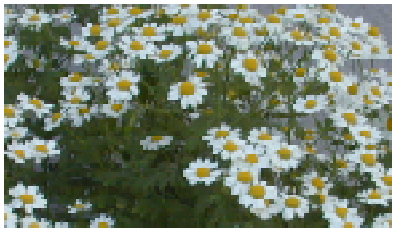
Canada-Saskatchewan Irrigation Diversification Centre

Production Practices for Feverfew

Increasing consumer use of natural medications has resulted in rapid expansion of the use of plant products as nutraceuticals, as functional foods, and as health products. This has lead to the rapid expansion of the herb industry in North America, including Saskatchewan.

This factsheet summarizes some results obtained from the agronomic and post-harvest handling studies conducted on feverfew *(Tanacetum parthenium)* by the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC), Outlook, Saskatchewan, and both the Department of Agriculture and Bio-Resource Engineering and the Department of Plant Sciences at the University of Saskatchewan.



Feverfew has been used to treat a wide range of ailments including fever, cold, rheumatism, and cramp. It is widely used at present to treat migraine headaches. Flowering shoots or the leaves are used for medicinal purposes. A sesquiterpene lactone, parthenolide, is considered to be the major biologically active ingredient. Several other unidentified molecules may also have biological activity.

Although feverfew is considered a semi-hardy perennial, it is susceptible to winter kill in Saskatchewan. Soil and climatic conditions, agronomic practices (plant population, fertility management, irrigation, and harvest method), and post-harvest management affect both yield and quality.

Irrigation:

Feverfew is a drought tolerant plant that responds well to supplemental irrigation. It is important to provide adequate soil moisture at transplanting to ensure successful establishment.

In 1998, when the crop experienced periodic moisture stress, irrigation produced 2035 kg/ha (1810 lb/ac) dry herb yield compared to 1665 kg/ha (1480 lb/ac) dry herb for dryland. In 1999, with well distributed rainfall, both dryland and irrigation produced comparable yields. Dry herb yields averaged between 3900 to 5000 kg/ha (3450 to 4450 lb/ac) in 1999.

Plant Population:

Feverfew seed is quite small (about 5200 seeds/g), therefore, direct seeding is difficult. Feverfew is normally established in commercial production using transplants. The spacing between rows and between plants within the row should be adjusted to optimize yield while enabling the use of machinery available to producer.

Field studies conducted at the CSIDC utilized a row spacing of 60 cm (24 in.) as it allowed the use of a standard walk-behind roto-tiller or a cultivator for weed control, and the use of a forage harvester for harvesting.

A high plant population of approximately 111,000 plants/ha, a 60 cm x 15 cm (24 in. x 6 in.) spacing, produced higher herbage yields than a lower plant density of 55,000 plants/ha (60 cm x 30 cm; 12 in. x 6 in.) under both irrigation and dryland. In 1998, the yield advantage of the higher plant population was 45% under dryland and 64% under irrigation. In 1999, the high density planting produced 6% to 12% higher dry herb yield than the low density planting.

Fertility Management:
Feverfew can grow on poor soils. It is essential that proper fertility management practices be adopted to maximize yield and maintain quality under commercial production.

Feverfew responded differently to nitrogen application in 1998 and 1999. In 1998, application of 100 kg N/ha caused a 522 kg/ha (465 lb/ac) yield reduction under dryland and a 328 kg/ha (290 lb/ac) reduction under irrigation relative to no fertilizer. In 1999, application of 100 kg N/ha produced 3% to 6% higher dry herb yield than unfertilized treatments.

Phosphorus application at 60 kg $P_2 0_5$/ha had a slight, non-significant yield improvement over the no phosphorus application under both irrigation and dryland.

Harvesting and Quality Attributes:
The stage of harvest and the height of cutting can significantly affect herbage yield and quality. Usually the crop is harvested during early bloom (10% flower) to full bloom (100% flower) as preferred by the buyer.

Feverfew harvested at the pre-flowering stage produced the lowest herb yield. Harvest at 10% flowering produced 12% to 18% higher yield than the pre-flower harvest. Harvest at 100% flowering produced only slightly higher yield than harvest at 10% flowering.

Parthenolide levels for leaves, stems and flowers for different harvest stages under both irrigated and dryland production are presented in Figure 1. The flowers contained the highest levels of parthenolide, while stems contained the least parthenolide. The parthenolide content in flowers increased and the content of the stems and leaves decreased as harvest was delayed. Accordingly, the best harvest stage for feverfew is around the 100% flowering stage. Parthenolide contents were slightly higher for dryland compared to irrigated feverfew.

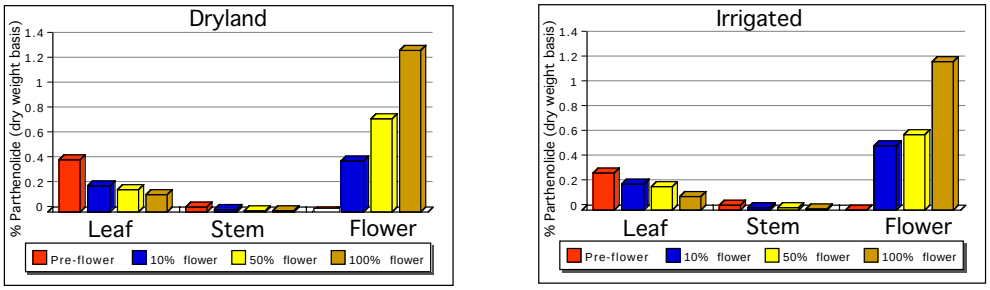


Figure 1. Effect of harvest stage on parthenolide content of leaves, stems, and flowers for feverfew grown under irrigation and dryland

Drying:
Herbs such as feverfew must be dried appropriately for subsequent processing while preserving the active ingredients. Several drying methods and temperatures were studied. It was found that rapid drying at 60°C or field drying (five consecutive dry days with temperatures between 25° and 28°C) retained the highest concentration of parthenolide.

Further information can be obtained from the Canada-Saskatchewan Irrigation Diversification Centre, Department of Agriculture and Bioresource Engineering, and the Department of Plant Sciences, University of Saskatchewan.

Canada Saskatchewan

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