

Department of Plant Sciences

ROOT CROPS FOR THE TENNESSEE VEGETABLE GARDEN

March 2019

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Crop Description

Gardeners use the term root crops to refer to garden plants in at least three key families. Several of the most common root crops are radishes and turnips from the family Brassicaceae, which are related to cabbage and broccoli. Then we also have carrots (Apiaceae) and beets (Chenopodiaceae). Obviously, with these three families, there are some differences in important insect and disease pests. However, all of these root crops are cool season, so there are several similarities in growing season and management. We'll discuss some growing tips together, and then break out the discussions as needed for fertilization, harvest and storage. Potatoes, the other most commonly grown root crop, will be discussed in a separate publication.



Figure 1. Garden radish at harvest.

Planting and Growing

Good soil drainage is essential. Root crops, especially carrots, prefer loose, friable and slightly sandy soil for best root growth. Radishes and turnips are likely more tolerant of soils with more clay, as long as they are not poorly drained. Optimum pH is around 6.5. A pre-plant fertilizer should be added to the garden site before planting.

Crop (species)	Cultivar Suggestions
Beet (<i>Beta vulgaris</i>)	Red Ace, Detroit Dark Red, Cyindra (for canning) Avalanche (white), Boldor (gold), Chiogga Guardsmark (striped)
Carrot (<i>Daucus carota</i>)	Atlas (short), Yaya, Bolero, Purple Haze, Sugarsnax 54
Radish (<i>Raphanus sativus</i>)	Pink Beauty, Easter Egg, Watermelon, Roxanne, Cherry Belle, Sweet Baby (purple), White Icicle
Turnip (<i>Brassica rapa</i> var. <i>rapa</i>)	Hakurei, Purple Top White Globe, Toyko Cross, White Lady

Root Crops for the Tennessee Vegetable Garden

Seeds are generally planted about $\frac{1}{4}$ to $\frac{3}{4}$ inch deep due to their small size. Direct seeding is the most common method of growing root crops, especially for the faster germinating radish and turnip crops. Many times root crops are seeded with close row spacing to reduce opportunity for weed growth. Root crops are also well suited to raised beds due to their space efficiency. These can be either temporary raised beds in the garden or permanent raised beds.

Soil temperatures should be at least 40-45 F to support germination, but warmer temperatures will lead to faster germination (until about 75-80 F when warm soil can reduce germination). Slow germination of beets and carrots has led some gardeners to start them in small plug trays and transplant at a young age. This may be especially useful for the small-space gardener who can be efficient with use of seeds to grow a few of each crop. Because of their cool and sometimes short season, plastic mulch is uncommon for root crops. However, a straw mulch could be useful to retain moisture and moderate soil temperatures to reduce heat stress on developing roots. Pollination is not a concern with these crops, so protective row covers can be a useful tool to exclude pests.

In general, optimum temperatures for growth of most of these cool season root crops are 50-65 F up to 75 F for some crops. These temperatures are ideal for root development and good flavor, which can sometimes be enhanced by cooler temperatures later in development with fall crops. Higher than optimum temperatures during maturation can cause poor development or quality. Also consider temperatures in terms of establishment because root crops seeded in the late summer for a fall crop will need close monitoring of soil moisture for good germination and stand.

Most root crops are moderate feeders with some being relatively short season. So, crops like radish and turnips are often not sidedressed with fertilizer during the growing season. Carrots and beets can benefit from nitrogen applied as a side dressing three to four weeks after transplanting. Keep in mind that the root system for these crops is not overly deep, so uniform, consistent moisture will be essential for rapid growth.

Crop	Spring Planting		Fall Planting		Spacing		Days to harvest	Notes
	East TN	West TN	East TN	West TN	In-row in garden	Plants in one square foot		
Beet	3/15-4/15	3/1-4/1	9/1-9/30	9/15-10/1	3 inches	8-16 (depends on size)	50-75 (seed)	Soaking seeds in warm water can speed the usual 10 to 14 days for germination.
Carrot	3/15-5/1	3/1-4/30	8/1-9/1	8/15-9/15	1 ½ to 2 inches	16	50-75 (seed)	Pelleted seed can be useful. Flavor can be better in fall crops.
Radish	4/1-5/30	3/1-5/1	8/1-9/15	8/1-9/30	¾ to 1 inch	16	25-45 (seed)	Sequential seeding is best.
Turnip	4/1-5/30	2/15-4/15	7/15-8/10	8/1-8/30	2-3 inches	8-16 (depends on size)	40-55 (seed)	Select cultivars for root or leaf.

Harvesting and Storage

Beet — Harvest when around 2 inches in diameter for best quality and remove the leaves if storing fresh. Best stored at 32-35 F with high humidity for up to four months of storage life.

Carrot — Harvest any time after the roots have reached the size desired for eating. Cooler temperatures in the fall will allow the roots to be harvested for a longer period of time (the soil can be outdoor cool storage). Best stored around 32-35 F with high humidity for up to four to five months.

Radish — Pick when desired size for eating because quality can drop quickly. Garden radishes can mature in only 20-30 days under good conditions. Warm temperatures and long days can reduce root quality. Best stored at 32-35 F with high humidity for two to four weeks.

Turnip — Pick when desired size for eating; roots can be the best texture when small. Best stored at 32-35 F with high humidity for two to four weeks.



Figure 2. Root knot nematode damage of carrot taproot formation. (Jonathan D. Eisenback, Virginia Polytechnic Institute and State University, Bugwood.org)

Common Pests, Diseases and Issues in Cole Crops

Description	Possible cause(s) and indicators	Prevention/Control Steps
Beet		
No germination	Damping off or rotting seeds	Cool, wet soils in early spring can worsen this issue. Seed treatment with a fungicide can help.
Circular leaf spots with a purplish margin	Cercospora leaf spot	Fungicide sprays or use resistant cultivars (Avalanche, Red Ace, Boldor). <i>It is best to get a lab analysis of many of these diseases to ensure proper management.</i>
Internal black spots in roots	Deficiency of the micronutrient boron	Can apply ½ ounce Borox for 100 square feet of garden area.
Carrot		
Leaf spots	Cercospora- lesions on leaves and stems (often younger leaves) Alternaria- black or brown spots that have yellow edges (often older leaves)	Protective fungicides, rotation, some resistance in some cultivars.
Deformed roots	Root knot nematode (see image above)	Rotation to another area of the garden.
Radish and Turnip		
Small insects feeding on plant	Flea beetles — small holes in leaves	Row covers, conventional insecticides or insecticidal soaps.



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