

ECHINACEA

AS AN ALTERNATIVE CROP

HORTICULTURE TECHNICAL NOTE

Abstract: Crop budgets for echinacea have been developed, but demand has leveled off. Conservation measures have been passed in many states to protect native plant populations. This publication describes recent research, propagation, cultivation, and marketing, and includes a bibliography and a list of seed and plug suppliers.

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INTRODUCTION

The genus *Echinacea* is native to the United States, occurring primarily in the Midwest and Upper South. Although nine species are recognized, only three are of commercial importance: *E.*

purpurea (L.) Moench (Purple Coneflower), *E. angustifolia* (Black Sampson), and *E. pallida* (Pale Echinacea). An older name for the genus *Echinacea* is *Rudbeckia* L. In European Common Market countries *E. purpurea* has long been raised as an ornamental, and more recently for processing into topical (externally applied) products and phytomedicines prepared from the whole plant. Herbal supplement manufacturers in the United States have customarily used the root only.

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Figure 1: *Echinacea purpurea*
Line drawing by Elizabeth Adam, 1998. All international distribution and reproduction rights reserved to the artist. U.S. rights reserved to National Center for Appropriate Technology, Butte, MT.

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ECONOMICS OF ECHINACEA — WISCONSIN AND NEW MEXICO STUDIES

A 1999 study (1) of the economics of echinacea production in Wisconsin (as an alternative crop to replace tobacco) was conducted by the Center for Integrated Agricultural Systems at the University of Wisconsin, Madison. The study concluded that echinacea farming could be profitable under certain conditions. Chief investigator Don Schuster said:

Going from growing tobacco to growing Echinacea could prove to be very profitable for some growers. Making \$3,766 per acre with *Angustifolia* Echinacea looks better than any corn or soybean budget that you will find anywhere. But, there are risks, mainly from price fluctuation, marketing strategies, and organic farming practices that play into this equation. This is not an endeavor to go into lightly. To grow Echinacea will take a lot of work and up front capital before any gains will be seen. Lastly, someone interested in growing Echinacea needs to do their own research before one Echinacea plant ever goes into the ground to make sure they know what they are getting themselves into and are not surprised along the way. (p. 5)

Another study — supported by the New Mexico Agricultural Experiment Station, Las Cruces, and the USDA Agricultural Marketing Service — developed cost and return estimates for several medicinal herbs, including *E. purpurea*, as part of a plant-spacing study at two sites in New Mexico (2). This study concluded:

The importance of keeping tabs on market prices and acreage expansion cannot be over emphasized. Compared to conventional field crops, medicinal herbs appear to be in the introductory phase of the product life cycle, with annually increasing demand. However, large medicinal herb acreage is in production around the globe . . . and market gluts can occur. For example, in Fall 1998 echinacea inventories increased to the point that prices for non-organic echinacea fell below \$12/lb. (p. 685)

E. PURPUREA VS. *E. ANGUSTIFOLIA*

Steven Foster's *Echinacea: Nature's Immune Enhancer* (3), still the best historical introduction to the natural history of echinacea in North America, includes an extensive reading list. Kelly Kindscher's *Medicinal Plants of the Prairie* is an excellent overview of *E. angustifolia* in the wild (see **Recommended Reading**).

In Europe more than 280 different products made from *E. purpurea* are sold — including ointments, lotions, creams, tinctures, liquid and dry extracts, and toothpastes. Licensing in Germany, and now in the European Common Market, is supported by a system of medical monographs by which herbal products are evaluated. (For an English translation of the medical monograph on echinacea, see **Recommended Reading**.) In the United States, preparations are mostly for internal use: infusions of fresh or dried roots, powdered roots, or encapsulated dried tops of *E. purpurea*. Sometimes echinacea preparations include other herbs, such as goldenseal.

Trout Lake Farm (4) (recently acquired by Amway Corporation) pioneered commercial growing of *E. angustifolia*, and manufactured its own line of echinacea preparations. Despite strenuous U.S. promotion efforts in the early 1990s, an export market never developed for *E. angustifolia*. This species of echinacea failed to win approval as a raw material in the 1994 Commission E monograph governing manufacture of echinacea products as phytomedicines for the Common Market. Subsequently, the attention of the U.S. industry turned almost solely to *E. purpurea* as raw material for the herbal products industry.

In 1998 Bastyr University Research Institute (BURI) of Bothell, Washington, conducted a 16-month, double-blind, placebo-controlled clinical trial of a leading U.S.-manufactured echinacea formulation (5). The test subjects were 200 Bothell residents selected for their proneness to frequent respiratory tract infections. Results of this trial—funded by Madaus AG, the German manufacturer of echinacea products—indicated no benefits from the formulation in reducing frequency and severity of cold symptoms (6). Although the methodology of the study was promptly called into question by American friends of herbal medicine, U.S. demand for echinacea products has leveled off.

CONSERVATION CONCERNS

A rationale for promoting farm-raised echinacea, rather than wild harvesting, has been the threat to wild plant populations from indiscriminate collecting on private and public lands (7). Professional wild harvesters have been collecting roots at an accelerating pace for sale to botanicals brokers. Landowners have also exploited the presence of wild populations on their land. Plant digging on certain western tribal lands dramatically increased after 1995. In the late 1990s several western states banned or restricted collection of wild echinacea to protect *E. angustifolia* populations.

Related to the problem of protecting stands of diverse wild echinacea species is the problem of monoculture. Claire Spector has pointed out the risks of “single sources of germplasm and monoculture” in preserving biodiversity. Spector blames *E. purpurea* blight problems of the late '90s not only on crowding and monoculture, but also on the cultivated crop's overly narrow genetic base (8).

Which conservation approach is the best—increased domestication of echinacea or protection of wild populations *in situ*—remains debatable. A national organization that can provide more information on a broad-based approach to saving endangered and threatened populations of wild medicinal plants is the United Plant Savers coalition (9).

PROPAGATION MATERIAL

Seed

About 50 U.S. and Canadian companies can supply seed for *E. purpurea*; some of these are listed below. Producers should be sure to obtain seed from a company that specializes in medicinal, rather than ornamental, plants.

Nick Morcinek, one of the largest echinacea growers in the Canadian Province of Ontario, cautions farmers about saving their own seed (10). He notes:

We don't collect our own seeds because these plants, being very similar genetically, have a very strong tendency to cross-pollinate. And this is one of the problems in the echinacea industry today. (p. 51)

The seven to nine recognized species of echinacea occur in relatively isolated populations in specific geographic areas. With more and more growers raising fields of echinacea, genetic drift becomes a very real threat to both wild and cultivated populations.

Classified ads appearing in such publications as *The Herbal Connection* (11) routinely affirm that seed on offer, particularly of *E. angustifolia*, was collected from “pure stock” in remote areas. According to Otto Richter of Richters Seeds, authentic *E. angustifolia* seed is very difficult to obtain from seed companies in any quantity at this time (12).

Morcinek explains one reason for this situation:

Unfortunately, over the last ten years a lot of echinacea that was sold as *Echinacea angustifolia* was in fact...*Echinacea pallida*, also known as pale purple coneflower, [which is] quite similar to the *angustifolia*. It has a long narrow leaf. The easiest way to tell if you actually are growing *angustifolia* is simply the height of the plant. It [*E. angustifolia*] rarely grows more than 24" tall... As a final test...the *angustifolia* root...should have a sharp, tingling numbing taste which *pallida* does not have. (p. 51)

Plugs

A few wholesalers can supply plugs for propagating echinacea in the field or garden; several are listed below. Most prefer to be contacted in advance of the season. Producers should buy plugs from a company that specializes in medicinal, rather than ornamental, echinaceas. Producers who need certified organic plugs may have to make special arrangements. Certified organic plugs are usually obtained locally, rather than from wholesalers.

Cultivation

Echinacea species generally grow in poor, rocky, well-drained soils that have an alkaline to near-neutral pH. They do best in full sun, but will tolerate light shade, and are drought tolerant. The plants cannot stand poor drainage, especially in the winter. Weed control is very important, as echinacea is not very competitive with other plants; frequent shallow cultivation is advised. Echinacea can be grown in USDA hardiness zones 3–10 (upper Midwest to Florida).

Propagation is either from crown divisions, plugs, or seed. Seeds require a period of one to four months of cold, moist stratification to improve germination. (One month is usually recommended for *E. purpurea*, and at least three for *E. angustifolia*.) Generally, germination is better when seeds are sown in flats in a greenhouse rather than direct-seeded in the field, although some growers report a 50% germination rate for field-sown seed.

Note that when seed company catalogues say “easy to grow,” the term “easy” is relative to other echinaceas that are much more difficult to grow. Echinacea is not easy to grow, compared with carrots or corn. The term “sow” (as in “sow after 7 days”) refers to placing stratified seeds in a flat in the greenhouse, rather than direct seeding in a field. Prof. Connie Falk (13) of New Mexico State University has researched advanced germination strategies for *E. angustifolia*. Seed priming (a soaking treatment) must be used to leach out germination inhibitors.

Propagation of *E. angustifolia* is:

- notoriously difficult
- characterized by somatic dormancy, a physiological mechanism affecting plant germination
- characterized by immature embryos when seeds ripen in fall
- typified by low germination rates, since a large number of seeds may have aborted embryos and never mature
- typified by presence of germination inhibitors

Mario R. Morales (14) reported on a set of germination tests of *E. purpurea* and *E. angustifolia* conducted at Purdue:

1. *E. purpurea* germinated best (94%) under light at alternating temperatures of 15/25° C (16 and 8 hours, respectively). Germination was also good (92%) at 20–25° C.
2. *E. angustifolia* germinated best (85%) under light at 25° C.

Richo Cech, of Horizon Herbs, offers the following advice to growers of *E. purpurea* (15):

A short period of cold, moist conditioning (about 2 weeks) will improve germination rate. Sow seed in the early spring in flats in the greenhouse. (p. 20)

E. angustifolia is best planted in the fall, in the field where it is to grow. For more information on farm production of echinacea, Horizon Herbs publishes a pamphlet, *Echinacea: Native American Tonic Roots* (16).

Transplants should be set out in the fall, with roughly 1.5-foot spacing down the row and 3 feet between the rows. This spacing requires approximately 9,800 plants per acre. In first-year plants there is very little flowering. As echinacea flowers and sets seed in subsequent years, growers have reported problems with wildlife damage (especially from goldfinches and deer, which relish the seeds). Growers usually use blueberry

nets to protect plants. There are significant hand labor costs.

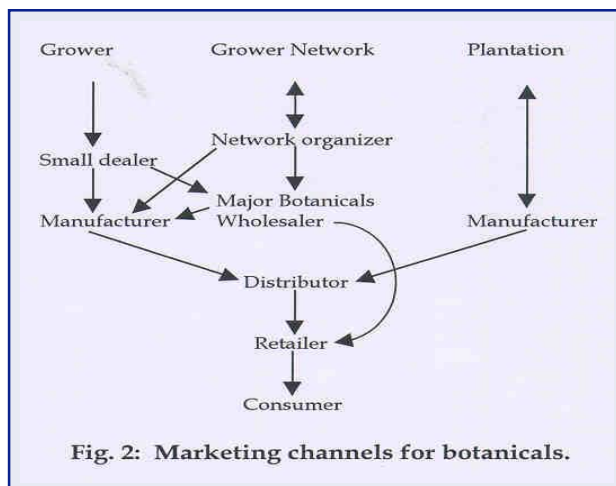
HARVESTING

Roots of echinacea are generally harvested in the fall at three (sometimes four) years from seed, as older roots may become pithy and woody (17). When grown in raised rows in the field, roots are easier to lift. Roots are cleaned of debris, washed, and dried. Buyers insist on having very clean roots. Mechanical root washers are available from several companies (18). Yield (under good conditions) is approximately 1,200 pounds of dried roots per acre. Roots may lose over half of their weight when dried, but a higher price per pound is paid for dried roots. This means that drying facilities must be available on the farm. For plans for medicinal root crop dryers and drying specifications, consult R.A. Miller's *The Potential of Herbs as a Cash Crop and Medicinal Herb Crop Farm Plans* (19).

Although in Europe echinacea is harvested for the foliage after one to two years (20), harvesting plantings intended for medicinal root production for the seeds or the flowers is not recommended, and second-year seeds may have a low germination rate. Growers such as Morcinek avoid harvesting flowers as an additional source of income for the same reasons that European companies harvest the whole plant for their liquid echinacea products. Many alternative practitioners and growers believe that herbal remedies cannot be successfully standardized because their beneficial effects depend in large part on synergies achieved by using the whole plant and on intangible aspects of harvesting and processing (such as spiritual practices). Morcinek and many others believe that a holistic approach best insures product quality (10, p. 53).

MARKETING ECHINACEA

A broad outline of a marketing structure for botanicals from the field to manufactured herbal products, from the viewpoint of the U.S. grower, is charted in Figure 2. It should be noted, however, that the driving force in the industry is the relatively few large corporations which control



manufacturing, distribution, and marketing of herbal products. This was pointed out in the New Mexico study (see p. 1).

A speaker at a recent meeting of the Northern Botanicals Association (a group of Pacific Northwest farmers seeking to identify alternative herb crops and develop a viable marketing structure) noted that fewer companies are seeking supplies on the world spot market, and more are dealing only with contracted growers (21). Companies will almost never enter into a contract with an inexperienced farmer. A grower must raise at least a trial plot in order to be able to supply the required sample to the buyer. Growers have reported that it takes up to 10 crop seasons to secure a contract. A decision to raise echinacea is a long-term commitment, requiring a minimum of three years until the first roots are large enough to market, and much longer until a reasonable return on investment can be achieved. Investments must be made in buildings, seed, and machinery, and – most of all – in acquiring knowledge. It is not a decision that can be made in the spring of the year (“Well, I think I’ll plant echinacea this year instead of corn”).

Large dealers and manufacturers often have minimum amounts that they will buy – if they will buy at all. Although an unexpected event may cause a short-term spike in demand, creating a window of opportunity for uncontracted growers, the more growers that enter the business, the less likely it is that shortages will last long enough to drive up the price. Routinely, prices can be predicted to drop three years after

the year in which large numbers of new echinacea growers enter the market. Companies offering contracts normally turn to their established contacts (rather than new growers) to produce new crops for them when marketing opportunities begin to emerge.

UNFORESEEN DIFFICULTIES

Some new growers have explored establishing a one-to-one relationship with a holistic practitioner, to whom they supply echinacea and perhaps other herb crops. This avenue has also been followed by grower co-ops. However, such practitioners uniformly require testing for herb potency at a university or commercial lab. Such tests can cost \$1,500 per batch in some states. Practitioners may also require that herbs be raised organically or in accordance with biodynamic principles, involving special techniques of soil preparation, special amendments to enhance fertility, special harvesting and storage procedures, as well as special processing or other requirements.

The botanicals industry is in a level or downward market at this time, becoming more-and-more consolidated, as multinationals squeeze out small, independent growers in the scramble for market share (22). The industry is slowly moving away from dependence on wild plants. Though many growers would, understandably, prefer to raise one herb and sell in bulk, there is at this time no single reliable way to access markets. A good way to keep up with information on markets is to participate in an electronic discussion group with other growers. (For information on how to subscribe to these listservs, please see ATTRA's *Herb Overview*.)

The American Herbal Products Association (AHPA) publishes a directory and has a website (21). The *Natural Foods Merchandiser* (annual directory issue in July) (23) publishes an extensive list of companies dealing in raw materials for the cosmetic, fragrance, and herbal supplement industries, as well as a list of hundreds of natural products websites. Some companies put experienced farmers under contract to produce various crops. Others prefer to lease land for plantation culture and bring in their own personnel.

Organized grower networks operate in selected states in the Midwest and Pacific Northwest.

A 1997 study at Kansas State University showed that independent farmers trying to sell a first crop in this business climate must negotiate one-on-one with a buyer. There is no established market price. It has been reported that of two neighboring farmers growing exactly the same botanical crop, a farmer with superior negotiating skills could receive up to four times as much as his neighbor (24). The smallest brokers handle a limited number of species, buy both from farmers and from wild gatherers, and keep no inventory on hand, but "call around" when they have an inquiry from a buyer. They are looking for top quality; one broker told me that a buyer will often double an order if the quality is there. Many small brokers handle only native medicinal root crops (which tend to be of higher value than leaf crops) and no other type of herb.

USDA is now in the public comment stage of setting up programs for insuring alternative crops, including medicinal herbs.

A farmer interested in growing echinacea must be willing to learn as much as possible about the herb industry before selecting and planting a crop.

Anyone considering growing echinacea or any other crop to supply the nutritional supplement industry must be willing to acquire considerable knowledge before selecting a crop. A marketing plan, including advertising, must be in place before the crop is in the ground. Attending trade shows and grower conferences; interviewing other growers, brokers, and processors; making farm visits around the country; and possibly employing a crop consultant are some ways to gain the necessary information—as are books, trade periodicals, and the Internet. Joining with other growers in cooperative marketing may be an option. Co-ops or farm improvement clubs with access to technical support from state agencies have had the most success with new crop ventures. Kentucky and Minnesota are examples

of states that provide considerable support for alternative crops.

COMPUTER RESOURCES

For those with Internet access, summaries and descriptions of manufacturing and harvesting specifics can be found through on-line searches. An increasing number of commercial sites are marketing botanicals and herbal supplements on the Internet (but the mix changes daily). Major seed companies are now on-line with catalogues and product information. Some botanicals brokers now have websites. Trade association and guild websites also provide access to information.

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ECHINACEA
P.O. Box 1343
Fayetteville, AR 72702
(501) 521-6369 FAX
- 4) Trout Lake Farm
Route 1, Box 355
Trout Lake, WA 98650
(509) 385-2025
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- 9) United Plant Savers (UpS)
P.O. Box 98
East Barre, VT 05649
(802) 496-7053
(802) 496-9988 FAX
e-mail: info@plantsavers.org
<http://www.plantsavers.org>
Lists of endangered native plants, including Echinacea. Also has forum discussion feature. Join as member of UpS on-line.

A related organization:
UpS Botanical Sanctuary/National Center for Preservation of Medicinal Herbs (NCPMH)
33560 Beech Grove Road
Rutland (Meigs County), OH 45775
(740) 742-8303
<http://www.ncpmh.org>
The sanctuary now covers 378 acres.
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Herb Growing and Marketing Network
P.O. Box 245
Silver Spring, PA 17575
(717) 393-3295
Editor: Maureen Rogers
<http://www.herbalconnection.com>

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Horizon Herbs
P.O. Box 69
Williams, OR 97544-0069
(541) 846-6704
(541) 846-6705 FAX
e-mail: herbseed@chatlink.com
<http://www.chatlink.com/~herbseed/>
\$3.00 plus \$2.50 s/h; complete set of 12 manuals on medicinal plants is \$26.50 plus \$3.50 s/h.
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8601 State Hwy. 107N
Marathon, WI 54448
(715) 443-2634
- Buetsch Implement Co., Inc.
2895 CTHS
Marathon, WI 54448
(715) 443-2276
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Acres U.S.A.
P.O. Box 91299
Austin, TX 78709
(800) 355-5313
(512) 899-4400
(512) 899-4448 FAX
e-mail: info@acresusa.com
- 20) Frontier Natural Products Co-op
Box 299
Norway, IA 52318
(319) 227-7996
(800) 669-3275
<http://www.frontierherbs.com>
As a result of a merger, Frontier, as of this writing, no longer supports herb research or contracts with growers, and is emphasizing other product lines.
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- 23) AHPA
4733 Bethesda Ave., Ste. 345
Bethesda, MD 20814
(301) 951-3204
(301) 951-3205 FAX
<http://www.ahpa.org> (includes e-mail)

- 24) New Hope Natural Media
1301 Spruce St.
Boulder, CO 80302-4832
(303) 939-8440
(303) 939-9886 FAX
(303) 938-1634 FAX (Natural Foods Merchandiser)
e-mail: sales@newhope.com
<http://www.newhope.com>
New Hope Natural Media sponsors two annual natural products trade shows, Expo East and Expo West. Publishes:
- Natural Foods Merchandiser**
e-mail: nfm@newhope.com
<http://www.nfmtradezone.com>
Every August issue is a directory of natural-foods manufacturers (by category, with products and specialties), distributors, brokers, raw materials suppliers, associations, publishers, service companies, ad agencies, and websites.
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SEED SUPPLIERS

Richters
P.O. Box 26
Goodwood, Ontario
Canada LOC 1A0
(905) 640-6677
<http://www.richters.com>
Catalog can be viewed on-line. Order by mail, FAX, or on-line.

Johnny's Selected Seeds
Foss Hill Road
Albion, ME 04910-9730
(207) 437-4301
(800) 437-4290 FAX
e-mail: commercial@johnnyseeds.com
<http://www.johnnyseeds.com/>

Elixir Farm Botanicals
Shanti
General Delivery
Brixey, MO 65618
(417) 261-2393
(417) 261-2355 FAX
e-mail: efb@aristotle.net
<http://www.elixirfarm.com>
Biodynamically certified organic seed of native and Chinese medicinal herbs. Order retail amounts through website.

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Williams, OR 97544
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(541) 846-6233 FAX
e-mail: herbseed@chatlink.com
<http://www.chatlink.com/~herbseed/>
All echinacea seed certified organic by Oregon Tilth or wild harvested. Also has manuals for growing Mediterranean herbs, native forest roots, Chinese

herbs, burdock, St. Johnswort, English herbs, and milk thistle. May be purchased separately or as a set. Credit cards accepted.

J. L. Hudson , Seedsman
Star Route 2, Box 337
LaHonda, CA 94020
Catalog requests only to P.O. Box 1058, Redwood City, CA 94064. 3 species of echinacea. Catalog costs \$1.00.

PLUG SUPPLIERS

Little Valley Wholesale Nursery
13022 E. 136th Ave.
Brighton, CO 80601
(303) 659-6708
Contact in advance; grows plugs on a contract basis.

Bluebird Nursery, Inc.
519 Bryan Street
Clarkson, NE 68629
(402) 892-3457
Wholesale only.

G.S. Grimes Seeds
11335 Concord-Hambden Road, Box 640
Concord, OH 44077
(800) 241-7333
Shipped in during season from growers; availability varies.

Cricket Hill Herb Farm, Ltd.
74 Glen Street
Rowley, MA 01969
(978) 948-2818
All types of plugs.

Dabney Herbs
P.O. Box 222061
Louisville, KY 40252
(502) 893-5198
Contact by January 1. Will grow plugs to order. Preference given to regular customers.

Kurt Blumel, Inc.
2740 Greene Lane
Baldwin, MD 21013-9523
(410) 557-7229
<http://www.blumel.com>
All types of plugs. Wholesale only.

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The electronic version of **Echinacea as an
Alternative Crop** is located at:

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