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David F. Graper
South Dakota State University

Rhoda Burrows
South Dakota State University

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Growing Asparagus

by David F. Graper and Rhoda Burrows,
Extension horticulture specialists,
SDSU Horticulture, Forestry, Landscape and Parks Department

Asparagus is an ancient vegetable, having been cultivated for over 2000 years. An ancient Roman author, Cato the Elder, in 200 B.C. wrote detailed directions for growing asparagus that are close to current recommendations.

There are a number of species, but only one, *Asparagus officinalis* L., is cultivated for food. Asparagus is a favorite spring vegetable, both for its earliness and its distinctive taste. Not only is it low in calories, asparagus is an excellent source of vitamin A and contains significant amounts of calcium, phosphorus, riboflavin, and vitamin C.

Although commercial asparagus production in the United States is concentrated in California, Washington, and Michigan, many other areas have potential for producing



asparagus. In South Dakota, the eastern end of the state and the Black Hills are two areas where asparagus can be grown most successfully.

Planning Commercial Production

The biggest problem in growing asparagus commercially is not the cultural practices but the marketing of the product. Partly because of competition from duty-free imports from Mexico and Peru, more of the U.S. production is now going into fresh market rather than processed. Although Americans are now consuming more asparagus than ever, the fresh market during May and June is nearly saturated, which has tended to keep prices low in recent years.

Nevertheless, a grower within a 15-minute drive of a city may be able to successfully market as a "pick-your-own," with one acre per 5,000 city dwellers. Asparagus also may be harvested and graded according to the specifications of the local supermarket and sold wholesale to them at, or retail through a farmers' market. The specific product marketing outlet, along with a realistic price, should be identified by a grower long before the first asparagus plant is put into the ground.

Climatic Requirements

To be productive, the asparagus plant needs a long rest period during winter and an average summer growing temperature of 66-75 F. The climate of this area meets these requirements. The crowns are hardy and are seldom injured by cold. Winter injury usually is restricted to fields where the tops have been removed in the fall.

Field Selection

When selecting a field for asparagus production, choose one that has not been in asparagus for the last eight years. Good soil drainage is essential, and the highest yields are obtained on deep sandy loams, since asparagus roots may extend six feet deep. The field should be fairly level to avoid soil erosion. Avoid shaded areas or low-lying areas subject to late spring frosts that could delay harvest and reduce yield. The soil should be free from stones, which can cause crooked spears. The field should also be free of perennial weeds, which are difficult to control as there are few herbicides available for establishing asparagus. Heavy soils that form a crust after rain or irrigation will damage the emerging spears. Do not plant in muck soils since freezing in these soils heaves and damages the crown.

Varieties

Crowns of the Washington cultivars (e.g., Mary or Waltham Washington) have been most readily available, especially to home growers, although newer hybrids are becoming more common. Take advantage of the new male hybrids from New Jersey, such as Jersey Giant or Jersey King. These hybrids have been developed to have greater rust disease resistance and higher yield, along with good cold hardiness, and have done well in trials in North Dakota and Minnesota. A novel variety that has shown promise in Iowa trials is "Purple Passion," which has purplish-colored large-diameter spears.

Growing and Selecting Crowns

Crowns may be purchased from a reputable nursery or produced from seed in a separate bed for later transplanting. Choose soil that is well drained, deep, loose, and light. Generally, one acre of seedlings will produce enough crowns for ten acres of asparagus. There are 900-1200 seeds per ounce. One ounce of seed can produce 550 high-quality crowns. You can figure out how many crowns you need and plant the seed accordingly. For example:

Rows 4 feet apart with plants 1.5 feet apart
Area per plant = $4 \times 1.5 = 6.0$ square feet
 $43,560$ (square feet per acre) / $6.0 = 7,260$ plants per acre

To hasten germination, soak the seed for 48 to 96 hours in warm water before planting; change the water frequently to avoid fungal growth. It is also advisable to use a seed fungicide. Plant seed one-half inch deep, 2-3 inches apart in rows 24-30 inches apart. Optimal temperatures for germination are 60-85 degrees F.

Cultivate during the growing season to control weeds. When seedlings are one year old, they may be transplanted to their permanent location. Dig the crowns in the spring before the buds begin to grow. Old plant tops can be mown if they interfere with the digging. A modified potato digger or moldboard

plow can be used to lift crowns from larger plantings.

One-year-old crowns are more vigorous and have greater productivity as compared to 2 to 3 year old crowns that suffer more root damage during digging, which may reduce quality. Good-quality crowns weigh 150 pounds per 1,000.

Transplant Production

An alternative to planting one-year-old crowns is to use transplants, which can be grown in a greenhouse. To do this, seed can be treated as above but then seeded into peat pots filled with a good potting media (not field soil). Plant two seeds per pot, and thin to one after emergence. Transplants can be started either in the early spring for setting out after danger of frost has passed or in late summer for transplanting in mid-Sept. Transplant when seedlings are 10 to 12 weeks old into the permanent bed prepared as for crowns: Pots should be covered with at least one inch of soil at the time of planting in the furrows and the furrows filled in gradually over the season as with crowns. Apply a transplant starter fertilizer solution at the time of planting.

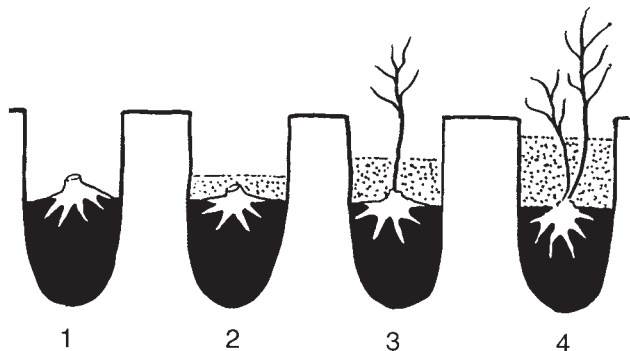
Planting

Discard any small or badly injured crowns. Sort crowns according to size. Plant crowns of the same size in a row to avoid competition for food. If needed, crowns can be stored at 40 F degrees and 85-90% humidity until planting. Do not allow to freeze. To avoid decay, the crowns should not have any damp or moist areas on them during storage. Before planting, dip the crown in a recommended fungicide solution.

Before planting the crowns, prepare the land so the soil is free of stumps, rocks and other coarse rubbish that might cause crooked spears. Any existing weeds should be controlled; spraying with a glyphosate herbicide (for example, RoundUp or KleenUp) two to three weeks before planting is recommended.



Open the planting furrow to a depth of 8-10 inches. Position the crowns, upright with the roots spreading, in the furrow about 8 inches below ground level and then cover with about 2 inches of soil. Close spacing may be practiced in the home garden, but when planting half an acre or more, it's usual to space rows 3 to 4 1/2 ft with plants 12-18 inches apart in the row.



As the crowns grow, gradually work the soil toward the plants during cultivation until the furrow is entirely filled. Be careful not to bury the ferns. Each cultivation should add about 2 inches of soil over the crowns. About three cultivations should cover the crowns and completely fill the furrow. Shallow-planted crowns often are injured by spring frosts or by disking and produce smaller spears. Deeply planted crowns produce larger spears that emerge later in the spring.

Fertilizer

Since asparagus occupies the land for 15-20 years, good soil preparation before planting is important. If possible, apply 5-10 tons of good farmyard manure per acre or plow down a green manure crop in the fall. Otherwise apply 600-1,000 pounds of 8-32-16 per acre (20 lbs per 1,000 square feet or 1/2 lb per 10 ft of row) before planting. A soil test is the best way to determine fertilizer needs.

Also make a test for boron, particularly in lighter soil. The soil should contain 0.5 ppm of boron. A boron application of two pounds per acre should correct deficiencies.

Apply 50 lbs of nitrogen per acre each year after planting. Also apply 50 lbs of phosphorus and potassium every other year to maintain a good yield. Broadcast fertilizer and then either water in or work into the soil by shallow cultivation.

Regardless of the general fertilizer practice, it is desirable to split the nitrogen application, applying half (25 pounds) in the spring before growth starts and half at the end of the harvest season (0.5 cup of ammonium nitrate [35-0-0] per 10 ft of row in spring and after harvest). The second application gives the plant more vegetative growth to accumulate more carbohydrates which gives a higher yield the following year and improves plant vigor to survive the winter.

Cultivation

Keep the field free of weeds. The spears are less brittle in the afternoon and cultivation is best done at that time. Weeding problems can be simplified by using herbicides in the rows. Shield asparagus plants from spring prevailing winds to protect the spears from damage by blowing soil particles. Hot, dry winds can retard growth on the windward side of the spear causing production of crooked spears that often are unmarketable.

Leave the tops standing in the field in winter months; cut and burn (reduces insects and diseases) or disk them into the soil in the early spring before the shoots develop. In this area, the tops can help protect the roots from low temperatures by holding snow that prevents deep freezing and rapid soil temperature changes in the winter.



Harvest

Delay harvest until two years after planting, and then limit harvest in the third year to 2-4 weeks, depending on the vigor of the fern the previous season. Established fields may provide a yield of 2,000 to 4,000 pounds per acre (3/4 to 1 pound per foot of row in a home garden), depending on climate and cultural practices.

Snap spears by hand or cut 2 inches below ground level, at about a 45 degree angle, when they are 6-10 inches tall. Morning harvest is preferred because the spears then contain a maximum amount of water and stay fresh longer.

The frequency of harvesting depends on temperature: spear growth is faster with higher temperatures. Studies in Michigan showed 22-23 pickings per season (about six weeks) optimal for both yield and spear size over time, compared to fewer (15) or more (28) pickings. This will vary somewhat depending on local climate.

After harvest, store asparagus at cool temperatures, between 32-36 F to maintain quality.

Lignin fibers make asparagus tough and undesirable. The tip of the spear has less lignin and the amount increases toward the bottom. The following practices can reduce lignin in the spears: Snap asparagus, rather than cutting at ground level, thus leaving most of the fiber portion (white portion) of the spear in the field. During cold weather, harvest shorter spears. The longer it takes a spear to grow, the more fibers it develops. Eliminate small diameter (thin) spears; they have more fiber on a weight basis. Cool spears as quickly as possible after harvest in ice cold water. Store asparagus at less than 36 F degrees, but do not allow it to freeze. Avoid water stress by wrapping asparagus in a wet material or in perforated plastic wrap, or store upright in a bowl with the stems in water. Do not store asparagus for more than 7-10 days.

Crooked Spears

Crooked spears generally are the result of dirt clods in the field, hot dry wind in early spring, or injury due to insects, frost, disking, or heavy soils. Avoid all these problems to produce straight, marketable spears.

Irrigation

Irrigation is not essential for established asparagus in this area, but it will increase productivity (spear size and numbers) and longevity of the planting. It will also increase vigor and decrease risk of infection by *Fusarium*, a fungal crown rot. Apply water at least for the first 2 years, if possible.

Male vs. Female Plants

Asparagus is dioecious (male flowers on one plant and female flowers on another plant). Non-hybrid varieties will have about 50% male and 50% female plants, but all-male hybrids are available. Female plants are less productive and have a shorter life because the plant's energy is allocated to seed production in the fall. Male plants produce a larger number of spears, starting earlier in spring, but they often are thin. Female plants produce fewer spears, but they are larger and are produced later in the season. The Jersey male hybrid varieties do not produce seeds.

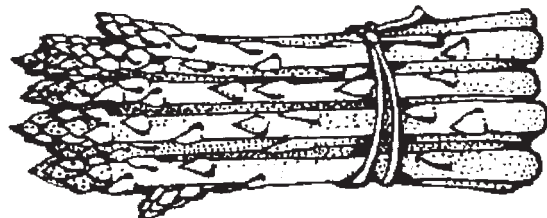
Diseases and Problems

Since *fusarium* root rot and crown rot eventually invade every planting, cultural methods that maintain the vigor of the plants will help prolong productivity.

Fusarium root rot: The fungus lives in the soil and enters the plant through the roots. Plant asparagus in a field that did not have asparagus for the last eight years, and dip the crowns in recommended fungicide before planting. Keep the planting healthy by practicing good cultural methods.

Rust: Cut and burn the tops in the spring, and use resistant varieties, such as the Jersey hybrids. Fungicides may be used in commercial plantings.

Feathering: Bracts of the spears are partly spread as a result of high temperatures.



Summary

Choose a planting site in full sun that has not been in asparagus previously. The soil should be light, free of perennial weeds, well drained, fairly level, deep, and have good organic matter content. Apply 20 pounds of 8-32-16 fertilizer per 1,000 square feet before planting. Dig a furrow 8-10 inches deep, and plant one year-old male plants or crowns in the furrow, setting them upright with the roots spreading. Cover the crowns with 2 inches of soil.

As the plants grow, gradually work the soil towards the plants. Water as needed. Do not remove the tops until early spring, since the tops help to hold snow and protect the plant from deep, hard freezes.

Do not harvest for the first two years, and then only harvest for three weeks in the third year. Apply one pound of nitrogen per 1000 sq ft in the spring before growth starts and the same amount after the last harvest.

For home use, asparagus spears can be harvested at any size, but for commercial sale, spears should be between 6-10 inches long. Store asparagus at cool temperatures, and use it as soon as you can.

For additional information: ExEx 8021 Garden insect Control and ExEx 6006 Vegetable Varieties for SD



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