Department of Plant Sciences

COLE CROPS FOR THE TENNESSEE VEGETABLE GARDEN

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Crop Description

Gardeners use the term cole crops to refer to several garden plants in the family Brassicaceae. One of the most interesting things about this family is the range of plants part that we consume. We eat the flowers of broccoli and cauliflower; the leaves of cabbage, mustard, kale, turnips and collards; the stem of kohlrabi; and the roots of radishes and turnips (which are thought of as root crops rather than cole crops and will be discussed in another publication).

Most of the important crops in this family are found in two main species, *Brassica oleracea* and *Brassica campestris*. While this family varies in whether crops are botanically annual or biennial, we generally grow them as annuals. Vitamin and mineral content vary, but many do have in common the production of sulfur compounds (glucosinolates) that contribute to their distinct flavor. All cole crops are cool-season crops, and this characteristic makes them great options for early spring and late fall production. But, it also presents some challenges when spring temperatures increase rapidly as these cool-season crops are maturing. Many of the most cold hardy leafy crops in this family (kale and mustard) can even be overwintered in Tennessee, so they are often found in raised beds and under low tunnels in home gardens.

Planting and Growing

When good drainage is present, cole crops can be grown successfully on a range of soil types from sandy to clayey. Optimum pH is around 6.5, and recommended pre-plant fertilizer should be added to the garden site before planting. To reduce time to harvest, transplants usually are planted for broccoli, cabbage, cauliflower and Brussels sprouts. Often kale, collards and

mustard are direct seeded, but they also transplant well if desired. Dark plastic mulches can warm soil and increase growth in early season crops. Conversely, a straw or white plastic mulch could reduce soil temperatures in the late spring or late summer planting to reduce stress. Mulches can also be an asset in moderating soil moisture. Pollination is not generally a concern with this family as we eat mostly vegetative tissue or immature flowers, so protective row covers can be a great tool to exclude pests.

Crop (species)	Cultivar suggestions
Broccoli (*Brassica oleracea* Italica group)	Packman, Green Magic, Emperor, Diplomat, Marathon, Artwork, Arcadia
Brussels sprouts *(Brassica oleracea*, Gemmifera group)	Hestia, Jade Cross
Cabbage (*Brassica oleracea* Capitata group)	Caraflex, Katarina, Dynamo, Famosa, Blue Vantage
Cauliflower (*Brassica oleracea*, Botrytis group*)*	Snow Crown, Majestic, Cheddar, Graffiti
Collards (*Brassica oleracea* Acephala group*)*	Champion, Flash, Top Bunch
Kale (*Brassica oleracea, B. napus)*	Toscano, Lacinato, Red Russian, Prizm, Redbor, Scarlet, Winterbor, Starbor
Kohlrabi (*Brassica oleracea* Gonglyodes group*)*	Winner, Konan, Early Purple Vienna
Mustard (*Brassica juncea*)	Green Wave, Red Kingdom
Turnip greens (*Brassica rapa*)	Purple Top White Globe, Seven Top, Top Star

Most cole crops are moderate to heavy feeders, and attention to fertility is important. A side dressing of nitrogen is generally recommended two to four weeks after transplanting. As with other cool-season vegetables, these crops have a root system that is not overly deep. So, much of the water and nutrient uptake occurs in the upper few inches of soil. Because water management is important, irrigation will be helpful in many seasons for growth and quality. Supporting rapid, steady growth is the main goal for cole crops, which need to mature to high-quality vegetables before the weather gets too hot (spring plantings) or cold (fall plantings) for optimum growth.

Crop	Spring Planting		Fall Planting		Plant Spacing/ Row Spacing	Days to harvest	Notes
	East TN	West TN	East TN	West TN			
Broccoli	3/25-4/25	3/15-4/15	7/25-8/15	8/25-9/15	12-18 inches/ 36-40 inches	55-70 (transplant)	Select cultivars for spring or fall.
Brussels Sprouts	3/15-3/30	3/1-3/15	7/15-8/15	8/1-8/20	24 inches/ 36-48 inches	80-100 (transplant)	Likely best as a fall crop.
Cabbage	3/25-4/25	3/15-4/15	7/25-8/15	8/25-9/15	6-18 inches/ 24-36 inches	50-75 (transplant)	Select cultivars for spring or fall.
Cauliflower	3/25-4/25	3/15-4/15	7/15-8/15	8/1-8/20	18-24 inches/ 36-48 inches	50-75 (transplant)	Likely best as a fall crop.
Collards	3/15-5/1	2/15-4/15	7/15-8/15	8/1-8/20	6-18 inches/ 24-36 inches	55-65 (seed)	F1s can be less prone to bolting.
Kale	3/15-5/1	2/15-4/15	8/1-9/1	8/15-9/15	6-18 inches/ 24-36 inches	25-55 (seed)	Select cultivars for baby/full leaf.
Kohlrabi	3/25-4/25	3/15-4/15	8/1-8/15	8/15-8/30	6-8 inches/ 24-36 inches	35-45 (transplant)	Both red and purple cultivars.
Mustard/ Turnip greens	4/1-5/30	2/15-4/15	7/1-7/30	8/1-8/31	2-4 inches/ 12-24 inches	20-50 (seed)	Range of colors, leaf shapes.

In general, optimum temperatures for growth are 60 to 65 F. Stress tolerance varies among the common cole crops, with broccoli and cabbage often described as being slightly more tolerant of variations in temperature than Brussels sprouts and cauliflower. Warm temperatures during maturation can cause poor head formation. Likewise, because many of these crops are biennial (meaning they flower after being exposed to a cold period), they can bolt (begin flowering) if exposed to extended periods of low temperature (40 F) followed by warmer temperatures. This sensitivity limits the earliness of planting some of these crops in the spring and leads many Tennessee gardeners to grow less sensitive leafy crops in the family (kale, mustard, collards) or focus on fall crops for their Brussels sprouts and cauliflower.

Harvesting and Storage

Broccoli — Pick when flower buds are still dark or bright green and are tight. Yellowing and buds opening indicate over maturity. Best stored at 32-40 F with high humidity for up to two weeks of storage life.

Brussels Sprouts — Harvest when sprouts are 1 to 1½ inches in diameter. Harvest sprouts from the base upwards with a sharp twist or a knife cut. The top can be cut out of the plant to improve sprouts in the late fall. Frost often improves taste. Best stored at 32-40 F with high humidity for up to two weeks of storage life.

Cabbage — Pick when heads are firm and dense and it becomes harder to compress the leaves with your hand. Size will vary by cultivar so be aware of mature size. Best stored at 32-40 F with high humidity for one to two months of storage life.

Cauliflower — Harvest when curds are still white and tight. Yellow or brownish curds may indicate over-maturity. Blanching (tying leaves over maturing heads of cauliflower) are often needed to retain white color. Best stored at 32-40 F with high humidity for one to two weeks.

Collards — Leaves can be picked as soon as they are large enough to eat. They should be firm and green. Best stored at 32-40 F with high humidity for up to two weeks of storage life.

Kale — Leaves can be picked as soon as large enough to eat. Cultivars vary with their quality for baby or mature leaf harvest. Leaves should be firm with good color, and single leaves can be harvested to enable plants to produce leaves for a period of time. Best stored at 32-40 F with high humidity for up to two to three weeks of storage life.

Kohlrabi — Stems are typically harvested when enlarged to 2 to 4 inches in diameter. The whole plant can be pulled out of the ground or the enlarged stem can be cut slightly above ground level. Best stored at 32-40 F with high humidity for up to two to three months of storage life.

Mustard — Pick when leaves are crisp, firm and the desired size for eating. Best stored at 32-40 F with high humidity for up to two weeks of storage life.

Common Pests, Diseases and Issues in Cole Crops

Description	Possible cause(s) and indicators	Prevention/ Control Steps
Yellowing foliage	· Fusarium yellows — One side of the plant will show yellow leaves that will then brown and drop off. Vascular areas show browning.	Fusarium is soilborne and difficult to control or treat, but there are resistant cultivars for some crops. Laboratory ID can be important to be certain of pathogen and treatment steps.
Distorted, enlarged or stunted roots (accompanied by plant wilting)	· Clubroot — Soilborne disease that enters root hairs or wounds and leads to distorted root growth. Wilting will start to occur aboveground.	Disease is hard to control in the soil. Long rotations, sanitation, and higher pH (above 7.3) can be helpful.
V-shaped dead areas on edges of leaves	· Black rot — Bacteria enters leaves on edges. Early symptoms are yellowing on edges and between veins and leads to V shape. Yellow areas turn brown and dry up. Veins also can become black as can roots. Worse under warm, humid conditions.	Bacterial disease that is seedborne, so purchase clean, tested seed. Rotation for at least three years.
Leaf spots	· Downy mildew — Purplish spots that turn yellow/brown on upper leaf, may see growth on leaf underside. · Alternaria — Black or brown spots on leaves.	Protective fungicides, rotation, some resistance in some crop. Laboratory ID can be important to ensure correct pathogen ID and treatment steps.
Moderate to large feeding holes	· Caterpillar (immature moth) feeding — A range of cabbage loopers and cabbage worms feed on cole crops.	Netting or row covers can exclude these pests, and biological or conventional insecticides can be used.
Small insects feeding on plant	· Aphids — Can feed on leaves and other plant parts and lodge themselves around buds.	Conventional insecticides or insecticidal soaps.

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