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College of Agriculture,
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Center for Crop Diversification Crop Profile
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Leafy Greens

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Introduction

"Leafy greens" or "greens" are broad terms used for a number of vegetable crops with edible leaves. Plants in this group belong to several unrelated taxonomic plant families that include Brassicaceae, Chenopodiaceae, and Asteraceae. Greens are cool-season crops that are planted in early spring or late summer/fall in Kentucky. High tunnels and similar structures can be used to extend the season into winter; however, extreme summer temperatures make year-round production in Kentucky a challenge.

Marketing

Direct markets for leafy greens in Kentucky include farmers markets, roadside stands, on-farm markets and Community Supported Agriculture (CSA). Leaf lettuce mixes (sometimes called "mesclun mix") are popular farmers market sales items. Wholesale options for Kentucky greens producers include produce auctions, foodservice and grocery stores. Leafy greens are a major vegetable crop for certified organic production, and growers may be able to gauge interest for newer and specialty varieties through discussions with grocers and chefs specializing in the organic category.

Market Outlook

Leafy greens or salad greens are consumed daily by most Americans. The popularity of salad bars, sandwiches and wraps, and bagged salad greens has increased the demand for these products.

The per capita use of romaine and leaf lettuce escalated in the 1990s and increased from 8.4 pounds per capita in 2000 to an estimated 11.2 pounds in 2010. Head lettuce use declined during

that period, indicating changing consumer preferences. Romaine and leaf lettuce consumption remained between 11 and 12 pounds per capita from 2010 to 2015, according to the USDA, indicating consumers continue consuming leafy green vegetables.

Broader consumer trends also favor production of more diverse leafy green varieties. Leafy greens are used in some salad mixes, and both fresh and cooked leafy greens are used in ethnic cuisine around the world. Consumers are interested in trying new products and expanding their taste palate to include more ethnic cuisine, including leafy greens. Field acreage trends reported in the 2012 U.S. Ag Census showed more acreage of collards, leaf lettuces and spinach. Mustard and turnip green production, as well as escarole and endive acreage, all showed some declines. Nearly all types of greens

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could be grown profitably in Kentucky, under typical market conditions, and most leafy green crops have a potential for further expansion in the region.

Production considerations

Plant and variety selection

Leafy greens that have been grown in Kentucky include the following, grouped by plant family:

- Crucifer or Mustard family (Brassicaceae) Arugula, broccoli raab, collards, kale (including flowering kale and Chinese kale), mustard greens, and turnip greens
- Goosefoot family (Chenopodiaceae) Beet greens, spinach (flat leaf and savoy), and Swiss chard
- Sunflower or Aster family (Asteraceae) Bibb (Boston), iceberg, leaf, and romaine (cos) lettuce; chicory; dandelion; endive; escarole; and radicchio

There are numerous cultivars to choose from, depending on the type of greens and market. Varieties can differ in leaf size, texture, and color, as well as earliness (very early, early, mid- and late season). The head types of lettuce cultivars include solid head, loose head or loose leaf. Resistance/tolerance to such diseases and physiological problems as bolting, downy mildew, heat, lettuce mosaic virus, Rhizoctonia bottom rot, Sclerotinia drop and/or tip burn is available in some selections. Varieties suitable for processing may not be suitable for selling to local fresh retail markets or other wholesale markets. For example, the head size required for processed romaine lettuce is too large for farmers market sales. Other varietal characteristics, such as color and earliness, should be considered for these other markets. Commercial growers should select only locally adapted varieties that have the qualities in demand for the intended market.

Site selection and planting

Soils should be well-drained and rich in organic matter. Lettuce is very sensitive to herbicides, such as triazines, and should not be planted where carryover could be a problem. Irrigation is necessary to provide continuous moisture for maximum yields and quality.

Traditionally, greens have been grown as row crops with wide spacing. Today, Kentucky growers are planting at higher densities using raised beds with multiple rows per bed. This system, along with plastic mulch and drip irrigation, has proved to be very productive for many crops in this group. Black plastic mulch is used for spring plantings, while white mulch can be used for late summer plantings. Greens can also be grown on raised beds without plastic; however, weed control with hand/mechanical cultivation or herbicides becomes critical.

Bed shaping machines commonly used in Kentucky will form a 6-inch-high raised bed 30 to 32 inches wide at the top with 5 to 6 feet between centers of the beds. Depending on the crop and between row spacing, two to three rows can be used per bed. Companies contracting for wholesale quantities of romaine lettuce can require beds that are 3 to 4 feet wide with three to four rows per bed. This tight spacing gives the crop a desirable shape and density per acre.

High tunnel production and low tunnel production of leafy greens in Kentucky is becoming more common. Seeding in a high tunnel early in the calendar year can provide greens by mid-March. Other growers are overwintering their greens using low tunnels, allowing late year and early harvest as well. In order for this to be successful, growers must consider their markets, location and variety selection. A combination of high and low tunnels can also be used.

Greens can be direct-seeded into either bare ground or plastic mulch. Pelleted seed is normally used for direct-seeding with a simple “Planter Junior” type seeder or vacuum seeder. Most Kentucky growers, however, use transplants that are set by hand or with a waterwheel setter onto raised beds with plastic mulch.

The number of rows can be increased to three or four per bed by making a special wheel for the waterwheel setter. Transplants are seeded into cell plug trays in the greenhouse four to six weeks prior to going to the field. Transplanting has the advantage of resulting in an earlier crop than direct-seeding, as well as a more accurate plant spacing and final plant population. In addition, transplants are less exposed to insect damage, drought, or other early season stresses. Competition from weeds is also reduced.

Some Kentucky growers have also produced leafy greens in tobacco float beds in the same way that tobacco transplants are grown. High quality Bibb lettuce and other greens can be produced in traditional greenhouses using a hydroponic production system.

Pest management

Greens are susceptible to a number of foliar diseases that can reduce the quality and marketability of leaves. These include downy mildew, powdery mildew and various fungal leaf spots. Most greens are susceptible to bolting (premature flower stalk production) during persistently hot weather and long days. Bolting is one of the main reasons it is very difficult to grow commercial quantities of head lettuce in Kentucky. Other types of lettuce, such as romaine, are more heat tolerant. Tip burn, an abiotic disorder generally related to nutritional problems, can also affect greens.

Potential insect problems include cutworms, wireworms, aphids, flea beetles, leafminers, leafhoppers and white flies. Scouting to monitor populations can help the grower determine when and how often insecticides should be applied.

Harvest and storage

Greens can be harvested as whole plants (once over harvest) or as individual leaves (multiple harvests). Fresh market leafy greens are hand-harvested. Greens have a high respiration rate and should be washed, packed and sold as quickly as possible. They can be field packed and top-iced in waxed corrugated cardboard boxes or wooden crates.

Turnip, mustard, collards and kale are harvested when the stalks are fairly young and tender. Rubber bands can be used to bunch three to five stalks together, but larger wholesale buyers may require labels or bands with price-look-up (PLU) codes. Spinach is harvestable as soon as the leaves are an edible size. Lettuce and spinach are often packed in cello bags. Endive and escarole must be harvested before a strong bitter taste and toughness develops that makes them unmarketable.

Labor requirements

Labor needed to produce a crop of green leafy vegetables will vary based on two factors: weed control techniques and harvest yield. University budget estimates for large-scale commercial leafy green production in the southeastern U.S. show labor needs of approximately 22 hours for field preparation, planting and crop care. If herbicides or black plastic are not used for weed control, then up to 80 additional hours of weeding labor could be required. Harvest and packing rates can range from five boxes per hour for bundled greens to 13 or more boxes per hour for intensive head lettuce production. An average harvest labor time is approximately 80 hours per acre, with some higher yielding crops requiring up to 100 hours or more of harvest labor.

Economic considerations

Startup investments may include specialized bed shapers, plastic layers, precision planters, irrigation and transplanting equipment. Post-harvest washing and cooling equipment may also be required, depending on the scale of production and intended market.

Leafy greens cover a wide variety of crops from head lettuce to mustard greens. Production techniques vary in intensity from bare ground cultivation in single rows to multi-row, irrigated, densely planted raised beds. Production expenses rise with more intensive production techniques.

Growers considering volume production of greens for wholesale markets need to address the post-harvest cooling and handling requirements for the crop, as well as the production needs. Total costs for collard greens averaged $4,250 per acre, using 2016 production assumptions for 400 boxes per acre produced in Kentucky. Total costs for leafy greens averaged $3,000 to $3,500 per acre for 300 boxes of 48 bunches, depending on pest management and handling requirements.

The estimated breakeven return to management for collard greens, using 2016 production assumptions

for Kentucky, ranged from $9.40 to $10.60 per box, based on a yield of 400 18- to 20-pound boxes of collard greens per acre. For spring greens, breakeven estimates per acre for 2016 ranged from $8.43 to $9.70 per box for 300 boxes of 48 bunches (there are usually six plants in a bunch). Breakeven prices for producers growing greens on a smaller scale are typically higher than these per acre estimates.

Selected Resources

- Vegetable Production Guide for Commercial Growers, ID-36 (University of Kentucky) http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm
- Collards (Hand Harvest) – Irrigated Enterprise Budget (Clemson University, 2016) http://www.clemson.edu/extension/agribusiness/files/enterprise-budgets/collards-irr.pdf
- Commercial Production and Management of Cabbage and Leafy Greens, B-1181 (University of Georgia, 2017) http://extension.uga.edu/publications/detail.cfm?number=B1181
- Lettuce/Leafy Greens (Cornell Cooperative Extension, 2016) http://cvp.cce.cornell.edu/crop.php?id=17
- Common Diseases of Leafy Greens (Alabama Cooperative Extension, 2000) http://www.aces.edu/pubs/docs/A/ANR-1189/
- Greens-Spring (Hand Harvest) – Irrigated Enterprise Budget (Clemson University, 2016) http://www.clemson.edu/extension/agribusiness/files/enterprise-budgets/greens-springirr.pdf

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