# FARM Facts

# **Dandelion production**

Dandelion (*Taraxacum officinale*), a member of the Asteraceae (Daisy Family), is a common weed in Saskatchewan and around the world. It is a perennial, tap-rooted plant that is listed as a noxious weed that must be controlled, in Saskatchewan and Manitoba, and is listed as a nuisance weed in Alberta. In spite of its status here as a noxious weed, the plant has both culinary and medicinal uses.

#### **Culinary Uses**

Both leaves and roots of dandelion are edible. Leaves, when young, can be used fresh in salads, particularly if they have been blanched before harvest. Dandelion greens are particularly popular in France.

The leaves are rich in vitamin A and C, as well as thiamine and riboflavin, and minerals such as iron, copper, silicon, magnesium, zinc and manganese. The β-carotene content in dandelion leaves is higher than that found in carrots. Blossoms are used to make dandelion wine. The primary commercial market for dandelion root is as a coffee substitute. The roots must be roasted and ground before being used for this purpose.

There has been strong demand in the USA for roasted dandelion root and frozen dandelion blossoms. Extracts of dandelion are used in flavorings for beverages, desserts, confections and cheese. Dandelion has been approved in the USA as a GRAS (generally recognized as safe) food ingredient.

#### **Medicinal Uses**

Dandelion has been used for centuries in Europe and Asia for medicinal purposes. The botanical name *Taraxacum*, derived from Greek, alludes to its medicinal value.

Although all parts of the dandelion contain a bitter, milky juice (latex), that from the root is considered superior. The components have been identified as taraxacin (*eudesmanolides*), a bitter crystalline substance, and *taraxacerin*, a bitter resin, along with inulin, gluten, gum and potassium.

In Germany, dandelion is officially recognized for use as a diuretic, appetite stimulator, and for treating liver, gall-bladder and digestive problems. In folk medicine, dandelion has been used as a blood purifier, laxative, and for treating skin problems, rheumatism and arthritis. More recently it has been regarded as being useful for its antioxidant content, which could have value in cancer prevention. Dandelion is marketed in Europe as dried, chopped or powdered root, or leaves and root together, or as extracts from roots or leaves.

#### **Production of Dandelion**

Because dandelion is classified as a noxious weed in Saskatchewan, production to date has been on neglected land, or from infested cropland, such as alfalfa fields, rather



than from deliberately planted areas. There is some disadvantage with this method. At harvest, roots will be of varying ages and sizes. In addition they need to be sorted from roots of other plants growing in the area. Digging may also be more difficult if the land has not recently been loosened by cultivation.

Preliminary research has suggested that mechanical harvesting is necessary, as hand digging is too labor intensive and would negate any financial returns. Land which is relatively stone-free is desirable, in order to reduce the interference with root growth. In addition, the soil should not be contaminated with chemical residues or heavy metals.

Prior to establishing a stand of dandelion, contact the local municipality to seek the consent of the local weed inspector to establish the crop. Outline the management plan that will be in place to prevent the plants from spreading seed. Prior contact with the municipality will prevent potential conflicts over the plants' noxious weed status during the growing season.







While the dandelion crop is being allowed to grow, flowering should be prevented (by mechanical means) as best as possible, as *The Noxious Weed Act* 

requires that dandelions be controlled. Best quality roots may be obtained from two year old plants, particularly those growing under shaded conditions, where moisture levels may be superior.

Research on requirements for cultivated dandelions has not been conducted in Saskatchewan. Recommendations from elsewhere suggest a seeding rate of one-three kg/ha, although in Europe rates as high as four kg/ha have been used. The seed is directly sown shallowly in early spring or late summer, in rows about 45 cm apart. A plant spacing within the row of 4 cm is suggested. A loose, friable soil is desirable to facilitate digging of roots later on. As with the crop growing as a weed in other crops, the flowering must be controlled. Hand weeding within the rows would be necessary, but mechanical cultivators could be used between rows. There are no registered herbicides for controlling other weeds in a dandelion crop. It is known from research in other countries, however, that some preemergent herbicides such as trifluralin can be utilized. Organic practices, including mulching, or the use of flame weeding might be considered. Dandelions have few insect or disease problems – damaged plants can be rogued at harvest time. Deliberate cultivation of dandelion is contrary to The Noxious Weeds Act.

#### **Harvesting Roots**

Roots are generally harvested in the fall. The desired roots are ones that are large, fleshy, and unbranched. Digging equipment that can go to a depth of at least 25 cm is desirable. In cultivated fields, a carrot digger is satisfactory. After the roots have been removed, they will need to be separated from other roots (if from other cropland), and sorted by size and quality. Digging when the soil is moist will facilitate removal of roots if hand digging is used. Following digging, the tops are removed close to the root, in preparation for drying. All traces of leaf bases should be removed from the roots. Washing is also necessary. After washing, any diseased roots can be discarded.

#### **Drying Roots**

Roots are dried either whole or cut, depending on the size of the roots and the intended market. Drying of whole roots is preferred for the medicinal market, as it is felt that bleeding of sap from the roots after slicing will reduce the quality of the roots. Slicing large roots longitudinally or horizontally into 8-15 cm lengths will facilitate drying, however. If the product is to be roasted for the culinary market, the roots can be sliced into small pieces.

Artificial heat is commonly used to dry the roots. The recommended drying temperature is 35-40°C. The roots must be dried until hard and brittle. Large roots must be checked before storage to ensure that the interior is dry. The interior color should be white with a yellowish core when the roots are fully dry. The exterior is dark brown and wrinkled. The roots shrink considerably during the drying period. Yield of dried root can be as low as 18 per cent of fresh root weight (non-cultivated) and no more than 35 per cent (cultivated). Roots must be stored in a dry, pestfree location. Larvae of moths are particularly attracted to dandelion roots. Paper bags or metal containers are suggested for storage, while plastic containers are not recommended. Storage beyond one year is not recommended if the product is destined for medicinal markets.

#### **Roasting Roots**

The market for roasted dandelion root is much better than for unroasted root. The roasting must be done carefully, for excessive roasting is undesirable. After roasting, the roots can be ground and packaged.

#### **Root Yields**

Limited research has been done on yields in Saskatchewan. A preliminary trial at Arborfield, SK in 1996, where roots were removed from a five year old alfalfa field yielded the equivalent of 3.8 t/ha (dry root). In New Zealand, two year old cultivated plants yielded 10t/ha, while six month old plants yielded six-seven t/ha. Differences in plant density will affect size of individual roots, which can vary from three-25g/root.

#### **Quality Standards**

For the medicinal market, individual buyers may differ in their requirements. Water soluble extractives in roots should be at least 30 per cent (some buyers ask for >40 per cent), with total ash under 10 per cent, acid insoluble ash under five per cent and foreign organic matter under two per cent. The levels for water soluble extractives is lower for leaf material.

# **Leaf Production**

Markets for fresh dandelion leaves are limited in Canada, but exist in large urban centres. Where leaf production is common, such as in Europe, transplants may be used. Although it raises cost of production, the transplanting causes roots to branch, increasing leaf production and allowing for easier weeding because of even plant spacings.

The plants are commonly spaced at six to eight plants per meter of row. Improved leaf varieties are generally used, such as *Improved Full Heart* or *Thick Leaf Improved*.

The culture of cultivated leaf varieties does not differ substantially from that for root varieties. The leaves are picked in spring before flowering, and only young leaves are used, as older ones become bitter, particularly along the midrib. Long days, high summer temperatures and dry soils contribute to increasing the bitterness. Bitterness is caused by the production of sesquiterpene lactones and triterpenoids in the plants.

In France, the dandelion is treated as an annual. There, some dandelions are dug in fall and replanted indoors and forced in the dark, in the manner of endive. This treatment caused the shoots to become blanched and milder in flavor. Leaves from plants grown in shady sites are generally thinner and more tender. Under such conditions, however, they may be prone to powdery mildew, although this may not be a problem in spring.

Dandelions leaves are also prone to predation by domestic and wild animals, including cats, rabbits, ground squirrels, pocket gophers, deer, moose, elk and bears, as well as chickens, ducks, geese, grouse and partridges. Aphids, leaf gall midges, caterpillars, leafhoppers and crickets are potential pests.

## **Flower Production**

The economics of harvesting dandelion in Saskatchewan for flowers has not been determined, but there may be opportunity to sell frozen blooms to companies that make dandelion wine.

Due to the noxious weed aspect of dandelion (profuse seed production), deliberate planting of dandelion for blossom production is not recommended, but wildcrafting of blossoms may be possible on neglected land. It should be ascertained that the plants have not been sprayed with herbicides or other pesticides. Consider growing dandelions crops in netted tunnels for production of dandelion. This will provide protection from the spread of seeds by wind and attack by predators in addition to shading for optimum quality.

# Prevention of Flowering & Reseeding

Flowering in dandelion is generally most profuse in spring and fall. Depending on where the plants are growing, and when the dandelions germinated, flowering may not occur until the second year, but if favorable, it may occur in the first growing season.

Prevention of flowering is not easily accomplished, and generally requires mechanical removal of flower buds before they open. Once open, the flowers will open for two or three consecutive days, then close, and the flower stems bend to the ground while seeds are ripening. The time period from first bloom to release of seeds is about nine to 12 days. Studies have indicated that dandelion seeds are able to germinate about seven days after the flower opens. Consequently, some (but not complete) control can be achieved by removing stems which have flowered shortly after opening.

Mature dandelion seeds are capable of germinating almost immediately. Under optimal conditions, a large dandelion plant can produce 48-146 flowering heads with an average of about 250 seeds per head. Cutting the flowering stems in bud or in bloom will result in production of non-viable seeds, and hence this is the ideal time to deal with the problem.

### **Root Regeneration**

The dandelion is well known for its ability to regenerate from root fragments. Unless complete roots are removed, they are likely to regenerate. Research has shown that upper, thicker root sections regenerate most rapidly and prolifically. Segments as small as four mm diameter and two mm length and 1.25 mm in diameter and six-10 mm in length have been found to regenerate.

Burying roots inverted or horizontally reduces survival and increases regeneration time. Deep burial is necessary, as roots regenerate easily through 10 cm of soil. Survival of roots is least from plants when taken at time of maximum flowering. Ploughing is considered the best method of root eradication because it buries the upper parts of the dandelion. On non-organic farmland, herbicides can be used to control dandelions, although older plants are more tolerant and require higher rates of recommended herbicides.

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