



Introduction

Asparagus is a perennial vegetable crop adapted to temperate climates such as Newfoundland and Labrador. The plant requires a rest period, satisfied in Canada by winter dormancy, and is dioecious, meaning that it produces male or female sexual parts within their flowers. In this way plants can be described as male or female.

Growth Requirements

Asparagus responds well to a deep, well-draining soil with a light texture profile (sandy loam). Ideally, the soil should contain at least three per cent organic matter and have a pH between 6.0-6.8. Asparagus will not tolerate standing water at the root system so soil needs to drain properly and be free of hard-pans. The soil should also be free of stone and gravel, as these can injure growing stems making them unmarketable. Asparagus will develop a large, proficient root system that can reach 1.5 metres deep at maturity. New plantings should not be placed in fields that have been previously used for asparagus cultivation - two soil born *Fusarium* diseases can cause serious production problems

and as a perennial crop there is no opportunity for crop rotation in an established asparagus stand.

Cultivars

There are no cultivar recommendations for asparagus in Newfoundland and Labrador. The University of Guelph cultivar “Millennium” and U.S. developed “Jersey Giant” are the most widely grown cultivars in Ontario and have given superior yields to other cultivars when tested in other parts of Canada. Both cultivars are male-hybrid. Both “Millennium” and “Jersey Giant” are male-hybrid genotypes, in most commercial settings all-male hybrid seed is preferred, to mixed seed as male plants are known produce 20-25 per cent greater yields than females.

Nutritional Value

Asparagus stems are a good source of vitamins A and C, and potassium. Asparagus is also low in calories with 90g of spear providing 18 kcals.

Crop Establishment

Seed Germination/Seeding:

Asparagus seed requires a minimum of 10°C to germinate, however germination success and seedling development are enhanced at temperatures between 15-30°C. The optimum temperature for asparagus seed germination is 24°C. Germination may also be enhanced by soaking seedlings in water at 32°C for three to four days prior to sowing. Soil should be at least 15°C when sowing asparagus seed.

Due to Newfoundland and Labrador's short growing season it may be advantageous to plant greenhouse grown seedlings or nursery grown asparagus crowns as opposed to direct seeding of asparagus. Asparagus transplants can be started in a greenhouse in middle to late February and transplanted into the field after eight to 12 weeks or when soil has reached an adequate temperature (15°C). Asparagus crowns are started

in nursery beds and left in the ground for one year; plants are dug up in the spring and then replanted as soon as possible. Selection of the best crowns is essential. Damaged, diseased or under sized (less than 25g) crowns should be discarded. Selection of the best asparagus crowns is essential, all damaged, diseased or under sized (less than 25g) crowns should be discarded, this may be up to 40 per cent of the crowns in the nursery beds. Crowns should be planted at a depth of 15-20 cm.

Seeding/Planting:

Permanent field spacing for plants should be at a distance of 1.25-1.75 metres between rows and a spacing of 30-45 cm between plants within the row. Asparagus seed should be planted at a depth of between 2.5-4 cm. Crowns should be placed in a 15-20 cm deep furrow and covered with 5 cm of soil. Soil should continue to be added through the season, usually during cultivation to control weeds.



Crop Management

The first two to three years of establishment are critical for the productivity and yield of the mature asparagus stand. During these first couple years young asparagus plantings can suffer from weed competition, inadequate soil moisture and/or soil fertility. It is also highly detrimental to over harvest plants during the first years of establishment. After the last harvest of the season the asparagus bed should be shallowly cultivated to control weeds and incorporate nitrogen fertilizer. Care must be taken to not damage the root system of the asparagus during these activities. The remaining stems will begin to unfurl their frond-like leaves which will photosynthesize and capture energy to recover from the harvest period and store reserves for winter dormancy and regrowth in the spring. While stems are still green they are still connected to the root system of the plant and should not be removed. When the stems turn yellow they can be removed, however the stems tend to catch snow which can help insulate the plant during winter. The stems can be cut and incorporated in the spring before the plant breaks out of dormancy. Incorporation of dead stem tissue can add 10 tonnes of organic matter per hectare.

Nutrition

All soil fertility recommendation begin with soil analysis. Test soil before any agricultural activities. Recommendations given here refer to results from a soil test using a Mehlich-3 extraction solution.

Nitrogen

Yearly nitrogen requirement for mature asparagus stand are approximately 110 kg/ha. Generally for mature stands half is applied prior to harvest and

then the remainder is applied after last harvest. For new plantings all nitrogen is applied before planting. Asparagus responds well to manure application. Production of asparagus crowns require approximately one half the nitrogen needed for regular production.

Phosphorus

A mature asparagus stand is unlikely to respond to increases in phosphorus when soil levels are 125 mg/L or greater. As phosphorus is difficult to incorporate into established stands, the optimum time to apply nutrient is at planting. Up to 135 kg/ha of phosphorus should be applied within the trench before planting crowns or transplants.

Potassium

Although asparagus has a relatively high potassium requirement, the plant is unlikely to respond to applications of potassium when soil levels are 250 mg/L or greater.

Micronutrients

Asparagus has a high boron requirement and the soils of Newfoundland and Labrador can naturally have suboptimum levels. Asparagus is unlikely to respond to Boron application when soil test levels of 1.5 mg/L or above. Soil nutrient analysis should be consulted before the application of micronutrients.

Application

For mature asparagus stands fertilizer applications are usually broadcast and incorporated using a light disking. For new plantings, fertilizer, especially phosphorous, should be banded within the row.



Climatic Limitations

Late spring frost can be damaging to asparagus plants. Generally frost will damage the first flush of stems produced by the plant in the spring, this is unfortunate as this first flush of stems tend to be the largest in terms of both size of the stem and the number of stems. Losses during this early period can cause major reductions in overall yield for the growing season. In addition stems damaged by frost must be removed from the field. Asparagus beds can be protected from frost by covering the beds with black plastic; however the practicality of this activity will depend on how large the asparagus field is. Early fall frost can also cause damage, however this is generally minor in comparison to spring frost issues.

Wind damage can cause a hooking of the stem, counter intuitively, into the wind. This is caused by reduced growth of the wind exposed tissues. Hooking of the stem does not change the flavor quality of asparagus and hooked stems can still be sold, although sometimes as a lower grade.

Pest and Disease

Disease: Asparagus rust (*Puccinia asparagi*)

Characteristics: Red/orange lesion develops on leaves and stems. This disease can cause premature defoliation of leaves which results in reduced yields in subsequent years.

Control: Monitor for the appearance of the disease so fungicides can be applied before significant buildup of infection and spore production. All infected material should be removed from the field or incorporated into the soil.

Disease: Fusarium crown and root rot (*Fusarium oxysporum* f.sp. *asparagi*) and (*Fusarium moniliforme*)

Characteristics: Rotted and hollow root system (both feeder and storage roots), can be accompanied by a red/brown discoloration. Above ground parts can appear stunted and/or wilted. *F. oxysporum* is wide spread in Canada and can be found in most soils. *F. moniliforme* is capable of infecting both asparagus and corn.

Control: It is imperative that new asparagus planting be placed in fields that have not been used for asparagus or corn production within the last five years. Avoid damage to the asparagus roots during cultivation. Fungicides are generally ineffective against this disease.

Disease: Botrytis blight (*Botrytis cinerea*)

Characteristics: Causes tan lesions with brownish borders, in more advanced cases fuzzy gray spores will be visible. Disease can completely kill newly emerging stems, and is most problematic when high moisture is present either during wet weather or when air is unable to move in the canopy.

Control: Botrytis is a common invader of wounded or weakened plant tissues and is also prevalent in storage. Reducing injuries to plants will reduce infection point. Remove and destroy infected tissues to reduce further spread.

Insects: Common asparagus beetle (*Crioceris asparagi*) and spotted asparagus beetle (*Crioceris duodecimpunctata*)



Characteristics: The most significant damage caused by these two beetles is feeding damage on stems and leaves of asparagus. Defoliation of stems can occur in serious cases, which can cause impacts on the following years yield. Larvae of the spotted asparagus beetle feed within berries, which will decrease seed yield.

Control: The beetles can be trapped by allowing a row or small group of asparagus to produce leaves early in the spring which will attract the mobile adult beetles. When a significant population has infested these plants they can be sprayed.

Harvest and Handling:

Asparagus should not be harvested for the first two years. This gives the plant an establishment period to develop an adequate root system and enough storage reserves to tolerate being harvested in the subsequent years. Stems of asparagus can be harvested from plants after two to three years of establishment, depending on the planting material. No data is available on asparagus yields in the province of Newfoundland and Labrador. In Ontario, yield from three-year-old plants can reach 1000kg/ha; four-year-old plants can yield 2000kg/ha; yields as high as 3000kg/ha can be produced from mature plants in years five to 15.

During the first harvest year (year three) stems should only be harvested for one to two weeks. During year four stems should only be harvested at three to four weeks. At year five and on through maturity of the asparagus stand stems can be harvested for up to seven weeks. Harvest should stop when size/diameter of the stem starts to diminish, as this is a sign that the plant is being over harvested and could have an adverse effect on the following year's crop. As a rule of thumb harvest should stop when $\frac{3}{4}$ of the stems have diameters smaller than one cm.

Storage:

Asparagus stems should be moved to cold storage as soon as possible after the harvest because the quality of the stems will decline rapidly. Store the stems at 2°C and with 95 per cent relative humidity. Asparagus can be held in storage for between two to four weeks; however quality can decline rapidly if temperature increase or humidity decreases.

For more information about crop production and soil fertility services contact: 709.637.2046

