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Fact Sheet

Fact Sheet 461

GROWING Kale, Collards and Turnips

Fresh market vegetables continue to increase in popularity throughout the metropolitan areas of Maryland. Small producers of vegetables may be able to expand production for local sale by adding crops such as kale, collards, and turnips to their present commodities.

Kale, collards, and turnips are closely related to each other and to cabbage, broccoli, and cauliflower. All three are grown as cool-season greens, usually in the fall, early winter, and spring. Turnips are also grown for their roots. The best quality greens are from fast-growing plants that are tender and less fibrous than slow-growing plants.

Kale

Kale is a winter-hardy plant similar to cabbage, but it does not form a head. It is grown for its curly, succulent leaves. Although it is a cool-season crop, once it is established it can withstand a wide range of temperatures without bolting (producing flowers).

Varieties

Among the older varieties still available are 'Vates' ('Dwarf Blue Curled Scotch') and 'Siberian Curled.' Newer hybrids such as 'Winterbor' are also available from some seed suppliers. These types may be used as a garnish and as a cooked dish. Some specialty types are also available that tend to have reddish, purplish, or whitish coloration that enhance their value as a garnish or background for other foods, especially in salad bars.

Field Selection and Fertility

Deep, well-drained loam or sandy loam soil is ideal for producing kale. The ideal pH is 6.5. Fields for kale production should be limed if pH is less than 6.2. Fertilize according to soil tests or nutrient management plan. Apply 50 pounds per acre nitrogen plus any phosphate and potash needed, broadcast and disked-in before planting. An additional 25 to 30 pounds per acre nitrogen may be applied as a sidedress later if needed. Soils testing in the optimum range for phosphate and potash should receive about 50 pounds P_2O_5 and 50 pounds K_2O per acre.

Planting

Kale is usually direct seeded in the field, but it may be transplanted. Row spacing may be from 16 to 24 inches or more apart depending on equipment available. Direct seedings may be thinned to 4 to 5 inches apart in the row or this spacing may be used for transplanting. About 3 pounds of seed will be needed per acre for direct seeding. The spring crop should be seeded or transplanted in early April, while the fall crop should be seeded in August.

Harvest and Yields

The entire plant can be cut off at ground level or selected leaves can be removed from the plants by hand. To maintain the quality

of harvested kale, keep the product cool and prevent loss of moisture. Harvest early in the day during hot weather. As harvest crates or baskets are filled, move them from the field to a shaded location. Clean water from a well may be used to cool harvested kale. For wholesale marketing on a large scale, slurry-ice in wax-lined boxes may be needed. Kale has a yield potential of up to 1 pound per foot of row.

Collards

Collards are a nonheading or looseleaf type of cabbage used mostly as a winter green. It forms a large rosette of smooth, thick, blue-green leaves. Plants may reach 2 to 4 feet in height. Collards are more tolerant than cabbage to cold and heat.

Varieties

'Champion' and 'Vates' are older varieties that are still grown. In addition, there are several new hybrids that growers may want to try. Seed of hybrid types will be much more expensive, but hybrids offer improved vigor and yield potential. Check with seed suppliers on varietal characteristics and availability of seed.

Field Selection and Fertility

Deep, well-drained loam or sandy loam soils with a pH of 6.2 to 6.5 are preferred for production of collards. Broadcast 50 pounds per acre of nitrogen plus phosphate and potash recommended by a soil test or nutrient management plan. Soils with optimum levels of phosphorus and potash would receive 50 pounds per acre each of P_2O_5 and K_2O. An additional 25 to 30 pounds per acre of nitrogen can be sidedressed after the plants are well established.

Planting

Fields may be established from either direct seeding or from transplants. Direct seeding will require about 2 pounds of seed per acre while transplanting requires about 4 ounces of seed to produce plants for one acre. For smaller-leaved collards, direct seed in rows 16 to 24 inches apart or set transplants 6 inches apart in the same row spacing. For production of larger leaves, plant collards 18 to 24 inches apart within the row and up to 4 feet between rows.

Harvest and Yields

Collards may be harvested at any stage of growth. Young plants may be harvested by cutting at the soil line. Larger older leaves may also be harvested by hand with the plants remaining in the field for later harvests of the newer leaves that continue to enlarge. Determine the size of leaves desired by the market to be served and harvest accordingly. Keep harvested collards shaded and as cool as possible. Collards may yield up to 1 pound per foot of row.

Turnips

Turnips may be grown for either the leaves or the roots. Select the varieties best adapted to the leaf or root production desired and follow recommended planting dates.

Varieties

Older varieties that are recommended for greens production in the fall include 'Shogoin' and 'Seven Top.' Varieties recommended for root production include 'Purple Top White Globe', 'White Lady', and 'Just Right.' Check seed suppliers for descriptions of these and newer varieties, disease resistance, and availability of seed.

Field Selection and Fertility

Turnips grow best in well-drained loam or sandy loam soils. If roots are to be harvested mechanically, try to avoid fields with wet areas, stones, or crop residues that would interfere with harvest. The desired pH would be from 6.0 to 6.5. Fertilize according to soil tests or nutrient management plan. Apply 50 pounds per acre nitrogen plus any phosphate and potash needed to be broadcast and disked-in before planting. An additional 25 to 30 pounds per acre nitrogen may be applied as a sidedress later if needed. Soils testing in the optimum range for phosphate and potash should receive about 50 pounds P_2O_5 and 50 pounds K_2O per acre.Turnips have a high requirement for boron, so a soil test should include that analysis. Roots grown on soils low in boron may have poor internal quality with dark discoloration.

Planting

Turnips may be grown in rows about 1 to 2 feet apart, depending on planting equipment available and intended harvest method. Final stand should be about 2 to 4 inches between plants. These spacings will require 2 to 3 pounds of seed per acre. Depending on growing conditions and the maturity range of the variety, the crop should be ready for harvest from 40 to 75 days after seeding.

Harvest and Yields

Turnips can be harvested for greens by cutting the entire plant, or individual leaves may be removed from plants in small plantings. Poor-quality or damaged leaves should be sorted out prior to marketing. Turnip greens are perishable and should be held at temperatures close to 32°F and high humidity to maintain quality. Turnips for roots can be pulled by hand and topped in the field. Topped roots should be stored at close to 32°F and high humidity. Roots should be stored in slatted crates or bins, and good air circulation should be provided. Turnip roots in good condition can be expected to keep for several months under ideal storage conditions.

Yields of turnip greens may range from 10,000 to 12,000 pounds per acre. Root yields are estimated to be 15,000 to 20,000 pounds per acre.

Irrigation

Irrigation will be important for stand establishment following seeding during hot, dry weather as may be expected when seeding in summer and early fall. This irrigation may be light, but it may need to be frequent in order for germination and emergence to occur. Irrigation during production periods may be needed to assure good yields of high-quality produce. This irrigation is most important during the period when the harvestable portion of the plant is being formed.

Pest Management

Weeds, diseases, and insects can reduce the quality, yields, and profit of these crops. For growers who want to use them, pesticides are available to help reduce losses from these pests. Check a current revision of Extension Bulletin 236, *Commercial Vegetable Production Recommendations* for the most recent information on pesticides. **Carefully read and follow all label instructions on any pesticide used.**

Weeds

Weeds will compete with the crop for nutrients, water, and sunlight and may be a contaminant of the harvested product. Organic growers can utilize cultivation and hand hoeing to reduce weed problems. Herbicides are labeled for preplant incorporated and preemergent weed control as well as postemergent control of grasses. Check EB 236 for the latest recommendations for materials, rates, and application methods.

Insects

These crops can be damaged by a number of insects, including aphids, leafhoppers, leafminers, flea beetles, beet armyworm, cabbage looper, diamondback moth caterpillar, and imported cabbageworm. For control of several of these insects, growers may use insecticides such as *Bt* that are approved for organic production. Other insecticides are listed in EB 236. **Be sure to check any pesticide label for reentry and days-to-harvest restrictions.** A brief description of insect pests of kale, collards, and turnips and the damage they cause is as follows:

Aphids: Small, soft-bodied insects that remove plant sap through sucking-type mouthparts. There are several species that may differ slightly in color. Aphids may live in small compact colonies. Damage from aphids appears as stunting of growth, distortion of leaves, and a potential reduction of yield. Bodies of killed aphids may remain attached to the undersides of leaves as a contaminant. Some aphids may secrete honeydew that supports the growth of sooty black mold.

Leafhoppers: Small, generally yellow-green insects that feed on sap from the underside of leaves. Adults are highly mobile, winged, and up to ⅛-inch long. Nymphal stages are wingless. Injury appears as curling and yellowing of leaf edges.

Leafminers: Small insects whose larvae are creamy white maggots that make light-colored, irregularly winding mines in the leaves. As the larva increases in size, the mine widens to form an irregular blotch at one end. Severe infestations may cause the leaves to turn brown or white, and infested leaves are unmarketable.

Flea beetles: Small, often dark-colored insects as adults that may jump away quickly when disturbed. Adults eat small holes in leaves and may kill small plants in the 2- to 3-leaf stage.

Beet armyworm: Soft-skinned, dull-green caterpillars about an inch long with a band of many fine, wavy broken lines down the back and a light-colored stripe along each side. They often feed on buds and terminal growth.

Cabbage looper: Light green with several white stripes along the body, about 1½ inches long. Because it has no legs in the middle of the body, it moves in a characteristic "looping" motion. Loopers may feed between the veins making ragged holes in older leaves.

Diamondback moth caterpillar: Larvae are greenish-yellow and up to 5/16-inch long. Their bodies are pointed at both ends and covered with fine, scattered, erect, black hairs. Larvae may wriggle and drop from the leaf on a silken thread when disturbed. Diamondback moth caterpillars may cause serious injury to collard greens.

Imported cabbageworm: The larva is a sluggish, velvety green worm with a faint yellow stripe on its back. Large larvae may reach 1¼ inches long.

Diseases

Proper rotations, field selection, spacing, fertilizer application, and irrigation practices can reduce the losses from diseases. Kale, collards, and turnips should not follow or precede other crops in the same family such as cabbage, broccoli, and mustard greens. Check a current revision of EB 236 for specific fungicides that may be registered for use.

Hot water-treated seed may be available from some seed companies. The treatment helps to eliminate seed-borne diseases. It is

Photo by Doug Wilson.

Diamondback moth larvae feed on a cabbage leaf.

Table 1. Production Costs and Estimated Returns for Kale and Collards, 1999.

Variable Operating Costs for 7,500 pounds		
Seed	(3 lb at $3.00/lb)	$ 9.00
Cover crop	(1 acre at $30.00/acre)	30.00
Nitrogen	(80 lb at $0.30/lb)	24.00
Phosphate	(50 lb at $0.30/lb)	15.00
Potash	(50 lb at $0.16/lb)	8.00
Lime	(0.5 ton at $26.00/ton)	13.00
Treflan	(1 pt at $4.20/pt)	4.20
Diazinon	(3 pt at $3.60/pt)	10.80
Bt insecticide	(3 lb at $35.00/lb)	105.00
Harvesting and Packing Costs		
Labor	(180 hours at $6.50)	1170.00
Boxes	(250 at $1.00)	250.00
Ice	(3500 lb at $0.05/lb)	175.00
Interest		
($1,814 at 8.5% for 6 months)		77.10
Fixed/Overhead Costs (per acre)		
Plowing		14.00
Disking		12.00
Fertilizer Spreading		5.00
Planting		12.00
Pesticide Applications	(3 at $6.00/acre)	18.00
Irrigation	(3 at $20.00/acre)	60.00
Land Charge		50.00
	Total cost	**$ 2062.21**

Net income above variable and fixed costs:

	Prices per pound		
Yield (lb)	$0.20	$0.30	$0.40
5,000	(-1062.21)	(-562.21)	(-62.21)
7,500	(-562.21)	187.79	937.79
10,000	(-62.21)	937.79	1937.79

usually easier to purchase seed treated with hot water than to do it on a small scale since water temperature and treatment times are very specific.

Costs of Production

The estimated costs of production for kale and collards in 1999 are given in Table 1. Costs for production of turnips should be similar.

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, University of Maryland, College Park, and local governments. Thomas A. Fretz, Director of Maryland Cooperative Extension, University of Maryland.

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P2002

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