



Production Practices for *Echinacea angustifolia*

Shrinking budgets for mainstream health care and the increasing awareness for alternate medicine has led to the medicinal use of many natural plant products. A multitude of plant species have been used in whole or in part for many centuries around the world, and North America is no exception.

Echinacea is one of the most popular herbal remedies used at the present time. *Echinacea* is widely used to treat cold and flu symptoms, and has several other purported uses. The root is the plant part most commonly used for medicinal purposes.



Echinacea angustifolia

Echinacea is a perennial herb native to the prairies. Several species of *Echinacea* have been identified. *Echinacea angustifolia* (narrow-leaved purple cone flower), *Echinacea purpurea* (purple cone flower), and *Echinacea pallida* (pale purple cone flower) are the species commonly used in herbal remedies. *Echinacea angustifolia* is considered to be the most valuable of these three species.

Currently, *Echinacea* is grown to small extent using considerable manual labour. The Canada-Saskatchewan Irrigation Diversification Centre (CSIDC), with financial support from the Canada-Saskatchewan Agri-Food Innovation Fund and with direction from the Saskatchewan Herb and Spice Association, is conducting field research to develop cost-effective management practices for commercial production of *Echinacea angustifolia* under both irrigation and dryland. These studies were initiated during the summer of 1997.

The main objectives of the study are (i) to evaluate crop establishment by direct seeding and transplanting, (ii) to determine optimum plant population, and (iii) to develop cost-effective fertility, water, and weed management practices. This factsheet summarizes preliminary results obtained in 1999 (3rd year crop) from the various direct seeded and transplanted field studies conducted at the CSIDC in Outlook, Saskatchewan.

Seed Dormancy and Propagation:

Echinacea can be propagated by seed or by crown division. Commercially, the crop is established from seed through direct seeding or transplanting. Inherent seed dormancy and the requirement of light for germination makes *Echinacea* a rather difficult crop for field establishment through direct seeding. Stratification, by mixing seed with moist sand and placing in a refrigerator (about 4°C) for approximately four weeks, was successful in breaking seed dormancy.

Direct Seeded *Echinacea angustifolia*:

Echinacea angustifolia can be established by direct seeding in the spring or in the fall. For spring seeding, stratified seeds were placed on the soil surface and pressed firmly. The soil was kept moist with light irrigation once a day until germination. The final plant stand was relatively thin and highly variable. Plant establishment ranged from 5% to 23% of the original seeding rate.

Fall seeding was done prior to winter freeze up. Unstratified seeds were sown approximately 0.5 cm (1/4 in.) deep using standard seeding equipment. The seeds germinated in the spring using the residual



Direct seeded *Echinacea angustifolia* crop (spring)



Direct Seeded *Echinacea angustifolia* crop (summer)

soil moisture without supplemental irrigation. The stand establishment was similar to spring seeding.

Direct seeded *Echinacea angustifolia* produced on the average 1200 to 1300 kg/ha (1070-1150 lb/ac) dry root when harvested three years after planting.

The row spacings of 40 cm (16 in.) and 60 cm (24 in.) produced comparable root yields both under irrigated and dryland production.

The effects of seeding rates from 60 to 180 seeds/m² were examined for root yield under both irrigation and dryland. The final plant stand was approximately 14% of the original seeding rate. Under dryland, the 60 seeds/m² seeding rate produced 875 kg/ha (780 lb/ac) dry root. Yield was 30% higher under irrigation. At the 120 seeds/m² seeding rate, both dryland and irrigated production produced similar root yields of approximately 1450 kg/ha (1300 lb/ac).

Transplanted *Echinacea angustifolia*:

Echinacea is generally grown from transplants (bare root or plugs). Deep plugs are better suited to accommodate the extensive root system. On a commercial scale, a “Water wheel” planter can be successfully used to transplant the crop both on bare-ground or into plastic mulch.



Echinacea angustifolia
transplant plugs



Transplanting *Echinacea angustifolia* into plastic mulch using a Water-wheel planter.

A plant population of 55,600/ha (60 cm x 30 cm; 24 in. x 12 in. spacing) yielded approximately 1200 to 1300 kg dry root/ha (1050 - 1150 lb/ac). Doubling the plant population (60 cm x 15 cm; 24 in. x 6 in.) produced 2400 to 2700 kg dry root/ha (2100 - 2400 lb/ac),

Irrigation

Echinacea is generally a drought tolerant species. However, supplemental irrigation has been found to increase yields. In our study, dryland and irrigated crops tended to produce similar yields both under both direct seeding and transplanting. This is likely due to the minimal moisture stress experienced by the dryland crop as a result of above average rainfall received during the harvest year (1999).

Fertility Management:

For direct seeded *Echinacea angustifolia*, application of nitrogen at the rate of 100 kg N/ha and phosphorus at the rate of 50 kg P₂O₅/ha produced 17% and 48% higher root yields as compared to fertilizer applied at half those rates. Nitrogen and phosphorus application had no effect on root yield for the transplanted crop. This is attributed to a higher inherent soil fertility on the transplanted test plot area.

Nitrogen applied in equal split applications, spring and fall, did not increase root yields over a single spring application.

The effects of production practices and post-harvest handling on quality attributes are being studied.

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