

Romaine Lettuce

Introduction

Romaine (*Lactuca sativa*), also known as cos, is a lettuce that produces elongated heads. Romaine is considered more nutritious and has more volume than iceberg. Because it is slower to bolt than other head lettuces, romaine has potential as a commercial crop in Kentucky.

Marketing

Fresh market opportunities for romaine sales include farmers markets and roadside stands. Bagged leaf lettuce mixes (sometimes called ‘mesclun mix’) are popular farmers market sales items. Local and regional marketing opportunities may be available for bagged salad and greens mixes, especially if they are certified organically grown. Current wholesale fresh market options include marketing through produce wholesalers, as well as direct sales to restaurants and local retailers.

Market Outlook

Leafy greens or salad greens are consumed daily by most Americans. The per capita consumption of romaine lettuce alone increased from 5 pounds in 1993 to over 11 pounds in 2010. Romaine was one of the top six vegetable crops for domestic use in the United



States for 2010. The popularity of salad bars and bagged salad greens, as well as its greater use in the foodservice industry, has increased the demand for romaine.

The high cost of shipping lettuce from the west coast has created a greater demand for romaine produced in the eastern U.S. Because romaine requires more space than other greens, it is more costly to ship. In addition, shipping costs have risen due to increased fuel surcharges. Salad plants have been built in locations like Ohio and North Carolina to handle the processing of eastern-grown romaine, thus reducing

the shipping costs and transit time required to transport lettuce to east coast customers. Growers wishing to tap into the wholesale market must be able to compete on a delivered price and quality level. Volume production plus post-harvest cooling and handling issues would have to be addressed to succeed in this market.

Production Considerations

Cultivar selection

Most of the romaine currently sold to wholesale salad companies are varieties that have been bred for western and southwestern U.S. climates. One important key to wholesale production in Kentucky will be selecting and/or breeding varieties

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adapted to our local climate. Researchers at the University of Kentucky have studies underway that will examine variety, yield, and quality characteristics in an effort to identify the best cultivars for Kentucky conditions. Desirable head characteristics for processed lettuce include large framed heads with a high density and a savoyed texture. Stripped heads should yield about 1½ pounds each.

Varieties suitable for processed romaine may not be suitable for growers selling to local fresh retail markets and other wholesale markets. For example, the head size required for processed lettuce is too large for farmers market sales. Other varietal characteristics, such as color and earliness, should be considered for these other markets.

Site selection and planting

Romaine is a cool-season crop that is planted in early spring or late summer/fall. High tunnels and similar structures can be used to extend the season. Soils should be well-drained and rich in organic matter. Uniform soil types are important to obtaining uniformity at harvest. Lettuce is very sensitive to herbicides, such as triazines, and should not be planted where carryover could be a problem.

Traditionally, greens have been grown as row crops with wide spacing. Today many Kentucky growers are planting at higher densities using raised beds with multiple rows per bed. 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 variety and between-row spacing, two to three rows can be used per bed. Researchers in the UK Department of Horticulture are examining various cultural practices, including plant spacing, to determine the best production methods for Kentucky romaine.

Romaine 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. Seed can be primed to enhance emergence uniformity and to prevent germination failure when soils are too warm (above 80° F).

Most Kentucky growers use transplants that have been seeded into cell plug trays in the greenhouse 4 to 6 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. Transplants can be set by hand or with a waterwheel setter onto raised beds. The number of rows can be increased to three or four per bed by making a special wheel for the waterwheel setter. Growers in North Carolina contracting with local salad companies are using a Mechanical Transplanter® Model 5000 cell type carousel setter on bare ground. Precision planting, plant population, and seedling depth are very important in obtaining the necessary quality and yields for wholesale processing.

Irrigation is necessary to provide continuous moisture for maximum yields and quality. Romaine is shallow-rooted, making drip irrigation, rather than overhead, more effective in delivering water directly to the roots. Romaine's poorly developed root system also means that nutrients need to be placed near the roots for more efficient uptake. Several sidedressings with nitrogen may be required; however, excess use can result in undesirable puffy heads.

Plasticulture vs. bare-ground production

Black plastic mulch has been used for spring plantings of a number of greens, including romaine. White mulch is an option for late summer plantings. Plasticulture of romaine produces a cleaner crop with fewer weeds. In addition, soils warm up more quickly with black plastic; however, black plastic may result in excessive heat toward harvest.

Bare-ground production is less expensive than plasticulture and allows for the higher plant populations required by wholesale salad companies. However, weed control with hand/mechanical cultivation or herbicides becomes critical without plastic. The UK research project includes a study of plastic mulch and drip irrigation.

Temperature

Young romaine plants can be hardy down to 22° F, but susceptibility to cold injury increases as plants mature. Plants prefer temperatures between 60° F and 65° F; however, romaine will grow well as long as the sum of the daytime and nighttime maximum temperatures does not exceed 150.

Pest management

The main threats to stand establishment are the fungi *Sclerotinia* and *Rhizoctonia*. Romaine is also 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. Other potential disease threats include bottom rot and drop, *Botrytis* gray mold, and viruses.

The main physiological problem affecting lettuce is bolting (premature flower stalk production) which can occur during persistently hot weather and long days. While romaine is more heat tolerant than head lettuce, bolting can still be a problem. Other physiological concerns include tip burn, brown rib, bitterness, and puffy head.

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

Harvest and storage

Romaine is hand-harvested as whole plants (once over harvest) for fresh market or salad processing. Growers selling bagged greens may

choose to harvest the crop as individual leaves (multiple harvests).

Romaine heads are harvested just as they start to close; waiting too long can result in bolting. Salad companies want 12-inch-tall heads with as small of a core as possible, generally, 3½ inches or less. Heads for wholesale markets must be uniform and free of tipburn.

Field packing romaine avoids having to handle the delicate crop twice, thus reducing the potential for damage. Field-packed lettuce harvested for the fresh market is generally packed into 24-count (head) cartons. It is then transported to either a vacuum or a forced air cooling facility to remove the field heat.

Following good food safety practices is essential, regardless of the market. Wholesale growers in North Carolina use stainless steel 3-point conveyor belts to field pack the lettuce according to salad company requirements. Generally, processed lettuce is packed in plastic bins or paper bin boxes. Romaine should be cooled to 32° F as soon as possible. While vacuum cooling is the standard, forced air is being used with some success. Stored at the proper temperature and relative humidity, romaine has a storage life of 2 to 3 weeks.

Labor requirements

Labor needed to produce a crop of romaine lettuce will vary based on weed control techniques, harvesting method, and yield. Field preparation, planting and crop care are estimated at 25 hours per acre. If herbicides or black plastic are not used for weed control, then up to 80 hours per acre of weeding labor may be required. Harvest labor requirements will depend on how the crop is packaged for market.

Economic Considerations

Initial investments for start-up may include specialized bed shapers, precision planters, bed cultivators, and/or plastic-laying and

transplanting equipment. In addition, an irrigation system, a conveyor type harvest aid, and post-harvest washing/cooling equipment may be required to produce quality products. Some buyers may require the use of specific harvesting techniques and equipment. For example, salad processors require that harvest aid equipment be made with stainless steel. Growers considering volume production of lettuce for wholesale markets need to address the post-harvest cooling and handling requirements for the crop, as well as the production needs.

Harvest costs will vary depending on how the lettuce is packed for market. North Carolina State University (NCSU) 2006 budgets estimated \$0.35 cents per pound custom harvest costs for romaine harvested and packed into 24-count (24-pound) cartons for both fresh and processing markets. Field packing into bulk bins, which is common for processing markets, could provide savings in packing and labor. Using NCSU budget information, production costs for one acre of romaine (drip irrigation) for both processed and fresh market sales were estimated at \$2,400, with harvest and marketing costs at \$2,600. Total expenses per acre, including both variable and fixed costs, were estimated at \$5,000. Presuming gross returns of \$7,500 per acre, returns to land, capital, and management would be approximately \$2,500 per acre. This 2006 budget presumed a yield of 30,000 pounds of romaine head lettuce per acre.

Romaine lettuce profitability will be determined by both production efficiency and prices obtained. While wholesale prices can vary considerably, wholesale prices of romaine lettuce are observed to reach levels 20 percent to 30 percent above the prices assumed in the 2006 budget estimates. This more than offsets rises in the cost of production inputs, and could indicate potential for profitability from commercial-scale romaine lettuce in the \$4,000 per acre range.

Selected Resources

- Vegetable Production Guide for Commercial Growers, ID-36 (University of Kentucky) <http://www.ca.uky.edu/agc/pubs/id/id36/id36.htm>
- Commodity Highlight: Romaine Lettuce (Economic Research Service, USDA, 2005) <http://www.ers.usda.gov/publications/vgs/feb05/vgs307.pdf#page=24>
- Head Lettuce and Romaine Variety Adaptations to Eastern NC (North Carolina State University, 2005) http://www.cals.ncsu.edu/specialty_crops/publications/reports/headlettuce.html
- NC Romaine and Head Lettuce History and Opportunities (North Carolina State University, 2006) http://www.cals.ncsu.edu/specialty_crops/pdf/nclettuce.doc

Reviewed by Mark Keating, Lecturer in Sustainable Agriculture (Issued 2007)

Reviewed by Christy Cassady, Extension Specialist (Revised 2008)

Reviewed by Dave Spalding, Extension Associate (Revised 2011)

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For additional information, contact your local [County Extension](#) agent