



# Echinacea

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## Introduction

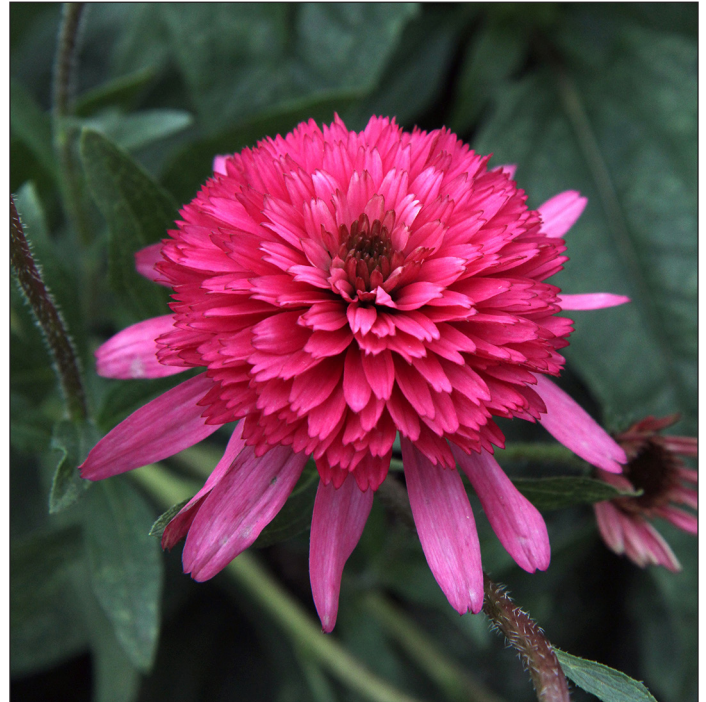
Coneflowers (*Echinacea* spp.) are herbaceous perennials with large daisy-like flowers. There are nine species of coneflower and all are native to central or eastern North America. Purple coneflower (*E. purpurea*), a well-known garden flower, is extensively cultivated in nurseries. This hardy ornamental is commonly planted in both home and commercial landscapes. Coneflowers are also effective, long-lasting cut flowers.

Some species (*E. angustifolia*, *E. purpurea*, and *E. pallida*) are also prized commercially for their reported medicinal properties. Echinacea has been used as an immune system stimulant, an anti-inflammatory, and as an aid in healing wounds. While dried roots are most desirable in commercial medicinal preparations, the flowers, leaves and seeds have also been harvested.

## Marketing

Echinacea for ornamental use may be produced for retail markets including garden centers, landscape nurseries and farmers markets. Echinacea plants may be wholesaled to other nurserymen, landscapers, or retailers. Cut flowers for floral arrangements could be marketed to wholesale and retail florists, and at farmers markets.

Roots and plant material for medicinal/dietary uses are generally marketed to herbalists, manufacturers, distributors, and pharmaceutical companies. Echinacea is sold in various forms, including teas, ointments, pills, tinctures, creams and powders. Most dealers will not enter into a contract with an inexperienced grower before seeing a



*Echinacea purpurea* 'Southern Belle'

sample of what the grower can produce. Buyers may also require laboratory tests for purity. Growers in other states have indicated that it can take up to 10 seasons to secure a contract.

## Market Outlook

Purple coneflower is a popular plant in formal and informal perennial landscape plantings. Producers could enter wholesale markets selling to retail garden centers and other retailers, as well as wholesaling to nurserymen, landscapers, and possibly landscape nurseries. Plants may also be sold at farmers markets or through other direct market channels. Perennial plant sales may tend to maintain some strength during more difficult plant retail



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environments, as consumers see perennials as a value buy or an enduring, affordable splurge for the home landscape.

Novel and native coneflower cultivars could also attract consumer interest. The flowers of many *E. purpurea* cultivars range in color from white to pink to purple and include several novel flower forms. Coneflower hybrids with yellow, orange, red, white and green flowers have been released in recent years. Some hybrids may not have the vigor or hardiness of the wild species, so growers should evaluate any cultivars they select before making the decision to produce them. In addition, University of Kentucky research has shown two additional species (*E. tennesseensis* and *E. paradoxa*) have potential for mass production. They have unique horticultural characteristics not found in the commonly cultivated *E. purpurea*. *E. paradoxa* has yellow flowers and *E. tennesseensis* appears to be more resilient in the landscape than *E. purpurea*. Along with the release of novelty hybrids of *E. purpurea*, these two additional species could fill a unique niche market for nurseries interested in new plants native to North America.

The market value for herbal dietary supplements reached an all-time high of \$6.92 billion in 2015, according to the American Botanical Council. Sales of echinacea supplements, which do not include teas and beauty products, ranked third among the top 10 herbal supplements in mainstream multi-channel outlets in 2015. The commercial echinacea market is concentrated among relatively few firms and large-scale producers, challenging new farm production for the herbal supplement market. Producers should always be sure to have a viable market before investing in any enterprise for new crops.

## Production Considerations

### FIELD-GROWN PRODUCTION

Echinacea plants can be field-grown for herbal or ornamental use, or container-grown for ornamental

use. Growing medicinal herbs may necessitate the use of organic methods of production. Organic growers must meet all USDA National Organic Program (NOP) requirements and be certified by a USDA-approved certifying agency, such as the Kentucky Department of Agriculture. NOP regulations state that the growing site must remain free of prohibited substances (e.g. artificial fertilizers and synthetic pesticides) for a minimum of three years prior to the time of harvest. Growers unable to secure organically produced seed may be permitted to use conventionally produced, untreated seed. However, seedlings for transplants must be raised in approved organic potting substrates.



*Echinacea purpurea* 'Milkshake'

Seed germination in Echinacea species can be difficult, so direct field-seeded crops do not usually result in adequate crop stands. Seeds are generally pretreated (stratified) to relieve seed dormancy. Stratification involves holding seeds in a moist substrate at approximately 40° F (4° C) for one to five weeks. Use of transplants results in more satisfactory crop stands. Transplants may be purchased ready for field planting, or growers may choose to finish their own transplants under protected cultivation systems from seeds or plugs purchased from a plug production specialist.

Choose a site that has well-drained and moderately rich loam or sandy-loam soil for field production. It is advantageous to grow plants in a soil type that easily washes from the roots when plants will be harvested for herbal extracts. Fields with heavy perennial weed pressure should not be planted to echinacea.

A tobacco setter or water wheel planter can be used for transplanting echinacea to the field. Some growers prefer setting plants in the fall; however, plants can also be successfully set in May in Kentucky. Harvesting roots is easier when plants are grown in raised beds in the field.

### GREENHOUSE AND NURSERY PLANT PRODUCTION

Ornamental Echinacea plants produced for the retail

market are usually produced in 4-inch to 1-gallon containers. Plants for the landscape trade are usually produced in 1- to 5-gallon containers. Plants produced for the retail market are usually transplanted into the finished container from plugs purchased from a wholesale plug producer. Plugs may be produced by the grower for seed cultivars, but vegetatively produced hybrids are patented and produced from tissue culture, so they are purchased as plugs. It is common to produce plants in the greenhouse from late winter transplants for spring sales along with other bedding plants. Since Echinacea is a summer flowering plant, growers may elect to purchase vernalized plugs to have flowering plants for spring retail sales. Vernalized plugs have received a cooling treatment to reduce the time to flowering. For spring sales, vernalized plugs must be grown under long-day conditions. This is usually done by extending the day with supplemental lighting to obtain at least a 13-hour day. Alternatively, the grower can use night interruption (lighting from 10 p.m. to 2 a.m.) to simulate a long day. Echinacea plants develop best at day temperatures of 65-70° F and night temperatures of 50-60° F. Under these combined conditions, plants come into bloom in eight to

10 weeks. Greenhouse-produced echinacea plants require moderate irrigation and fertilization regimes. Substrate pH should be between 5.5 – 6.0 with an EC under 2.5. Plants can receive a constant feed of 75-150 ppm nitrogen. Growth regulators can be used to increase basal branching or to control plant height. As with all growth regulators, growers should trial any new chemical application.

Landscape size plants can be produced under standard nursery practices used for other herbaceous perennials. In general, nursery container production requires a site with good surface drainage. To aid drainage, a 2- to 4-inch layer of coarse gravel can be spread on the site. This gravel bed is then covered with landscape

fabric to suppress weeds. The ideal site will have a slightly sloping topography for proper air and surface water drainage. It will also offer water drainage to a pond or retention basin for recycling back to the crop. Container-grown plants need to be frequently irrigated, and the frequency varies with container size. A source of clean water is probably the most important consideration in selecting a suitable site. Water quality should be tested for pH and mineral content on a regular basis, especially if the source is a well or pond. Drip or trickle irrigation is a desirable irrigation method as it allows efficient use of water and does

not wet the leaves; wet foliage favors foliar disease development. However, overhead sprinkler irrigation is common for container nurseries. Fertilization is most often from a slow-release nursery formulation added to the surface of the container in the spring or after potting. Liquid fertilization is possible if drip irrigation is employed. Plants produced for larger sizes may require multiple production years and need to be overwintered in plastic-covered Quonset overwintering structures.

#### *Pest management*

Weeds are the greatest threat to field production. Echinacea is a poor competitor with other plants, thus weed management is critical, especially during the first year. Most herbicides are not an option

for organic growers, so hand hoeing and mulching tend to be the main techniques for weed control in organic fields. Diseases with the potential to cause serious crop losses include aster yellows and Sclerotinia crown and stem rot. Other diseases include southern blight and powdery mildew. Insects that may threaten echinacea include aphids, Japanese beetles and leafhoppers.

#### *Harvest and storage*

Nursery plantings of echinacea for landscape use are generally marketable the growing season following planting. Field-grown plants may be harvested as either bareroot plants or moved to containers. The length of time a plant can be grown in a container is limited. Once unsold plants outgrow their container,



*Echinacea angustifolia*

they will have to be repotted to a larger container, divided into smaller units, or discarded.

Echinacea cut flowers are hand-harvested with a sharp knife, clippers, or pruners during the coolest part of the day. Once harvested, stems are placed in a bucket of water containing floral preservative. Harvested flowers should then be placed in a cooled area or cooler until sold. Depending on the market, cut flowers are commonly sold individually, in bunches of five or 10 stems, or in mixed arrangements. Packaging containers may vary from 5-gallon plastic buckets to clear cellophane sleeves. Floral preservative and refrigeration are essential to keeping flowers fresh and extending their shelf and vase life.

Plants harvested for their roots are typically grown for two to three years. Roots can be harvested in the fall with a modified potato digger and then chopped into sections before washing. Dried roots will bring a higher price. Drying is accomplished by leaving roots in the field to dry naturally or by using an industrial batch drier typically used for tobacco. An acre of echinacea averages 2,500 to 3,000 pounds of dried root after three years of growth.

#### *Labor requirements*

The level of management for container-grown nursery plants is significantly higher than in field production. A common rule of thumb is to employ one nursery worker per actual acre of container production or one employee per 7 to 8 acres of field production.

Labor needs include approximately 42 hours per acre for planting echinacea to the field. Producers growing their own transplants will have additional labor needs. Hoeing will necessitate well over 160 hours per acre over a three-year growing period. Cut flower production is labor and management intensive, and requires trained labor for harvesting stems. Echinacea harvested for herbal extracts will necessitate an additional 35 hours per acre for washing and drying roots.

#### **Economic considerations**

Start-up costs for echinacea production include the purchase or production of plugs, the labor required for establishment, and installation of an irrigation system.

Production of ornamental echinacea plants, especially

novelty species or cultivars, can be a profitable addition to an existing nursery operation. The cost of producing echinacea for the ornamental market is comparable to other herbaceous perennial plants. Nursery production costs will vary considerably depending on operation type and size. The large overhead investment required to establish a field container nursery typically requires a size larger than 15 acres to generate economic returns. Growers with superior management and production skills who cultivate niche markets for new or specialized varieties may be able to generate positive returns from smaller nurseries.

Echinacea herb production is a long-term investment in time, energy and finances. It takes a minimum of two to three years for roots to develop to a marketable size. Risks include plant establishment failure, an uncertain market, fluctuating prices, and the difficulties associated with organic production practices. Equipment needs include a planter, potato digger, washing equipment, and drying equipment. The total capital investment could easily reach \$10,000 per acre before a harvest is realized. Breakeven prices for production costs calculated for a hypothetical acre of production in Kentucky ranged between \$7 and \$8 per pound. A higher price per pound (\$15 to \$20) would be needed to recoup the grower's capital investment within five to 10 years. As of 2016, it would be unlikely to locate a regional wholesale market guaranteeing such wholesale prices for farm-raised echinacea.

#### **Selected Resources**

- Evaluation of Coneflower (Echinacea) Species for Nursery Production under Field Conditions (University of Kentucky) <https://www.uky.edu/Projects/SeedBiology/research/coneflower.PDF>
- Selected Internet Resources for Herb Marketing (University of Kentucky, 2013) <http://www.uky.edu/hort/sites/www.uky.edu/hort/files/documents/herbmarketing.pdf>
- Medicinal Herb Profile (Agricultural Marketing Resource Center, 2017) [http://www.agmrc.org/commodities\\_products/specialty\\_crops/herbs/medicinal-herb-profile/](http://www.agmrc.org/commodities_products/specialty_crops/herbs/medicinal-herb-profile/)
- Commercial Echinacea Production, Agdex 188/20-1 (Alberta Agriculture and Food, Canada, 2015) Available for purchase [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex10531](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex10531)
- Specialty Croppportunities: Echinacea (Ontario Ministry of Agriculture Food and Rural Affairs, 2012)

<http://www.omafra.gov.on.ca/CropOp/en/herbs/medicinal/echin.html>

- Medicinal Herbs for Commerce (NC State University) <https://newcropsorganics.ces.ncsu.edu/herb/medicinal-herbs-for-commerce/>
- Echinacea as a Tobacco Crop Alternative (University of Wisconsin-Madison Center for Integrated Agricultural Systems, 2000) <http://www.cias.wisc.edu/wp-content/uploads/2008/07/echinace.pdf>
- Herb Production in Organic Systems (ATTRA, 2005) <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=42>
- Production Practices for Echinacea augustifolia (Agriculture and Agri-Food Canada, 2007) <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1193337467277&lang=e>

- Warm Climate Production Guidelines for Echinacea (University of Florida, 2004) [http://hort.ufl.edu/floriculture/pdfs/crop\\_production/Echinacea\\_ENHFL04-008.pdf](http://hort.ufl.edu/floriculture/pdfs/crop_production/Echinacea_ENHFL04-008.pdf)

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*Photos courtesy of Robert Geneve*

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