



# Root Crops

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## Carrots

### Environmental Preferences

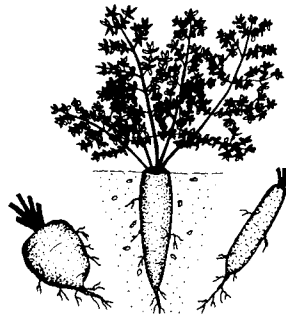
**LIGHT:** sunny

**SOIL:** well-drained, deep loam, free of rocks

**pH:** 5.5 to 6.5

**TEMPERATURE:** cool (60 to 65°F)

**MOISTURE:** moist, but not water logged



### Culture

**PLANTING:** sow seeds as soon as soil can be worked, 1/4 to 1/2 inch deep

**SPACING:** 1/2 inch x 12 to 18 inches, single row or wide bed

**HARDINESS:** hardy biennial

**FERTILIZER NEEDS:** broadcast 2 pounds of 10-10-10 per 100 square feet before planting; sidedress with 1/2 pound of 10-10-10 per 100 square feet if needed

### Cultural Practices

Carrot seeds are extremely small and difficult to space uniformly. Mixing the seed with fine soil and lightly scattering the mixture in the row or bed helps avoid overcrowding.

Carrot seedlings are weak and slow to grow when young. Therefore, it is important to control weeds. Cultivate shallowly until plants are 12 inches high.

Seedlings should be thinned at 1 inch high to no more than three plants per inch for finger carrots, one to two plants per inch for carrots that will be harvested young, and one plant per inch for larger varieties. Moisture is required to keep the plants growing quickly, but as carrots approach maturity, decrease water to prevent cracking. Carrots require a deep, friable soil for the largest, most shapely roots. A well enriched, loam deeply dug is best suited for most varieties. For heavy

soils, select a finger or short type. Half-longs are the largest type that do well in most of Virginia's gardens.

### Common Problems

**DISEASES:** aster yellows

**INSECTS:** cut worms, rootknot, nematodes

**CULTURAL:** green crowns (sunburning, cover crowns with mulch or loose soil as crowns begin to swell); forked, twisted roots (seeding too thickly, inadequate thinning).

### Harvesting and Storage

**DAYS TO MATURITY:** 55 to 80

**HARVEST:** Carrot roots may be harvested whenever roots reach an acceptable size. Dig only the amount needed for immediate use, and allow the remainder to increase in size. Carrots may be left in the ground in the winter and dug as needed. Roots are normally harvested when 1/2 to 3/4 inch in diameter.

#### Carrot Sizes:

Type	Length
Finger	3 to 4 inches
Short	2 to 4 inches
Half-long	5 to 6 inches
Cylindrical	6 to 7 inches
Standard	7 to 9 inches

**APPROXIMATE YIELD:** 7 to 10 pounds (per 10-foot row)

**AMOUNT TO RAISE PER PERSON:** 11 pounds

**STORAGE:** in cool (32°F), moist (95% RH) conditions two to four weeks - immature carrots; four to five months - mature carrots

**PRESERVATION:** canning, freezing

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# Beets

## Environmental Preferences

**LIGHT:** sunny, but tolerates partial shade

**SOIL:** well-drained, deep loam

**pH:** 6.0 to 7.0

**TEMPERATURE:** cool (60 to 65°F)

**MOISTURE:** moist, but not waterlogged

## Culture

**PLANTING:** sow seed 1/2 inch deep as soon as soil can be worked

**SPACING:** 2 to 3 inches x 12 to 18 inches or equidistant 2 to 3 inches apart in wide bed

**HARDINESS:** hardy annual

**FERTILIZER NEEDS:** broadcast 2 pounds of 10-10-10 per 100 square feet onto soil before planting; sidedress with 1 pound of 10-10-10 four to six weeks after sowing or when plants are 4 to 6 inches tall

## Cultural Practices

Beets may be grown for both their greens and their roots. They are heavy yielders and high in iron and vitamins. Beets come in several colors and shapes. In addition to the standard dark red, orange and white varieties are available. The lighter varieties do not bleed their color as readily, but are less attractive in canning jars and on the plate than the red ones. Round beets are most common, but flat and oblong types are grown as well. Flat and round beets tend to be early maturing varieties, while the long cylindrical beets are usually late maturing.

Beets are relatively tolerant to heat and cold, though very high temperatures tend to make the leaves bitter and roots woody with poor color development. Two to three weeks of daytime temperatures below 50°F may cause seed stalks to form at the expense of root development. Spring and fall crops produce the best results in Virginia.

The beet seed is actually a fruit with one to four seeds enclosed. Thinning is usually necessary for this reason. Crushing them lightly with a rolling pin will allow individual seed to separate and reduce the amount of thinning required. Soaking the fruits may enhance germination. Plant at three-week intervals for a continuous harvest. If you're interested in greens only, space the seeds closely for high leaf yields.

Keep the soil moist after planting. Sawdust or other light mulch placed over the seeded row will keep the soil from crusting. Beets often take a long time to germinate, so be patient. Control weeds, and water if necessary.



# Common Problems

**DISEASES:** Cercospora leaf spot (rotate crops)

**INSECTS:** leaf miners, aphids

**CULTURAL:** Woody textured roots (excessively high temperatures, lack of water, roots too large); poor root development (overcrowding, improper nutrition); internal black spots in roots, dead bottom leaves (boron deficiency - use 1 tablespoon household borax to 12 gallons of water per 100 square feet, lime acidic soil according to soil test).

## Harvesting and Storage

**DAYS TO MATURITY:** 45 to 80

**HARVEST:** Greens may be harvested when of sufficient size. Excessive removal of the leaves for greens will inhibit enlarging of the root. Harvest greens lightly until beet is ready for harvest at 1 to 3 inches in diameter. Roots larger than 3 inches tend to be woody.

**APPROXIMATE YIELD:** 8 to 10 pounds (per 10-foot row)

**AMOUNT TO RAISE PER PERSON:** 5 to 10 pounds

**STORAGE:** cold (32°F), moist conditions (95% RH) for three to five months with greens removed, greens may be stored as well

**PRESERVATION:** pickle, freeze, can, or dry

# Radish

## Environmental Preferences

**LIGHT:** tolerates partial shade

**SOIL:** well drained, well worked, deep, and free of rocks

**pH:** 6.0 to 8.0

**TEMPERATURE:** cool (60 to 65°F)

**MOISTURE:** moist, but not waterlogged

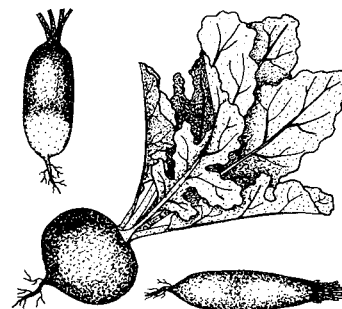
## Culture

**PLANTING:** sow seeds early to mid-spring for spring harvest and late to mid-summer for fall harvest; winter radishes usually grown as fall crop from seed sown in mid-summer

**SPACING:** spring - 1 x 12 inches; winter - 4 x 12 inches

**HARDINESS:** hardy annual or biennial

**FERTILIZER NEEDS:** broadcast 2 pounds of 10-10-10 per 100 square feet, work 4 to 6 inches into the soil before planting



## Cultural Practices

Two types of radishes are grown by home gardeners, annual radishes and winter or storage radishes. The type seen in grocery stores is an annual that grows only in cool weather and matures in 25 to 35 days. Successive plants can be made every 10 to 14 days from the time soil can be worked in the spring until early summer, then again in late summer for fall harvest. During hot weather, plants produce seed stalks and roots develop a hot flavor.

Seeds are often started with carrots, parsnips, or beets to mark the rows of these slower growing plants or between slow-maturing vegetables, such as cabbage, pepper, and tomato. Overcrowding causes poor root development, and slow development results in hot or woody roots. Therefore, good water and nutrient supply are needed to encourage quick growth for good quality. Overfertilization, however, can cause excessive top growth and poor root development.

Winter or storage radishes are biennials that are planted in mid-summer for fall or winter harvest. They are slow growing, requiring 45 to 70 days to maturity. They are often planted in the space in which early corn or onions were planted. Varieties range from mild to very hot and produce roots up to 50 pounds.

## Common Problems

DISEASES: club root

INSECTS: cabbage root maggot, aphids, flea beetles

## Harvesting and Storage

DAYS TO MATURITY: spring radishes - 25 to 35 days; winter radishes - 45 to 70 days

HARVEST: Spring harvest as soon as radishes are edible size - about 1 to 1.5 inches in diameter. Winter harvest depends on variety which may be up to 2 feet long and 50 pounds. Winter radishes should be harvested and stored like other root crops.

APPROXIMATE YIELD: 1 to 4 pounds (per 10-foot row)

AMOUNT TO RAISE PER PERSON: 3 pounds

STORAGE: spring radishes - cool (32°F), moist (95% RH) conditions, three to four weeks; winter radishes - cool (32°F), moist (95% RH) conditions, two to four months

PRESERVATION: pickle

# Parsnips

## Environmental Preferences

LIGHT: sunny

SOIL: deep, well drained, well worked, and free of rocks

pH: 6.0 to 5

TEMPERATURE: cool (60 to 65°F)

MOISTURE: average



## Culture

PLANTING: sow seeds early to mid-spring, one to two weeks before frost-free date

SPACING: 1/2 inch deep, 2 to 4 inches x 18 to 24 inches

HARDINESS: hardy biennial

FERTILIZER NEEDS: broadcast 1 pound of 10-20-10 per 100 square feet, work 4 to 6 inches into the soil before planting; sidedress four to five weeks after planting with 1 pound of 10-10-10 per 100 square feet

## Cultural Practices

Parsnips are slow to germinate and require a long growing season. The seeds should be planted in the spring and allowed to grow through summer and fall. Thin to 3 inches between plants as crowding causes small, tender roots. Parsnip seeds are not long-lasting and will lose viability after a year.

Parsnips should remain in the ground until their tops freeze in late fall. Then dig as needed or harvest for storage. If parsnips are left in the soil over the winter, put about an inch of soil mulch over the crowns after the first fall frost. However, parsnips will lose their flavor and become fibrous if not harvested before growth begins in the spring or if growth continues too long in the fall.

## Common Problems

DISEASES: very few problems

INSECTS: cabbage root maggot, aphids, flea beetles

## Harvesting and Storage

DAYS TO MATURITY: 94 to 120 days from seed

HARVEST: Leave parsnips in the ground through the winter, cover crowns with mulch; or dig up entire crop in early winter and store as a root crop.

APPROXIMATE YIELD: 10 to 12 pounds (per 10-foot row)

AMOUNT TO RAISE PER PERSON: 10 pounds

STORAGE: cool (32°F), moist (95% RH) conditions, two to six months

# Turnip & Rutabaga

## Environmental Preferences

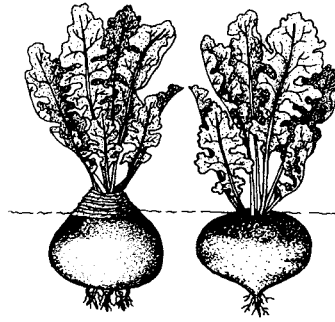
LIGHT: sunny

SOIL: well drained, well worked, and free of rocks

pH: 5.5 to 7.0

TEMPERATURE: cool (60 to 65°F)

MOISTURE: moist, but not water logged



## Culture

PLANTING: sow turnip seed in early spring for summer harvest, and mid- to late summer for fall harvest; sow rutabaga seed in June for fall harvest

SPACING: 3 to 5 inches x 8 to 24 inches

HARDINESS: hardy biennial

FERTILIZER NEEDS: broadcast 2 pounds of 10-20-10 per 100 square feet, work 4 to 6 inches into the soil before planting; sidedress with 1 pound of 10-10-10 per 100 square feet

## Cultural Practices

Hot, dry weather and low fertility levels cause turnips and rutabagas to be small, hot, and woody. Balanced soil fertility and water levels are important for quality crops. Turnip roots will split when a heavy rain follows a dry period.

Rutabagas require four to six weeks longer to mature than turnips, have a firmer flesh, and will store longer. They do not become pithy if they overmature as turnips do.

## Common Problems

DISEASES: club root

INSECTS: cabbage root maggot

## Harvesting and Storage

DAYS TO MATURITY: rutabaga 80 to 100; turnip 30 to 60

HARVEST: The quality of turnips and rutabaga roots is best when they are medium size (turnips 2 to 3 inches, rutabagas 3 to 5 inches). Roots can also be harvested when 1 to 2 inches in diameter. The roots will stand frost, but should be dug before ground freezes. Heavy straw mulch will extend harvest through early winter. For greens, turnips are pulled before storage roots develop. For broccoli raab, turnips are allowed to overwinter and flower stalks harvested the next spring.

APPROXIMATE YIELD: 8 to 12 pounds (per 10-foot row)

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AMOUNT TO RAISE PER PERSON: 5 to 10 pounds

STORAGE: cool (32°F), moist (95% RH) conditions, two to four months. Rutabagas can be dipped in wax to reduce shriveling.

PRESERVATION: freezing

# Salsify

## Environmental Preferences

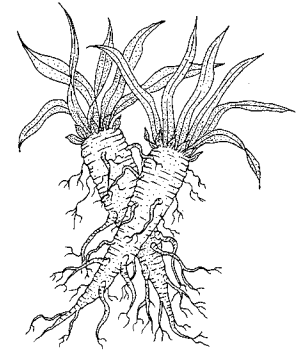
LIGHT: sunny

SOIL: light, crumbly, loose soil, 18 inches deep

pH: 6.0 to 6.8

TEMPERATURE: 55 to 75° F

MOISTURE: average



## Culture

PLANTING: sow seed as soon as ground can be worked

SPACING: 1/2 inch deep, 2 to 3 inches x 16 to 18 inches

HARDINESS: hardy biennial

FERTILIZER NEEDS: before planting, incorporate 2 pounds of 10-20-10 per 100 square feet

## Cultural Practices

Salsify is also called oyster plant due to the oyster-like flavor of its roots. It requires a loose soil to produce long, straight roots with few side roots and will grow best in a raised bed filled with a mix of organic matter, fine sand, and vermiculite. Manure should not be used as it will cause branched roots. Plants should be irrigated until established, then they will tolerate some dry conditions.

## Common Problems

DISEASES: no disease problems of major consequence

INSECTS: no insect problems of major consequence

## Harvesting and Storage

DAYS TO MATURITY: 120 to 150

HARVEST: Harvest should be delayed until after a frost for best flavor and texture. However, the roots may be harvested when they are 1 to 1.5 inches in diameter. Complete harvest before growth begins in spring.

APPROXIMATE YIELD: 10 pounds (per 10-foot row)

AMOUNT TO RAISE PER PERSON: 5 pounds

STORAGE: roots may be stored in damp sand in a cellar, or they may be left in the ground over the winter; light mulch should be used to protect roots left in the ground

PRESERVATION: freeze