analysis of the economic viability of cultivating selected botanicals in North Carolina. A report commissioned for the North Carolina Consortium on Natural Medicinal Products by North Carolina State University, Raleigh, NC. 244 pp.

Sturdivant, Lee, and Tim Blakley. 1999. Medicinal Herbs in the Garden, Field, and Marketplace. San Juan Naturals. Friday Harbor, Washington. 323 pp.

US Department of Agriculture, Crops Research Division Agricultural Research Service. 1960. Index of Plant Diseases in the United States, Agriculture Handbook No. 165. Washington, DC. 531pp.

Westcott, Cynthia. 1960. Plant Disease Handbook. D.Van Nostrand Company, Inc. Princeton, NJ. 825 pp.