

Organic Black Currant Production Manual



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Introduction

PEI organic producers have sought to break out of traditional markets and identify high value markets that can be supplied through Island organic production. One such market, which has been identified, is the organic black currant market in Japan. The interest in organic black currants has grown over the past decade in Japan due to the health benefits of the fruit.

While black currents have been grown in smaller clusters in PEI, organic black currants have never been grown commercially in PEI and as a result there is a need for a production manual so that growers will have up to date and uniform production and harvesting information. A standardized production manual will also help ensure that berries from producers are consistent in size and quality and thus acceptable to the needs of mechanical harvesting as well as the Japanese import market.

Growing organic blackcurrants for the commercial market requires some specialized knowledge, especially when the plants are first planted. Several factors must be considered to give an adequate return for the grower. As with most organic horticultural crops attention to detail is critical as any omissions or missteps can cause loss in plant health, increased weed maintenance costs, a decrease in yields or increased difficulty in harvest. The longevity of a plantation is also critical to the return on capital and so great care must be taken to ensure that the black currant bush remains healthy.

As with all organic production success begins with the fertility of the soil as well as how well the soil is prepared for the planting of new stocks. Well prepared and fertile soil will result in not only superior berries and harvest volumes but will also require less weed maintenance. Weed reduction is a particular challenge to organic growers because of the prohibition in the organic production regulations to the use of herbicides.

In the following sections you will find information on the attributes of particular varieties, how to grow organic black currants commercially through proper site selection, the development of the best soil types, the biological details of plant development, the pitfalls in growing black currants, the plants' nutritional requirements, methods for weed control and prevalent pests and diseases. The manual also provides an overview of the variety of ways that black currants are processed for market.

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Plant Description

Summary Description

PLANT TYPE: Perennial
SCIENTIFIC NAME: Ribus nigrum
ZONE / HARDINESS: Hardy to zone 4
MATURE PLANT SIZE: Average up to 5-7 feet high
LIGHT: Sandy Loam to Some Clay
FLOWERING PERIOD: Mid Spring to Early Summer
SOIL TYPE: Well-drained, fertile soil
pH RANGE: 5.6 to 6.5
KNOWN PESTS: Aphids and red spider mites
KNOWN DISEASES: White Pine Blister Rust, Mildew and leaf spotting diseases

Botanical description

A. Plant: The blackcurrant is a shrub that grows to 1-2 m tall. The leaves of black currants are alternate, simple, 3-5 cm broad and long(somewhat acute tips, dentate margins), and palmately lobed with five lobes, with a serrated margin. The flowers are 4-6 mm diameter, with five reddish-green to brownish petals; they are produced in blossoms or racemes that are 5-10 cm long. Renewal canes come from the crown or beneath the soil. Plants do not reach full maturity and maximum yield until about four years. Plant longevity is generally 15-30 years, being less for black currant than red currant or gooseberry.



Flowers: The flowers of the currant are formed toward the base of one-year-old stems and on spurs of older stems. The currant flowers appear in early spring with new growth. Each flower bud opens to a number of flowers (up to 20), joined together on a delicate, drooping 5 - 6 inch stem, called a strig. The lack of a winter chill will result in a strig of reduced length or flowering that is suppressed. The individual currant flowers (green in the case of red currants and blush pink for black currants) do not make an imposing display. The flowers are joined together on the strig and give the bush a lace like texture.

C. Pollination: Most currant varieties today are self-pollinating, and are mostly grown without pollinizers.

However, the degree of self-fertility is influenced by climate and the particular variety. Hoverflies and other insects also provide pollination to blackcurrants. Currant flowers also attract honeybees.

D. Fruit: The fruit size and number can be increased by clipping off part of the ends of the strigs while the bushes are flowering. Depending upon the cultivar, fruits ripen from 70 to 100 days after blossoming. In all cases it is an epigynous, that is, having the floral parts attached to or near the summit of the ovary, as in the flower of the apple, cucumber, or daffodil. The fruit is usually glabrous, that is, it has no hairs or projections and is crowned with calyx remnants. Pronounced striations appear like "lines of longitude" in surfaces of young fruit, especially gooseberry.

E. Medicinal Parts

Leaves, berries



The leaves of the blackcurrant contain components that increase the secretion of cortisol by the adrenal glands, thus stimulating the activity of the parasympathetic nervous system, which may prove useful in stress-related conditions.

Black currant seeds are rich in gamma-linolenic acid (GLA). This a fatty acid similar to that found in evening primrose oil and borage seed oil. GLA is believed to reduce the inflammation of arthritis, lupus, and other inflammatory diseases. Gamma-linolenic acid also inhibits blood clotting and thus may protect against heart attacks and strokes. Black currant berry skins are also high in anthocyanin, a bioflavonoid that is a potent antioxidant.

The leaves and berries also contain substances that have antifungal and antibacterial properties, which may explain why it is effective in treating diarrhea caused by E. coli. In addition the tea and juice are rich in potassium, an essential electrolyte mineral that many pharmaceutical diuretics wash out of the body.

Black Currant Varieties



When commercial blackcurrant production began one of the significant challenges encountered was the inconsistency of cropping. This was generally the result of spring frost damage at flowering time. As a result the majority of new black currants plantings worldwide are the Ben Series and Titania. These new varieties, starting with Ben Lomond, were introduced to meet the cropping challenge. The popularity of these varieties has grown because they give high yields as well as deliver a consistent crop, even when the plant is

subjected to late frost and poor growing conditions during the spring flowering season.

When choosing the variety of black currants, that you will grow, it is important to first decide what market the berries will be directed toward. It is also useful to consider the harvesting technique as well as their resistance to White Pine Blister Rust and Powdery Mildew, two of the most prevalent diseases associated with black currant production in the Maritimes.

Although it is important to review research material in this manual, as well as other resources when choosing the black currant variety(ies) it is also important to make full use of the expertise available at the nurseries from which you buy your plants. It is therefore important to buy from a well established and trusted nursery and so avoid being directed to plants simply because the nursery has an overstock of a particular variety. If asked, most credible nurseries will provide you with other growers that have used their stock and therefore you will be able to get an independent second or third opinion on what variety of black currants work best in your region.

With regard to end use, that is whether the berries will be sold into the fresh market, made into jam, jelly, juice, frozen or sugar infused, it is important to understand whether the black currant variety will deliver the type of berry, in terms of sweetness and flavour that the market requires. The section below will be helpful in this matter.

If you are seeking to export into the Japanese market it is also important to keep in mind the antioxidant levels associated with each variety. Japanese food importers are seeking to differentiate their products and, although further research is needed, it is hoped that the Maritime climate and growing conditions may produce black currant berries with special attributes such as a high level of antioxidants.

One should also keep in mind the harvesting technique. For example, mechanical harvesters are NOT capable to collecting berries below 6" from the ground and therefore one should choose one of the varieties that grow to be 5-6 feet high.

If you simply intend to harvest by hand for direct marketing a smaller plant may suffice.

In general as with any project it is good to begin with the end in mind, that is ask yourself the questions: “what market will I supply, what type of harvesting will I undertake and what sort of pests, including weeds will I have to deal with?” When these questions are answered sufficiently then you are ready to choose black currant varieties that will lead to a successful and profitable agriculture undertaking.

Ben Connan

This is an early variety of black currant, producing four or five days earlier than Ben Lomond in the UK. It is considered a high yielding variety in the UK and shows even and uniform ripening. It has large, deep black berries (187 Connan berries vs. 206 Lomond berries/250 grams fruit) with a pleasant acid/sweet flavour. Its compact growth habit makes it suitable for mechanical fruit harvesting, U-pick farms and the home garden market. The Ben Connan variety is great for fresh eating, jams, preserves and canning but needs to be well harvested and ripened for the best sweetness. This variety is not ideally suited for juice production. While not completely resistant to White Pine Blister Rust, this variety has relatively low levels of infection.

Ben Tirran

The Ben Tirran is a high yielding, late cultivar with small to medium sized berries with a pleasant flavour. The Ben Tirran is considered an excellent berry for juicing. It flowers a little later than other Ben series black currants so it has reasonable tolerance to spring frosts. Growth habit is upright and vigorous. Fruit is suitable for both juice and jams, for commercial and u-pick operations, and home gardens. The Ben Tirran is quite susceptible to White Pine Blister Rust but has good resistance to mildew.

Ben Nevis

The Ben Nevis, black currant variety, is a “sister seedling” of Ben Lomond. This variety is a productive, mid-season currant with large, firm berries. It has good frost tolerance with no signs of overwintering problems in the Edmonton area. This variety of black currant is resistant to mildew and produces medium size fruit.

Ben Alder

This variety of black currant is considered a good choice for juicing, because of its high levels of anthocynins, high vitamin C content and high colour stability in addition the medium-size berries produce juice with good colour. Because this variety is late to flower, it may help in the avoidance of late spring frosts. The small size of the Ben Alder berries contributes to a high per cent age of antioxidants. Plants show vigorous growth and the growth habit is upright which allows for ease of mechanical harvesting.

Although the plant is resistant to mildew, the plant is susceptible to White Pine Blister Rust. Rust does not seem to reduce production since it is a late-season problem.

Ben Sarek

This black currant variety is a mid-season cultivar with large firm berries. The Ben Sarak is a somewhat compact semi-dwarf shrub with an average height of 3 ft which makes it suitable for u-pick and home gardens and generally not used in operations that use mechanical harvesters. Fruit is produced approximately seven days earlier than Ben Lomond. With regard to White Pine Blister Rust, although Ben Sarek has a “fair resistance” it is generally not considered a resistant variety.

Ben Hope

The Ben Hope is an above average yielding black currant variety, that is vigorous and tall, developed at the Scottish Crop Research Institute. Depending on wind conditions, the Ben Hope may require a sheltered site. Considered by many to be the best flavoured fruit of all our varieties, it shows good resistance against the foliar diseases and has a good resistance to both mildew and leaf spot. In PEI this variety seems highly susceptible to a variety of White Pine Blister Rust which completely covers the crop and reduces future yields. The Ben Hope flowers 2 days after Ben Lomond and can usually be harvested 10 days later than the Ben Lomond variety. Ben Hope yields are consistently high. They produce medium sized berry with good sensory qualities and the fruit is acceptable for commercial production.

Consort

The consort black currant is an early mid-season variety that is considered to be only fair in productivity. The berries are medium-small and the clusters are medium in length. Generally this variety is considered “poor to fair” for mechanical harvesting. Plants are susceptible to leaf spot and extremely susceptible to mildew, but resistant to white pine blister rust. This variety is considered of value in a growing area where resistance to rust is required.

Titania

Titania stands apart from other varieties in terms of reaching maturity in three seasons as well as having good disease resistance. Although this variety does have better resistance to White Pine Blister Rust, both a Danish study and an OACC study have found WPBR on Titania plants. The Titania does have very good resistance to mildew. This variety is known for consistent cropping and produces large firm berries that have a good mild flavour, which is good for processing and moderately high juice quality. Plants are extremely vigorous with ripening and flowering being very similar to Ben Lomond.

Tiben

Tiben is known for its high yield, high levels of anthocyanins and vitamin C as well as its even ripening, upright growth and resistance to mildew. It is reported to be relatively resistant to White Pine Blister Rust in Poland. In comparative yield studies it was shown that Tiben recorded higher yields than 'Ben Lomond' (both medium-late). 'Tiben' ('Titania' × 'Ben Nevis') also had strong growth and a resistance to powdery mildew [*Sphaerotheca mors-uvae*] similar to 'Titania'.

Tisel

Tisel is known for its exceptional high yields, even ripening, very high levels of vitamin C. It is also characterized by a very pleasant fresh flavour. It ripens somewhat earlier than Titania and two weeks earlier than Tiben. This variety of black currant is resistant to mildew and immune to White Pine Blister Rust.

Plant Breeding History

(taken from The Black Currant Foundation in the UK

<http://www.blackcurrantfoundation.co.uk/varieties.html>)

The mainstay of the blackcurrant industry for many years was the variety 'Baldwin'. Of unknown origin, 'Baldwin' is thought to be over 150 years old, and whilst generally outclassed now in terms of agronomic performance, it is still grown on a reduced scale today. 'Baldwin' has a mild flavour, and reasonable levels of vitamin C, but it is very susceptible to many foliar diseases, including mildew, and the flowers are extremely sensitive to damage by spring frosts. There are several other very old varieties that can still be found in small quantities today, including 'Lee's Prolific' (from 1860), 'Boskoop Giant' (1880) and 'Wellington XXX' (1913).

The first of the 'Ben' varieties bred at the Scottish Crop Research Institute was 'Ben Lomond', released in 1975. This variety still occupies a significant proportion of the UK acreage, and was released as a high-yielding type with delayed flowering to avoid damaging spring frosts at flowering time. This was achieved by the introduction of plant material from Northern Scandinavia into the SCRI programme, thereby combining high yield potential and consistency. The introduction of 'Ben Lomond' into commercial blackcurrant growing was a pivotal event in the development of modern blackcurrant varieties, and for many years 'Ben Lomond' was the leading UK variety in both acreage and performance. 'Ben Lomond' has a high winter chilling requirement, and its performance in southern parts of England may be affected after mild winters. Although resistant to mildew when released, 'Ben Lomond' is now highly susceptible to this disease.

Released in 1989, Ben Alder offers very high levels of anthocyanins, together with a typical blackcurrant flavour. From a cross between 'Ben More' and 'Ben Lomond', this variety also has a more upright habit that is more amenable to mechanical harvesting.

It has fairly small berries, held close to the stems, and again has later flowering, like 'Ben Lomond'.

The late flowering character is most obvious in the variety 'Ben Tirran', released in 1990. From a complex cross involving the old variety 'Seabrooks Black', 'Ben Lomond' and SCRI hybrids with some redcurrant ancestry, 'Ben Tirran' is the latest of all the 'Ben' varieties in both flowering and ripening. It is fairly high in vitamin C, and its later ripening provides a means of extending the harvest. Yields of 'Ben Tirran' are consistently high throughout the UK.

'Ben Hope' was released in 1998, because of its high yields, good flavour profile and especially because of its reduced susceptibility to gall mite ('big bud'). Estimates made in field trials at East Malling Research have shown 'Ben Hope' to be up to 30 times more resistant to gall mite than other commonly-available varieties, making 'Ben Hope' a valuable asset at a time when control measures for gall mite are increasingly limited. The variety derives from a complex cross, including 'Westra' (a form of the old variety 'Westwick Choice', but with a very upright habit that is passed on to 'Ben Hope') and a hybrid with some gooseberry ancestry (from whence the relative resistance to gall mite is obtained). There are several hybrids from SCRI with complete resistance to gall mite currently in trials, but at the present time the combination of positive characteristics mean that 'Ben Hope' is the most widely-grown variety in the UK and throughout Europe, for both large-scale commercial growing and gardens.

'Ben Gairn', also released in 1998, is the only current UK variety with resistance to reversion virus, a disease which renders the plant sterile and therefore non-fruiting. The resistance is derived from a Russian variety, 'Golubka', which was crossed at SCRI with 'Ben Alder' to produce 'Ben Gairn', and should enable the life expectancy of plants and plantations to be extended. This variety is very early in both flowering and ripening.

'Ben Avon' and 'Ben Dorain' are sister seedlings from a cross between 'Ben Alder' and 'Ben Lomond', giving high yields, upright growth habit and very good fruit/juice quality. Released in 2003, these varieties show differences in their local adaptation, so that 'Ben Dorain' performed best in trials in the West Midlands and Scotland, whilst 'Ben Avon' was better in East Anglia. The higher vitamin C content of these varieties makes them useful alternatives to 'Ben Alder' and 'Ben Tirran'.

In addition to varieties bred for the commercial juicing market, there are several varieties bred at SCRI for the PYO and amateur markets. For these markets, growth habit and juice quality is not as crucial as for processing, and there is a preference for large berries with sweeter flavour. The main varieties are 'Ben Sarek', 'Ben Connan' and the as yet-unreleased 'Big Ben'; the latter is currently in trials within Europe including at the Royal Horticultural Society, and has the largest and sweetest berries compared to other types. 'Ben Sarek' and 'Ben Connan' both have reasonable habit and high yields.

Plant Development

Site Selection

Black currants prefer a cool moist soil. A reasonably drained, rich clay loam soil with a pH 6 to 7.5 is ideal. It is true that black currants tolerate a wide range of pH and it is known that pH can be mediated by high organic levels, however, generally a pH of 6 has been found to be optimal. If the soil is sandy, incorporate peat moss, compost or well-rotted manure to a 15 cm depth before planting. Mulching with grass clippings, bark chips or chopped straw will help conserve moisture and maintain a cool soil temperature.

The initial setting for the blackcurrant plantation is one of the most important factors of growing a healthy plantation. Black currant flowers can be damaged by severe spring frosts, consequently it is helpful to have somewhat of a downhill slope to permit cold air to drain to lower levels, and to shelter the plantation from the NW through to NE winds. Cold air behaves like water in finding the lowest level but is slower moving. Exposed sites are to be avoided as strong winds during spring and summer can damage the bushes and strip both flowers and fruit.

Many plantations are planted adjacent to existing woodlands or hedges, but where it is necessary to provide additional shelter, windbreaks are established. Historically, species suitable for windbreaks include Alder (Red, Italian or Grey but not Common Alder) for in field planting, Birch and Spruce for perimeter protection. Poplars, once common, are not used as they are very water demanding. However, where possible multi-species windbreaks are now encouraged to create a wide range of habitats for wildlife. Due to the prevalence of White Pine Blister Rust and its parasitic relationship with pine trees the use of these evergreens in black currants windbreaks should be avoided.

Site Preparation

Because organic growers are limited to the use of natural pest control, it is important that the future site for black currant planting be prepared the year before, so as to limit the amount of weeds on the site. Research results also indicate that limiting weed production will significantly increase black currant plant growth. It should be remembered that black currant height will be a significant factor in the effectiveness of mechanical harvesting as any berries below 6" cannot be harvested. In trials carried out by the OACC, in PEI, it was found that bush growth (height and width) was 25% lower in the site that had no weed control as opposed to the sites that used landscape fabric.

It is generally recommended that the future site for black currants be left fallow for one season prior to planting to help rid the site of persistent weeds, such as Canada thistle, quack grass, sow thistle and bindweed. During this period a cover crop is an effective method to suppress weeds, prevent erosion and build healthier soil. Cover crops are also known as "green manures" because they add valuable organic matter and nutrients to the soil.

There are several plants that can be used as a green manure, such as buckwheat or clover. These grass species will also out compete weed populations and thus allow for more vigorous growth of the black currant plants. Buckwheat has an added advantage in that it has a long depth of roots and draws phosphorous from deep in the soil to the surface. To be effective, buckwheat must be planted sufficiently thick in order to out compete the weeds. Although buckwheat is not a big biomass producer, especially if planted late summer, it is easily decomposable. Buckwheat should be plowed under within 7-10 day from the time of flowering to prevent volunteer plants from growing during the next year.

Clover also has many benefits. For example, sweet clover used as a cover crop, is also good at eliminating weeds. It will also deliver one of the highest levels of biomass at 1.75 tons to the acre and fix nitrogen in the soil at 120 lbs per acre. It was noted, however, that several farmers found white clover overly aggressive and not easily controlled in the alleyways between the black currant plants. As a result several producers have recommended against its use.

Black currants are heavy feeders and so long term cropping can be improved by applying and plowing under a heavy dressing of well-rotted manure prior to planting.

Controlling weeds in organic farming systems requires the use of many techniques and strategies in order to achieve economically acceptable weed control and yields. Weeds can always be pulled or cut out, but in the end the question is: "how much can a grower spend in terms of time and money to reduce weed pressure?". The more a grower is able to reduce weed pressure (seed and perennial propagules) the more economical it is to produce the black currant crop. (See below "weed management")

Climatic Conditions

Because of their extreme cold hardiness, long chilling requirements, short maturation period, and intolerance of summer heat, black currants are well-adapted to northern areas, and are often grown where severe winter cold precludes tree fruit production (northern Scotland, Alberta etc.). Since bushes are small, snow often protects them from winter injury in the extreme north.

Currants are very hardy and can withstand winter temps of -22 to -31°F (-30 to -35°C). The flowers are tolerant to frost and can withstand temperatures between 31 and 28°F (-0.5 to 2.0°C) when open and 27 to 23°F (-3 to -5°C) when closed. The small fruit is tolerant to temperatures between 28 and 27°F's (-2 to -3°C's).

- Black currant plants require 120-140 frost-free days to mature fruit and complete their full seasonal plant growth.
- Fruit ripens in 90 days, and is harvested in late July to early August in Canada.
- Sites with a cooler microclimate, such as a northern exposure, are best since heat injury can be a problem.
- Unlike other fruit crops, *Ribes* are shade tolerant, but will produce more in full sun. Afternoon shade may be used to avoid heat stress in warm areas.
- Irrigation is beneficial to production, due to shallow rooting. However, water requirement is relatively low, 1 inch per week.
- Chilling requirements for plant development is 800 to 1600 hrs.

Global climate change is presenting a number of concerns for various crop production initiatives. For example research on historical meteorological data for North America and Europe shows a trend toward warmer winters. These warming tendencies result in changes in woody plants, particularly the flowering traits. As a result, there may be cause for concern that the commercial cropping of berry crops, such as blackcurrant (*Ribes nigrum*), may be adversely affected by a series of mild winters. It is postulated that insufficient winter chill may result in poor bud development in the subsequent year.

As a result of changing climatic conditions the Scottish Crop Research Institute, which developed the “ben” black currant series, is undertaking specialized research into the development of environmentally adapted cultivars in order to support the sustainability of future black currant production.

Propagation and Planting

Black currants can be obtained either from a reliable nursery (see list below) or from another farmer’s disease-free bushes. If an established planting is the source for the plants, or replacement is required for patented stock, they may be propagated by layering or from cuttings. Remember that most variety patents do not allow for propagation with the exception of replacement of diseased or injured plants.

Late spring is typically the time when layering is done in order to provide plants for removal from the parent. A lower branch of a bush is bent over, and covered with soil, leaving about 15 cm of the branch tip exposed. Roots then form along the buried branch, and the new plant is easily removed and transplanted the following spring.

In the fall, after the currant leaves have dropped is the time when cuttings are taken. Vigorous shoots of the present season’s growth should be used for cuttings. Make cuttings 20 to 25 cm long. Be sure to make the lower cut square and immediately below a bud, and make the upper cut sloping and about 1 cm above the top bud. The cuttings should be placed upside down in slightly moist sand or soil in a box. Store in a cool basement or in a cold frame under 30 cm of soil. In the early spring plant the cuttings in a sheltered spot in the garden. Dig a trench about 20 cm wide, and lay the cuttings on the sloping side about 15 cm apart. Set the cutting deep enough so that only one bud is above the ground. Fill the trench and firm the soil against the cuttings.

The soil should be kept moist to promote rooting.

Black currant hardwood cuttings will root readily as long as each eight to twelve inch long piece is set deep enough in the ground so only the top most bud is exposed. The best time to set cuttings is either in early spring, autumn, or even at the end of the summer. If cutting is set in summer leave the topmost leaves on the cuttings attached and make sure the plants do not dry out before rooting.

Currant softwood cuttings also root easily. Three-inch tip cuttings, given shade and a clear plastic tent or mist, grow roots in three or four weeks.

Black currants often produce drooping branches that layer themselves. If only one or two new plants are wanted, this layering habit can be encouraged by bending a low branch to the ground and covering it with some soil and a stone.

Plant black currants in the spring before they leaf out or in early September after the leaves have dropped. Set black currants 2.5 to 3 ft apart in the row and allow at least 12-13 ft between rows for mechanical harvesting. Yield studies indicate that tight spacing has a proportional effect on yields in the first four years but that production levels even out later.

Growing Requirements

Irrigation

Black currants require sufficient soil moisture in order to have good plant growth, high yields, and produce large size berries. Generally currants require about 25 mm of water each week from the time they bloom until the end of harvest. A good grass sod between the currant rows will tend to support moisture retention. If initially, however, landscape fabric is used in weed control and rain does not provide sufficient moisture, then watering is advised. Plants should also be watered during prolonged dry periods after harvest until late August or early September. However, do not stimulate plant growth in late fall by watering, this may prevent hardening of the plants which is necessary to prevent winter injury. In watering, add enough water to moisten the soil to a depth of 15 to 20 cm (6 to 8 inches) and then let the soil dry out somewhat before watering again. Be careful not to water excessively or roots will be injured.

Trickle irrigation is a good method to provide moisture for currants. The system slowly adds small amounts of water each day directly to the soil around the base of each plant. Various types of equipment are available. For more information, see OMAF Fact sheet No. 81-070 *Trickle Irrigation for Fruit Crops*.

Weed Management

Research indicates that without some form of weed control, crop yields and plant vigor will be greatly reduced. As discussed earlier, the Organic Agriculture's Centre of Canada's initial black currant field trials in the Province indicated significantly (25%) reduced growth in plants that did not have weed control.

In organic farming, weed control is only one goal of a weed management system in cropping areas. A weed management plan is very important for organic producers and should allow for a minimum amount of erosion. It should also provide for the easy movement of farm equipment, not impact adversely on pest management or soil fertility, while at the same time minimize weed competition for soil nutrients and water.

The hoe is perhaps the most basic tool that can be used to control weeds around black currants and works well near the plant because of the shallow depth of black currant roots. As a result cultivation should be kept shallow as deep cultivation damages roots and encourages unwanted sucker growth.

It is quite advantageous in black currant production to eradicate all perennial weeds such as quackgrass, bindweed and Canada thistle in the year prior to planting. A key focus should be to not permit weeds to go to seed. In order to reduce weeds in the rows in between the black currant plants rows different methods are now currently being used in PEI black currant production. The description below examines each method and provides the benefits and draw backs to each.

Mulching is one method for weed control and does have a number of benefits in that it is easy to apply and can be composed of a variety of easily accessible material such as straw, seaweed, bark, grass clippings or leaves. Organic growers must be careful, however, not to take any mulch material from lawns that have been treated with herbicide. Mulch must be applied to, at least, a depth of 3 inches if it is to be successful in reducing weed infestation.

There are some cautions around mulching. One concern is that as the mulch begins to decay, especially if it is applied to a depth greater than 4 inches it will draw nitrogen and other nutrients from the soil. Another concern with regard to mulch application, in black currant plantations, is that if it is spread too thickly it will create difficulty for the mechanical harvester mechanisms.

All organic black currant growers must make sure that the mulch material is approved under the Organic Production System Standards Permitted Substances list. The description of materials that fit within the guidelines may be found on line in downloadable PDF at:

http://www.tpsgc-pwgsc.gc.ca/cgsb/on_the_net/organic/index-e.html

A second method of weed control uses landscape fabric to reduce or suppress weed growth. The material is usually installed as a three foot strip extended along the crop row. Early indications are that it was quite effective in forestalling weed growth around the crop.

Landscape fabric is manufactured using a variety of material including wood cellulose. It is probably wise to choose fabric that will break down in the ground at a minimum of two years thus allowing the black currants to get well established. At this point they are able to readily out compete many weeds that grow after the breakdown of the fabric. Landscape fabric is utilized in the present trials being undertaken by OACC and does seem to be a useful tool in black currant weed management. There are some concerns about the cost, the time required to install the material and also identifying landscape fabric that does not have any substances prohibited by the national organic regulations.

It should be added here that plastic will perform the same function as fabric, although keep in mind it is not permeable and thus nutrient and water access might be limited to the plant (this may also be somewhat of a concern with fabric depending on the type of manufacturing materials used). Plastic material can be used in organic production but must not contain any PVC substances. In addition most organic certifying bodies allow plastic to remain in fields growing perennial crops, however, it must be removed after it begins to break down. Some growers have found that there is considerable time and difficulty in removing the plastic after it begins to break down thus leading to additional labour costs. On the positive side plastic is cheaper than fabric and has less degradation through UV exposure.

The third method being used to provide weed control is through the planting of a grass cover crop. A grass formula commonly known, within the Province, as “Highway Mix” and composed of a variety of grass varieties mix is seeded out and then maintained to a minimum length through the regular cutting with a bush hog or similar such devices. This method provides the added advantage of providing the black currants with a stable environmental cover and thus protects the plants during significant weather variations during the winter months. It is also an effective way of maintaining soil moisture throughout the growing season. More research work is required with regard to the most effective mix of grass seeds to plant since many grass and weed varieties can out compete currants for nutrients.

Obviously each method of weed control has its pluses and minuses related to cost, both in terms of humans and cash resources, as well as the benefits to the black currant plants. As a result each grower needs to evaluate the weed control method in terms of money, time and the effects on the plants itself.

Compost and Soil Additives

Black currants are heavy feeders and as a result they should not be planted in marginal soils. Good soil fertility, it has been shown, will be a significant factor in maintaining plant health as well as yields.

At the present time a variety of organic soil conditioners and fertilizers have been used in maintaining and increasing soil fertility such as, compost, fish fertilizer, sea weed, pelletized chicken manure, crab meal, compost tea and canola meal. Some currant producers have also added boron or include crab meal which contains boron. Boron is important as a trace element but it is generally lacking in Island soils.

The OACC is investigating fertility requirements of older plantings and newer plantings. For plantings in 2009 they are investigating three fertility rates applied in May only, in late August or applied as a split application to assess what timings and rates are most effective for this crop. For older plantings, planted in 2008, they are looking at spring and fall fertility application and a spring plus fall application as well as the use of a foliar fertilizer. These two trials are being tested at 2 sites each (4 locations in total).

Whether an early or late application is applied, the soil should have a rich supply of organic matter to promote good drainage, aeration and moisture retention. It is generally recommended that 45 t/ha or 20 L/m² (5 bu/100 ft²) of well-rotted manure be applied in late summer or fall before planting. Work it thoroughly into the soil. Manure that is not well-rotted should be applied the previous fall to allow time for weed seeds to germinate so they may be destroyed.

Pruning



Pruning of the black currant plant is required to ensure robust crops and although older branches will bear fruit the quantity and quality decline with age.

The purpose of pruning is to remove about one third of the oldest stems each year. The bark of the older stems is very dark to the point of being black. One should leave 10 to 12 stems per mature bush, with about half being one-year-old stems. Generally it has been found that one-year-old black currant stems are the most productive. As a result, all stems older than three years should be removed in order to allow continual new growth to occur. Pruning cuts should be made close to the ground.

If mechanical harvesting is utilized one should remove branches that are hanging close to the ground. It is also important to remove and dispose of any diseased branch tips and branches which are late leafing out, sickly or dying in order to control any insect or fungal infections.

Modern harvesting equipment may have attachments that allow growers to prune their crops mechanically. This generally entails shaping the bush for harvest efficiency but also encourages new growth especially at a height that is more adapted for

mechanical harvesting. It is best to prune the plants when they are dormant in late winter or early spring.

Diseases

Powdery Mildew



Black currants and European types of gooseberries are especially susceptible to powdery mildew. In order to lessen the possibilities of this disease provide a site with good air circulation. Control can be obtained by planting currant varieties that are resistant to powdery mildew. Given the limitation on organic growers to the use of chemical fungicides it is important for the grower to be aware of the first signs of powdery mildew infection in order to eliminate the spread of

the disease.

In early summer, a white powdery fungus growth appears on young leaves and tips of branches and new shoots. The fungus may spread over much of the bush and often occurs on gooseberry fruits. It seldom occurs on the berries of currants. Later, the white powdery growth becomes brown, and forms a felt-like coating over affected parts. Shoot growth is often stunted, tips may be killed, and the berry fruit may also be stunted. The fungus is spread by spores. Warm, humid conditions favour its development. In order to stop infection from spreading cut off the diseased tips of shoots and branches when pruning in early spring. Be sure to remove the material from the field and burn.

White Pine Blister Rust



White Pine Blister Rust was introduced into North America in the early 1900's from Europe. It is not native to Europe, however, it is believed to have been introduced into that continent from Asia. Its introduction to North America resulted in one of the most serious disease outbreaks on conifers.

The fungus causing this disease spends part of its life cycle on currants or gooseberries and part on white pine and as a result black currant plants were banned for several years in many of the states of America. With the introduction of new disease resistant varieties, several states have lifted the prohibition on black currant plantings. In any case, it is still important not to plant currants within 300 m (1,000 ft) of susceptible

pinus. Black currant varieties such as *Titania* and *Tisel* are known to be somewhat resistant to White Pine Blister Rust.

The symptoms for WPBR, while generally mild, develop throughout the growing season. When infected the lower leaf surface becomes pale and within a few days small orange pimple-like fruiting bodies (uredinia) develop in which yellow-orange rust spores are produced. The spores cause repeated new infections on the currant leaves, from May through late summer, when another spore-bearing form of the rust fungus appears. This form of the spore, called a telium, is a short, yellow-brown, hair-like filament. Due to the large number of these filaments the lower leaf surface has a fuzzy brown appearance. An issue with this disease is that it doesn't tend to effect the years' harvest but, due to early leaf drop, can greatly effect the following years' harvest.

Viruses:

There are a number of virus diseases known to be present in North America including gooseberry vein banding and tomato ring spot nepovirus that can infect black currants. The first sign of infection appear when the first leaves expand in the spring and show a pale yellow banding.

Another virus which may infect blackcurrants is tomato ring spot. The symptoms of this disease consist of varying degrees of chlorotic(yellowing) spotting and vein banding. This yellowing may vary from a few blotches or spots to a mild vein banding in a leaf or to a yellowed leaf with a few green spots or the conspicuous yellowing of the entire plant.

The following procedure is recommended for maintaining plant health:

- Where possible obtain plants that are virus free
- Control pest nematodes(also called round worms) that spread the virus
- Control aphids and mites
- Remove and burn infected plants

Insects Pests

There are four main insect pests that can attack blackcurrants: currant borer, aphids, currant fruit fly and mites, however others are described below.

Currant Borer

This insect can cause serious injury to currant, and to some extent gooseberries. The adult is a clear-winged moth similar in size and appearance to a thin housefly. Wings

have black bands and the body has several narrow yellow bands. The young larvae bore into the pith of the shoot and feed there. The following spring, affected shoots often leaf out late are sickly and may die. When an injured shoot is cut, a dark hole can be seen where the larva has tunnelled in the pith. The yellowish-white larvae, which are about 12 mm ($\frac{1}{2}$ inch) long, may also be present. Symptoms of a currant borer include yellow foliage in the spring which is then followed by die back of the canes. When pruning, remove and destroy branches which have dark, hollow piths. Also, remove and destroy any dying or sickly branches during the growing season. Follow recommended pruning practices and do not let shoots become too old. Keep plants growing vigorously.

There are now indications that it is possible to disrupt the clearwing moth using pheromone stations. Several trials have been undertaken in Washington and British Columbia which have shown considerable promise.

Scale Insects

Both currants and gooseberries are susceptible to attack by several species of scale insects. Scale insects are small insects of the order Hemiptera. The insects are common parasites of plants and tend to feed on sap drawn from the black currant's vascular system. Scale insects will attack the tender wood of the black currant and at times the berries.

Aphids

Aphids feed on a variety of leafy plants. In currants these small greenish-yellow pests feed on the under surface of young leaves at the tips of shoots. Infected leaves will curl downward and have a burnt or blistered appearance. Generally black currants are not as susceptible as red currants wherein the affected leaves when weakened may die.

Currant Sawfly

The currant sawfly larvae are smooth greenish worms with many black spots. The length of worms are about 20 mm ($\frac{3}{4}$ inch) long when they reach adulthood. Currant sawfly are capable of stripping the foliage from a plant and tend to feed on the edge of leaves. The best sign of infestation is tiny pinholes that can be seen from the upper leaf surface. One to three cycles of this pest may become evident in May and June which is the most common time for infestation. When signs of feeding are noticed, usually early in the season, kill any worms present. An application of insecticide soap is usually an effective method of control during the early stages of larval development.

Currant Fruit Fly

The adult currant fruit fly will come into view around the time currants are in bloom. The developing currant berries provide the host for the female to lay its eggs. The fruit fly eggs develop into maggots which feed inside the berries. As a result of this infestation many berries ripen prematurely and drop to the ground before the harvest season. Each fallen berry will contain a small white maggot which will leave the berry and spend the winter season in the soil.

Earwigs

Earwigs have also presented a problem to some PEI black currant plantings. The common earwig is omnivorous, eating other insects, plants, and ripe fruit. To a large extent, this species is also a scavenger, feeding on decaying plant and animal matter if given the chance. This insect is a nuisance in currant production because it borrows into the fruit thus making it unuseable.

There are several methods of controlling earwigs. Dampen rolled up newspapers and place in the production area in the evening. Generally earwigs feed at night and seek out a damp, sheltered spot during warm dry days. In the morning you can gather a good number for disposal. Shallow cans, such as cat food or tuna cans, with a little bit of vegetable oil can also be placed around the plants as traps. Because Earwigs crawl, sticky tape or petroleum jelly can be placed around the base of the currant bush to catch them. Diatomaceous earth also seems to deter them and should be applied to the soil and reapplied, if required in one week.

Miscellaneous

Premature Fruit Drop

Several weeks after bloom black currants can suffer from premature fruit drop. This phenomenon is called "run-off" in Europe and is thought to be caused by lack of seed set or inefficient pollination in the fruit.

There is thought to be a number of causes to "run-off," including self-incompatibility, lack of pollination (too few pollinators or poor pollinating conditions), soil fertility levels, virus, currant fruit fly, drought, excessive moisture, Botrytis, frost or varietal intolerance of cold above 0°C temperatures.

Research has found that the black currant variety Magnus can lose 60% of its fruit if the overwintering buds are subjected to 2°C for two days when the fruit buds are at the grape stage, the period when the fruit buds are just beginning to expand (usually one or two weeks before flowering).

Frost Injury to Blossoms

Black currants bloom early in the spring and as a result intense frosts can injure new blossoms as well as immature berries. One should choose sites with good air drainage so that frosts will cause fewer problems.

To protect the plants from frost in small plantings use cloth or paper coverings (plastic offers no protection) placed over plants for protection. In larger sized plantations sprinkler irrigation is effective. The conversion of water to ice protects blossoms and berries as the plants release heat.

Harvesting

Generally black currant berries ripen over a two-week period and once ripe will stay on the bush for a week without becoming over ripe or falling off the bush. The end use for the berry, that is, whether it will be used in processing, the fresh market, quick frozen or made into jams or jellies will determine whether the berries can be harvested in one or two pickings. With more frequent picking, there is a tendency to pick berries which are not fully ripened.

Whether black currants are harvested by hand or by mechanical harvesters the berries should be taken out of direct sunlight and stored in cool area until they are processed or brought to the fresh market. In addition, the berry containers used should not allow the berries to be distributed to a depth of more than 4 inches. All of the foregoing will preserve the berries' freshness and thus the quality of the end product.

Mechanical Harvesters

Straddle harvesters are still widely used and have been further developed through the last 20 years to continuously improve performance, minimise bush damage and incorporating health and safety requirements. Many of the models also now use cross conveyors to move the fruit into a third row so that stoppage time is minimised. The fruit is also usually picked into large ½ tonne bins which makes transport significantly easier. A modern machine is usually operated in daylight hours only and depending on the hours worked can pick up to 50 tonnes in a day using only an operator, 2 quality controllers and 2 tractor drivers - a far cry from the crowds of hand pickers of the 1960's and 1970's.

There can be problems associated with modern harvesters, such as the dust that can be created by the machine which may settle on the fruit still to be picked, making it unsuitable for harvesting. This problem is exacerbated by cross alleyways and the headlands in the plantation especially if the grass is not well established. Care must be taken to place the filled bins where they will not be contaminated by dust and dirt.

Routine general maintenance must be carried out regularly during the harvesting season including pressure washing when there is an opportunity. Most growers now

have on-farm workshops and can perform most maintenance without referring to the manufacturer.

Harvest Dates

In order to allow the black currant plants to get well established it is recommended that plants not be allowed to bear fruit the first year of planting. During the second year it is possible to harvest a light crop. In the third year black currant plants generally bear a full crop. Although it depends somewhat on the variety, plants should remain productive for at least 8 to 10 years.

The starting date for picking black currants in PEI is usually early August, although summer weather conditions and the variety of black currant can also effect harvest times as well as the duration of the harvest. European growers generally find that a heavy crop will generally result in a later start to picking. It also has been found that if the summer season is cold and wet then harvesting will be delayed by two or three days. As all the fruit becomes black, the berry weight will gradually diminish due to fruit shrivelling or dropping.

Processing



The Japanese and southeast Asia market now import large quantities of black currants for use in a variety of food products because the plant is well known in the region for its health benefits. For example, the black currant berries are known to contain substances that have antifungal and antibacterial properties, which may explain why it is effective in treating diarrhea caused by E. coli. In addition the tea and juice are rich in potassium, an essential electrolyte mineral that many pharmaceutical diuretics wash out of the body.

There are three main market opportunities for organic blackcurrants: fresh market, jam/jelly market and sugar infused. Organic black currants can also be found as an ingredient in a variety of health drinks and juices. A report from HortTechnology (University of Guelph) states that a major opportunity for the expansion of the black currant industry is in the juice industry. The berries also freeze quite well and thus allow producers to choose a variety of processing options.

Fresh Market:

As the knowledge of the healthful properties of black currants grows the direct marketing of black currants at farmers markets, community supported agriculture (CSA) distribution systems and at the food retail market continues to grow. Generally the fresh market requires berries that are of high quality and hand picking tends to produce the highest quality berries although harvesting by hand is labour intensive and may limit the future expansion of the fresh market.

Sugar Infusion:

Sugar infusion involves marinating the currants in a sugary syrup, allowing the liquid to seep into them and so act as a preservative. Once the berries have been thoroughly infused by the sugar they are dried and can either be used in other products or, as in Japan, eaten as consumer ready products. At the present time the closest plant for sugar infusing is in Quebec although attempts are being made to develop this processing technology in P.E.I..

Black Currant Jam and Jellies:

One of the main marketing vehicles for black currants, in PEI, is black currant jam or jelly. In order to connect with the Japanese market the Anne's PEI Farm label has been established. The facility at PEI Preserves has been sub contracted to make and bottle the jam and jelly.

Any fruit can be made into jam or jelly. All jams and jellies require sugar and pectin. While all fruit contains natural pectin, some fruits have more than others. That is why some fruits require that you add additional pectin in order to get it to jell properly. Although most fruits will eventually gel if you cook it long enough, the cooking process

tends to lower the nutritional value of the product and therefore the use of pectin reduces cooking time while preserving the quality of the fruit product.

Product Health Benefits

Black currants have grown in popularity because of there are health benefits and in fact they have now become known as a “superfood”. Certainly it is known that the deep black fruit is packed with antioxidants, vitamin C, potassium, as well as iron, calcium, manganese, magnesium and best of all, the flavour is unique and absolutely delicious. Black Currants have been used since the middle-ages to treat bladder stones, liver disorders, coughs, chest ailments, urinary problems, and skin conditions.

The development of currants and more specifically the “Ben” variety has been led by the Scottish Crop Research Institute. Their research work over the past years has confirmed that black currants have higher levels of antioxidants and total vitamins and minerals than virtually any other fruit, including blueberries and pomegranates. Their research of 20 of the most popular fruits looked at their extracts compared to disease models and also examined data on energy, fiber, protein, vitamins and minerals. In terms of antioxidants, black currants ranked first.

It was found that black currants have the highest level of an antioxidant called anthocyanins. Research in black currants has shown to be beneficial in warding off ailments including heart disease, cancer, Alzheimer’s disease (2006 Tuft’s University Study), diabetes and high blood pressure.

As a result of the research a number of marketers have produced a variety of derivatives from currant seed oil, dried currants, blackcurrant juice concentrate, blackcurrant herbal extracts, blackcurrant powder and blackcurrant dried leaves. Black currants are also processed as a puree and are considered a European staple.

A Comparison of the Nutritional Values of Various Fruits

One (1) pound of raw fruit

Fruit	Calories	Protein	Fat	Carbo- hyd	Ca mg	Ph mg.	Fe mg	Vit A IU	Thia mine mg.	Ribo- flavin mg	Niacin mg.	Vit C mg.
Blueberry	310	2.9	2.1	63.8	63	54	3.6	421				58
Cranberry	218	1.8	3.2	51.4	64	50	2.7	182	0.13	0.09	0.45	55
Black Currant	240	7.6	0.4	58.2	267	78	34.9	1,020	0.24	0.22	1.3	889
Gooseberry	178	3.6	0.9	44	100	127	2.3	1,330	0	0	0	149
Grape	324	3.5	1.8	73.5	75	92	2.6	330	0.24	0.12	1.9	17
Orange	164	2.9	0.7	36.6	106	75	1.3	910	0.25	0.8	0.8	162
Raspberry	294	5.4	6.2	59.9	132	97	4.1	tr	0.12	0.30	1.3	81
Strawberry	179	3.5	2.6	35.3	122	118	3.5	250	0.13	0.29	1.3	261

Canadian Black Currant Suppliers

Hortico Nurseries Inc.
723 Robson Rd.
R. R. #1
Waterdown, ON
L0R 2H1 (905) 689-6984
(905) 689-6566 - Fax
Email: office@hortico.com
Website: www.hortico.com
black currants,
red currants,
white currants,
gooseberries

McGinnis Berry Crops Ltd. 3583 Dove Creek Rd.
Courtenay, BC
V9J 1P3 (250) 338-8200
(250) 338-1676
Email: mcginnis@berrycrops.net
Website: www.berrycrops.net
black currants,
red currants,
white/pink currants,
gooseberries

Mori Nurseries Ltd. 1709 Niagara Stone Road
R.R. #2, Niagara-on-the-Lake, ON
L0S 1J0 (905) 468-7863
(905) 468-5847 - Fax
Email: mori@morinurseries.com
Website: www.morinurseries.com
black currants,
red currants,
white currants,
gooseberries

Strawberry Tyme Farms R.R. #2
Simcoe, ON
N3Y 4K1 (519) 426-3099
(519) 426-2573 - Fax, Email: styme@kwic.com, Website: www.strawberrytyme.com
black currants,
golden currants,
clove currants,
red currants, white currants, gooseberries