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# FRUITS & VEGETABLES

## Vegetable Root Crops

no. 7.604

by J.E. Ellis<sup>1</sup>

### Quick Facts...

Root crops are among the first and last vegetables to mature.

With proper home-storage facilities, a supply can be available all winter and into spring.

They are well adapted to gardens in short-season areas because they do not have a definite stage of maturity and can be consumed when very small.

Root crops are ideal for small gardens because they take up little space.

Most root crops are frost tolerant and the edible portion is somewhat protected by the soil.

Root crops are the first and last vegetables to be harvested and, under proper storage conditions, are available year round. They take up little space, which makes them ideal for small gardens. They have no definite stage of maturity that must be reached before they are edible, so they are ideal for short-season areas or areas where the length of season is unpredictable.

Vegetable root crops may be eaten at any size. Most species are frost hardy and grow if an early fall frost is followed by warm weather. Soil somewhat protects the edible portion from frost damage.

### Recommendations

**Fertilizer.** Root crops require more phosphorus and less nitrogen than nonroot crops. Therefore, an application of 1 pound of nitrogen (N) and 2 pounds of phosphate ( $P_2O_5$ ) per 1,000 square feet is recommended. When starting a new garden, and every five years thereafter, it is a good idea to have a soil test.

**Soil.** Root crops do best in a sandy soil well supplied with organic matter. Remove stones and add extra organic matter to clay soil to make it more friable. Add well-decomposed organic matter in any quantity; however, do not apply fresh manure and uncomposted organic matter in amounts exceeding 10 cubic feet per 1,000 square feet.

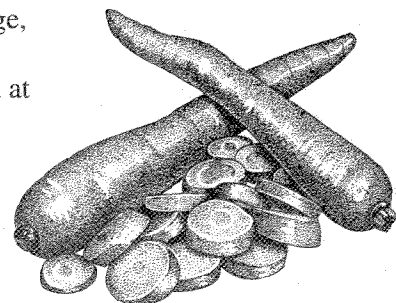
**Temperature.** A root is a storage organ that expands to accommodate the food being manufactured in the plant top. The faster the food is produced in the tops, the greater the root expansion. Warm, bright days and cool nights produce maximum root expansion and best color.

High temperatures, particularly at night, produce high respiration rates that burn off the sugars needed for root expansion and pigment formation, which produces the bright colors.

**Light.** The amount of food produced by the tops and stored in the roots is directly related to the amount of light the plant receives. Root crops are responsive to sunlight and the more they receive, the better they perform.

**Planting.** Seed root crops directly into furrows 1/2- to 1-inch deep in rows 1 to 3 feet apart. Space the seed in the furrow 1 to 3 inches. As the seedlings emerge, thin to the desired spacing as determined by the diameter of the root at harvest. A root harvested at 2 inches in diameter should be thinned to 2 inches. Beets and turnip tops that are thinned may be eaten and often are planted more densely than normal for this reason.

Root crops seldom are transplanted because this usually breaks the tap root



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and causes misshaped and forked roots. They can be transplanted if tap root breakage can be avoided.

**Pesticides.** Minimize pesticide use by encouraging healthy growth and avoiding situations that encourage pests. For optimum growth, plant seed in soil warm enough to promote rapid germination, then provide the cultural conditions that make rapid growth possible. This includes adequate water, sunlight, nutrients and weed control. Do not replant the same crop in the same area. Ignore minor damage that doesn't reduce yield. However, if damage threatens the crop, then action is required.

### **Vegetable Root Crops**

*Beets usually are harvested at 2 inches in diameter, although they will grow much larger if left all season.*

*Carrot seed is tiny and should be planted only 1/2 inch deep.*

*Celeriac is a type of celery that develops a turnip-like root.*

*Purchase horseradish rootlets and plant vertically with tops just below the surface.*

*Plant whole Jerusalem artichoke tubers in the spring and dig the crop before the ground freezes.*

*Kohlrabi is a swollen stem, not a root.*

*An onion is a bulb, not a root.*

*Plant parsnips in April because the seed germinates slowly and the crop requires 100 or more days to mature.*

*Plant radishes in April as a spring crop or in August as a fall crop.*

*Sweet potatoes may be grown in the warmer areas of Colorado on a trial basis.*

*Turnips are harvested at 2 inches in diameter. Three successive plantings may provide a continuous table supply.*

**Root maggots** can be a problem when adult flies lay eggs at the base of the plant stems. Treat the infestation with diazinon granules applied to furrow at planting. However, permissible chemical uses are always changing so carefully read the label before using any chemical. The maggot stage of the **leafminer** may be observed burrowing in leaves, producing blotchy mines. Although conspicuous, the injury usually has little effect on the growing root. Problems often can be managed by picking infested leaves or crushing the eggs and larvae during plant inspections.

**Flea beetles** feed on leaves of many root crops, chewing small pits or holes. Young seedlings can be killed or stunted by this injury, although established plants suffer little negative effects. Planting conditions that favor rapid seedling growth often avoid significant flea beetle injury. Seeding at higher rates also dilutes flea beetle attacks. The more vigorous, surviving plants can be left after thinning. Foliar insecticides, such as carbaryl (Sevin) and rotenone, also can control flea beetles.

The most important pest problem associated with carrots is **aster yellows**. Infection by mycoplasma, which produce aster yellows, causes carrot roots to become hairy and top growth to be bushy and discolored. Aster yellows is spread by the aster leafhopper. There are no effective controls for aster yellows in gardens, but incidence is usually low.

Foliar diseases, unless severe, pose no threat to root crops.

**Storage.** Any root crop can be stored for a while before being eaten. In general, root crops store best at 32 degrees F and 95 percent relative humidity. Leave the crops in the garden as long as weather permits, then dig and store in a root cellar, pit storage or refrigerated storage.

## **Recommended Varieties**

**Beets.** Formanova: cylinder, red. Ruby Queen and Detroit Dark Red: red globes. Golden: yellow globe. Beets usually are harvested at 2 inches in diameter, although they will grow much larger if left all season. While larger beets are a little tougher, they also are sweeter and store better in a root cellar. If diced before cooking, the toughness is not objectionable.

**Carrots.** Nantes Coreless: cylindrical. Chantenay: wide shoulder, heavy. Danvers Half-Long: old garden favorite. Imperator: long, slender, not for clay. Carrot seed is tiny. Plant it only 1/2-inch deep. The roots are edible at any stage and develop until the ground freezes. Freezing and thawing damages the exposed shoulders, so mound them over with soil or harvest carrots before weather gets too cold.

**Celeriac.** Giant Prague, Early Paris. Celeriac is a type of celery that develops a turnip-like root. It is more common in Europe than the United States. Its primary use is as a flavoring in soup, although it can be eaten like any other root crop. The seed is small and requires a finely prepared seed bed, shallow planting and meticulous moisture control until seedlings emerge.

**Horseradish.** Maliner Kren, Improved Bohemian. Purchase horseradish rootlets and plant them vertically with tops just below the surface. Dig the roots

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before the ground freezes. Remove side roots and store the larger ones for spring planting. After removing the side roots, store the main roots for consumption.

**Jerusalem artichoke.** Brazilian White, Brazilian Red. This crop does well in poor soil and may become a weed. Plant whole artichoke tubers in the spring and dig the crop before the ground freezes. The tubers have a thin skin and shrivel in a dry atmosphere. They store best in the soil but will keep well in a root cellar if packed in moist sawdust.

**Kohlrabi.** White Vienna, Purple Vienna. Kohlrabi is actually a swollen stem, not a root. Sow it in rows and harvest it at 2 or 3 inches in diameter. Kohlrabi has a tendency to become woody if allowed to grow over 3 inches. Because of this, do not plant until July 1 if grown for storage.

**Onion.** Red: Southport Red Globe. Yellow: Early Yellow Globe. White: Southport White Globe. Transplant: Yellow Sweet Spanish, White Sweet Spanish. Sets: Ebenezer. An onion is actually a bulb, not a root. Plant onion seed in April for maximum vegetative growth before warm weather initiates bulbing. Do not plant sets and transplants until May because cold weather may induce seed development instead of bulbs. When 80 percent of the tops fall over, the onions are ready for harvest. Pull the bulbs and leave them in place until the tops are dry. In a few days, top, crate and store them in a cool dry place.

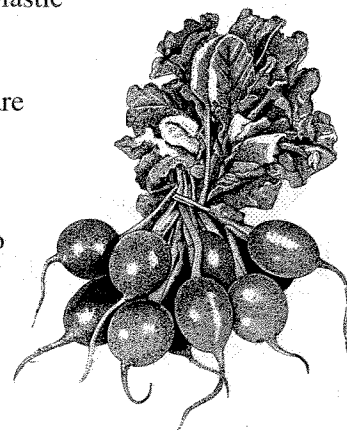
**Parsnip.** Improved Hollow Crown, All-America. Plant parsnips in April because the seed germinates slowly and the crop requires 100 or more days to mature. This is one of the few root crops that can be overwintered in the garden. Many believe this enhances its eating quality. To overwinter, hill soil over the crown. They also may be dug in the fall and stored like carrots.

**Radish.** Early Scarlet Globe, Cherry Belle, White Icicle. Plant radishes in April as a spring crop or in August as a fall crop. When planted in summer, they generally go directly to seed without producing edible roots. Store the fall crop in moist sawdust. Winter varieties require about twice as long to mature as the spring varieties and are usually grown for storage. China Rose and Black Spanish are winter radish varieties.

**Rutabaga.** American Purple Top. Rutabagas are similar to turnips but do not become strong-flavored and fibrous when grown to a large size (4 to 6 inches). Sow the seed in April or May and harvest the root before the ground freezes. Store like a carrot.

**Sweet Potato.** Maryland Golden, Orlist. Sweet potatoes may be grown in the warmer areas of Colorado on a trial basis. Bury the sweet potato root in a pot or deep pan of moist sand six weeks prior to the last frost date. Keep the pan in a warm window. As the sprouts rise, add more sand to encourage deeper rooting. Detach these shoots from the root and transplant into the garden. Use black plastic film for its warming effect on the soil. Dig the potatoes immediately after frost kills the vines. Cure the roots for five days at 85 degrees and high humidity. After this treatment, store them at 60 degrees and 85 percent relative humidity. Cure in crates, cover with black plastic film, pack in moist sawdust and store in a heated basement.

**Turnip.** Purple Top White Globe. Turnips are harvested at 2 inches in diameter. Three successive plantings may provide a continuous table supply. Store the last planting like carrots. Turnips will develop fiber and strong flavor if allowed to grow to large sizes.



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