

Asparagus Production

Introduction

Asparagus (*Asparagus officinalis*) is a member of the Lily family. It originated near the Mediterranean Sea and was considered a delicacy by the ancient Greeks. Asparagus was cultivated in Europe and Asia since 200 BC, it was grown in American gardens since the earliest settlements were established. However, it was not until 1860 that asparagus was planted extensively by commercial growers in North America. BC production has been centered in the Okanagan valley since the 1930's. Wild asparagus is found along the warm dry river benches of southern BC.

The asparagus plant is a long-lived monocotyledonous, herbaceous perennial that can grow in the same area for 20-30 years. The plant is grown for its succulent fleshy shoots (spears), which appear in early spring after a prolonged winter rest period. These shoots arise from buds on the crown, which is the critical growth center for all fleshy roots, fibrous roots and rhizomes (shoots). Asparagus is dioecious meaning that there are separate male and female plants. Male plants out yield female plants since no energy is diverted from shoot production to seed production.

Varieties

Mary Washington, Martha Washington, Viking - Open pollinated seed selections. Old standard varieties with relatively low yields.

Jersey Centennial - a member of the Jersey Series developed by Rutgers University in New Jersey. This is **not a male hybrid**, but it does out yield the open pollinated varieties.

Jersey Gem - All male hybrid developed by Rutgers University. Not the highest yield in most tests.

Jersey General - All male hybrid developed by Rutgers University. A newer hybrid with limited information at this time.

Jersey Giant - All male hybrid developed by Rutgers University. A high yield in most tests.

Jersey Prince - All male hybrid developed by Rutgers University. Selected for its ability to perform on heavier soils.

Jersey Knight - All male hybrid developed by Rutgers University. The highest yielder of the Jersey series in most tests.

Guelph Millenium - All male hybrid developed by Dr Wolyn at Guelph university. Preliminary results show Guelph selections out yielding Jersey varieties by 25%. Seed was first available in 1998, crowns are now available in commercial quantities. G24xG305 became Guelph Millenium.

Sources

Asparagus Marketing Board, Ontario -- John Jacques, 519-246-1640
or Home 519-692-4416, or H. Fax 519-692-5590

Don Wright, RR#1, Harrow Ontario, N0R 1G0 -- phone 519-738-4612 Fax 519-738-3358

Kato's Nursery, Abbotsford, BC (Wholesale only) -- phone 1-800-550-5286 Fax 604 – 856-9307

Pan American Nursery, Surrey, BC (Volume 500+) -- phone 1-800-576-8641 Fax 604 – 576-6560

Van Nort Bulb Co., Langley, BC (Volumes of 250+) – phone 604 – 888-6555 Fax 604 - 888-7640

Site Selection, Site Preparation and Soils

Site selection and preparation before the first asparagus plant is planted will determine the success or failure of the asparagus plot. Asparagus grows and yields best in a deep, well-drained sandy loam soil, but will tolerate heavier soils as long as the soil has good internal drainage, open structure and the water table does not come within four feet of the surface.

Perennial weeds should be eliminated the year before. This is usually done with a non-selective systemic herbicide.

Organic matter should be built up with a cereal green manure crop plowed down the fall before planting.

Site Selection, Site Preparation and Soils (Continued)

Soil test should determine the pH and fertilizer requirements. Ideal pH is 6.7-7.0 Phosphorous is least efficient nutrient to add after planting, the soil should have 250 pounds available phosphorus in the top foot of soil. If lime or phosphorus is required, it should be added and disced in prior to planting.

Fusarium root rot (fungus disease) is a major cause of weak, short lived stands. Avoid fusarium populations by not planting in old asparagus fields.

Frost Pockets should be avoided. Spring frosts kill emerged spears and reduce marketable spears per crown (number of buds per crown is set prior to spear emergence in the spring). Early spring growth of asparagus is not an advantage if it is frosted and never marketed. To avoid frost pockets pick sites which are slightly above the rest of the field or with good air movement (cold air drainage). Cold air flows similarly to water, areas which puddle are the same areas that will be frost pockets.

Planting

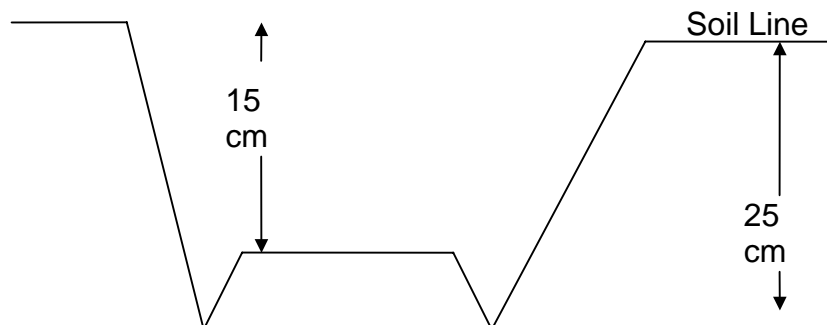
Three methods are available for starting an asparagus field: direct seeding; transplanting; or planting 1 yr crowns.

Direct seeding was commonly used with open pollinated varieties when the seed was relatively inexpensive. This method took one year to produce crowns, these were lifted from the nursery area and replanted out into their final location according to the crown method.

Transplanting method is commonly used today with more expensive hybrid seeds and availability of greenhouses. Seedlings are started and grown in greenhouses for 10-12 weeks prior to being planted out in the field. This method saves one growing season and seed mortality is much lower when compared to direct seeding. The use of sterilized soil prevents bringing fusarium organisms into asparagus field. Transplants are planted similarly to crowns into the bottom of trenches so that they are 15 cm (6") below the field level and only buried the same as they were in their trays. The soil will gradually be cultivated and brought up until the field is flat at the end of the first season. Spacing and care of the transplants is similar to the care of the transplanted crowns.

Crown method still the most common method for establishing an asparagus field involves transplanting 1 year old crowns into the field. W-shaped or U-shaped trenches are dug in the field at 120 cm centers (wider spacing of the trenches can be used if between cultivation is planned during the growing season) and 20-25 cm deep. Additional phosphorous fertilizer is placed in the bottom of the trench and covered. Crowns should be soaked in a fungicide prior to planting to kill any fusarium organisms on the roots. Crown roots are spread out and placed in the bottom of the trench at 30 cm (irrigated) or 60 cm (dry-land) spacing along the trench. The roots are only covered with 4 cm of soil. Fill the trench gradually by cultivating as the plants grow.

Diagram of Trench for planting crowns or transplants



Weed Control

Weed control during the first 3 years is a critical factor in the production and life of an asparagus field. During the establishment year there is only Devrinol®™ registered for use in asparagus fields. Devrinol®™ is a selective broadleaf herbicide with little activity against mustard family weeds, therefore, cultivation will be needed during the establishment year. This cultivation will gradually bury the transplant or crown as it grows. Damage or stress to the fern during establishment will reduce the vigour in the crown the following year. After the crowns have been established for a growing season, there are several pre-emergent and post-harvest broadleaf herbicides that can be used..

Insects

There are many insects which may feed on your asparagus plants, most populations won't reach levels to cause economic damage except the Asparagus beetles and Asparagus aphid. The Asparagus Beetles feed on the ferns and defoliate them. Asparagus Aphids are not widespread in the province, the aphids suck juice from the stem and cause them to take on a "bonsai" or "witches broom" appearance. Both the Asparagus Beetles and the Asparagus Aphid can be controlled with a number of products.

Disease

Fusarium root rot and Asparagus rust are fungal diseases that will weaken and kill asparagus crowns in your field. These are most easily controlled through management that prevents the spread of these diseases, and mechanical damage to the ferns and crowns during or after harvest.

Harvesting Asparagus

Harvesting asparagus is not possible during the year of planting because the crowns must be allowed to establish. Harvesting in the second growing season is not recommended unless the fern growth at the end of the first season was very vigorous. This **delay of harvesting until the third growing season** allows the crowns to become well established before they are stressed with harvesting. Research has shown that **small** harvest a year after planting can provide early return to help cover establishment costs and the harvest may stimulate bud formation. However, this initial harvest may weaken the crown and decrease the following year harvest. Harvesting in the third year should occur for a 4 week period, subsequent year harvesting may take place for 6 weeks. Harvesting should stop when 75% of harvested stems are no longer 3/8 inch in diameter or greater. . During cool weather , Asparagus should be harvested daily, during hot weather it may be necessary to harvest in the morning and again in the evening to prevent the spears from ferning out. Longer harvesting stresses the crowns making them more susceptible to disease and reducing future yields. Harvesting can be done by hand-snapping or by cutting the spears with an asparagus knife.

Cutting Asparagus - This is done with a heavy knife, the spear is cut parallel to the ground and below the surface. The cut asparagus has better market appeal than the snapped asparagus. Cut asparagus is slower to harvest but slightly higher weights than the snapped asparagus. Cutting asparagus leads to the potential of damaging buds on the same crown as the spear being cut.

Snapping Asparagus - This is done by bending the spear backward, it usually snaps off just below the ground surface, above the part of the spear containing the fiber.. Hand-snapping asparagus is faster than cutting the spears. The snapped asparagus end is usually has a square end for ¾ of the spear and a tapered end for the last ¼. This makes snapped asparagus slightly less attractive when displayed for market. Snapped asparagus has a low fiber content right to the snapped end, making it completely useable without trimming. Snapped asparagus should command a higher price because it is more tender than the cut asparagus, however, most consumers prefer to buy product based on appearance rather than non-apparent quality.. This lower market appeal is only a factor if the local market is saturated. Snapping asparagus is easier done when the air is cool and the plants are turgid. Asparagus should be harvested early in the day, but air temperature is more important if it is to be snapped rather than cut.

Handling, Grading and Storage of Asparagus

- Harvest daily, or even twice a day when it is hot.
- Asparagus is very perishable, cool quickly to 4.4°C.(40°F.)hydro cool with cool water
- Grade and bunch Asparagus ready for sale.
- Storage of Asparagus at 95% humidity and 0.0° - 2.2°C. (32 - 36°F.)
- Store bundled Asparagus standing upright in shallow trays of water to prevent moisture (turgidity) loss. If the bunches are 1 pound, then it speeds the marketing procedure at the market.

Grades

#1-Jumbo

- Over ¾ inch in diameter, found on vigorous crowns early in the season.

#1-standard

- 5/16 " to ¾ inch in diameter, most spears are standard size.

#2-thin

- Less than 5/16 inch in diameter, found late in the season(air temperature high) and on less vigorous crowns. Most producers stop harvesting the field before they have very much thin asparagus. As the crowns are stressed from disease, reduced nutrients, long harvest periods, and competition from weeds – the crowns vigor will decrease.

#2 - defects

- All other marketable Asparagus falls in this grade. This includes any spears which are not fresh, not properly trimmed, crooked, or of poor colour. Many producers only market thin #2's and #1's, any #2-defects are culled at home and not sold.

Culls

any spears less than 7" long, starting to open(ferned out), broken tips, decayed or damaged spears. Don't jeopardize your asparagus market by selling culls as second class asparagus

Summary

Year 1 - Plot Selection and weed control

- site selection (early spring frost protection, good soil drainage, good Organic Matter content)
- Remove/control all weeds especially perennial weeds like quackgrass and cottonwoods.
- Preparation of plot for irrigation delivery system.

Year 2 - Planting

- Trenches prepared for planting.
- Crowns dipped in fungicide (Benolate) to kill fusarium rot organisms.
- Plant crowns(transplant seedlings).
- Fill-in trenches gradually as new plants grow.
- Culturally control all weeds.
- Asparagus is allowed to grow and fern out.
- Irrigate/fertilize plot as required

Year 3 - Plot Establishment

- Before spear emergence, cut and remove last year's ferns.
- Before spear emergence, Disc/rotovate plot in preparation for weed control
- Before spear emergence, pre-emergent spray for broadleaf and grassy weeds.
- No harvest as plants are rested and allowed to fern-out and establish.

- Irrigate/fertilize plot as required
- Monitor for Asparagus beetle and Asparagus aphid. Control insects as required.

Year 4 - First Harvest

- Before spear emergence, cut and remove last year's ferns.
- Before spear emergence, Disc/rotovate plot in preparation for weed control
- Before spear emergence, pre-emergent spray for broadleaf and grassy weeds.
- Cut or snap **all** stems over 7 inches, remove culls from field to prevent diseases from developing and spreading to healthy plants.
- Stop harvesting when 75% of the stems are no longer 3/8 inch in diameter. (About 4 weeks)
- After harvest broadleaf weeds should be controlled.

Year 5 to 20 - Harvest years

- Before spear emergence-- cut and remove last year's ferns, Disc/rotovate plot in preparation for weed control, pre-emergent spray for broadleaf and grassy weeds.
- Cut or snap **all** stems over 7 inches, remove culls from field to prevent diseases from developing and spreading to healthy plants.
- Stop harvesting when 75% of the stems are no longer 3/8 inch in diameter. (About 6 weeks)
- After harvest broadleaf weeds should be controlled.

Acknowledgments

Asparagus Production, Management and Marketing Ohio state University Extension, 1993.
Vegetable Production Guide 1998/99 Edition BC Ministry of Agriculture and Food, 1998.

Cariboo Demonstration sites

Two demonstration sites were selected and prepared in 1994 & 1995. One site is in Quesnel at Mufford Valley Ranch, the other is north of Williams Lake at Soda Creek Acres.

Results

Jersey Giant>>Jersey General, Jersey Prince, Jersey Gem, Jersey Knight>Jersey Centennial.

Jersey Giant out performed all the other varieties at both sites, with an average yield of 2200 pounds/acre compared to only 1300 pounds for all other varieties. The other Jersey varieties performed differently at the two sites, another year of data will be needed before the variations can be attributed to the varieties or the two sites.

Soda Creek Acres site (Rob and Bernice Johansen)

- bench directly above the Fraser River at the Soda Creek townsite.
- sandy loam soil pH 8.2 Elevation 1400 feet

1994 - site selection and preparation.

- Fertilized with 300 lbs/A 13-16-10-14
- Roundup, Fall Rye, Roundup, Cultivation, Roundup

1995

- Fertilized with 300 lbs/A 13-16-10-14
- planting of 3000 Jersey Knight crowns
- 18" spacing, 5' rows in trenches 6" deep
- preparation of remainder of site.

1996

- Fertilized with 300 lbs/A 13-16-10-14
- planting 500 crowns each of 5 Jersey varieties(Centennial, Gem, General, Giant and. Prince)
- Crowns soaked in Bennolate
- 12" spacing, 5' rows in trenches 6" deep
- Site sprayed with Devrinol. Hand tillage at weekly intervals.

1997

- fern removal and early cultivation ,Site sprayed with princept 9T
- limited planting of 3 guelph numbered varieties (250 crowns)
- 12" spacing, 5' rows in trenches 6" deep
- small harvest of Jersey knight.

1998

- fern removal and early cultivation ,Site sprayed with princept 9T
- Initial harvest of demonstration and measurement of yields taken.
- Harvest of Jersery Knight

1999

- fern removal and early cultivation ,Site sprayed with Linuron 480
- Harvest of demonstration and measurement of yields taken, harvesting of Guelph varieties deferred to 2000.

Yields

| Year | Yield/plot (pounds) | Yield per acre (pounds) |
|------|---------------------|-------------------------|
| 1995 | - | - |
| 1996 | - | - |
| 1997 | - | - |
| 1998 | 961 | 1232 |
| 1999 | 342 | 438 |
| 2000 | 568 | 728 |

Mufford Valley Ranch site (Dave and Chris Mufford)

- bench above the Fraser River Just north of Quesnel.
- sandy loam soil pH 7.3 Elevation 1600 feet

1995

- site selection and preparation.

1996

- planting 500 crowns each of 5 Jersey varieties(Centennial, Gem, General, Giant and. Prince)
- 1000 Jersey Knight crowns
- Crowns soaked in Bennolate
- 12” spacing, 10’ rows in trenches 6” deep

1997

- fern removal and early cultivation ,Site sprayed with princept 9T
- limited planting of 3 guelph numbered varieties(250 crowns)
- 12” spacing, 10’ rows in trenches 6” deep

1998

- fern removal and early cultivation ,Site sprayed with princept 9T
- Initial harvest of demonstration and measurement of yield.

1999

- fern removal and early cultivation ,Site sprayed with Linuron 480
- Harvest of demonstration and measurement of yields taken, harvesting of Guelph varieties deferred to 2000.

Yields

| Year | Yield/plot (pounds) | Yield per acre (pounds) |
|-------------|----------------------------|--------------------------------|
| 1996 | - | - |
| 1997 | - | - |
| 1998 | 1346 | 1520 |
| 1999 | 1652 | 1921 |
| 2000 | 1942 | 2259 |
| 2001 | 1830 | 2129 |