



Celery and Celeriac

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Introduction

Celery (*Apium graveolens*) is an herb and vegetable member of the parsley family. It is a cool-season crop that is a biennial, but is often grown as an annual for fresh market consumption. It does best when temperatures are relatively cool, particularly at night. Celery is a versatile ingredient for cooking, used both fresh and frozen. The stalk (technically the leaf petiole) is often served raw or cooked in vegetable dishes. Celery leaves are used much like an herb, similar to parsley, in flavoring soups, stews, salads and other dishes. Celeriac (*Apium rapaceum*), also known as celery root, is grown for its smooth celery flavor and long storage capacity. Celeriac has a fine-grained white flesh and tastes much like a stalk of celery. Celery seed for spices is derived from smallage, a wild type of celery from which modern celery and celeriac were derived. Celeriac is often cooked and added to mixed vegetable dishes. It is easier to grow than celery if conditions are cool and moist.

Marketing and Market Outlook

Fresh market celery production is concentrated in California and Michigan. A small portion of celery is harvested for processing use in prepared foods such as soups and juices. The 2017 Census of Agriculture reported 1,603 U.S. farms harvested 34,717 acres of celery, with 30,385 acres harvested for fresh market sales¹. The 2017 Census reported that 17 Kentucky farms harvested celery². Celeriac was not reported in the 2012 or 2017 Census information. Per capita fresh celery use declined somewhat, from 6 pounds in 2012 to 5 pounds in 2016, according to the Economic Research Service.



Celery and celeriac may be interesting crops for direct marketing in Kentucky, such as farmers markets sales and sales to restaurants. Cool-season crops can increase product variety and help growers extend harvest seasons. Niche crops can also be effectively marketed to highly interested consumers, like community supported agriculture members. Sharing information about benefits, how to use celeriac, and how it tastes will be important to sales. For marketing to health conscious groups, fresh celery contains vitamins A, C and folic acid, and nutritional minerals, yet has practically no calories. It is also an excellent source of dietary fiber.

Production Considerations

Cultivar selection

Celery generally takes 85-120 days to harvest after transplanting, while celeriac requires a longer growing season than most vegetables. Both also require a con-



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sistent amount of water throughout the entire growing season and prefer cool temperatures. Celery is a more difficult crop to grow and when drought stressed, it becomes tough, stringy and stronger in flavor.

Varieties

Conga, Merengo, Samba and Tango are varieties that should do well in Kentucky. Samba and Merengo are resistant to Fusarium and Tango is tolerant to this soilborne disease. Tango is considered to be sweeter and more tender than the other varieties listed here and is thus an excellent prospect for direct sales. Mars and Brilliant are two very good celeriac varieties.

Site Selection and Planting

Celery and celeriac both require fertile well-drained soils with a pH range of 6.0 to 7.0. Irrigation is very important throughout the growing season. Sow the very small seeds indoors in March about 10 - 12 weeks before transplanting outdoors. Keep soil temperature warm and germination should occur within three weeks. Transplant outdoors in late May to mid-June after last frost has passed. Set plants 6 to 8 inches apart in rows 24-36 inches apart. Celery can be planted on bare ground or plastic mulch; however, white plastic is recommended to keep the soil cooler. Celery and celeriac bolt or go to seed easily. Exposure to night temperatures below 40 degrees F and day temperatures below 50 degrees F for 10 days can cause premature bolting. Plants will survive light frosts. Celeriac is more tolerant of frosts than celery. Celery has a high fertilizer requirement and should be sidedressed with 50 pounds of nitrogen per acre four to six weeks after transplanting and three to four weeks prior to harvest.

Pest Management

Common insects that damage celery are thrips, flea beetles, aphids, tarnished plant bug, leafhoppers, cutworms, armyworms and cabbage loopers. In addition, celery may suffer from spider mites, particularly if there are conditions of high fertility. Diseases that have been identified in Kentucky in the past 15 years include early blight (caused by *Cercospora apii*, which can also infect celeriac) and late blight (*Sep-*

toria apiicola), both fungal diseases that typically initiate as leaf spots in foliage. These pathogens have been shown to originate on celery seed and/or infected celery debris from the previous cropping season, so purchasing certified disease-free seed and using regular crop rotation will decrease the risk of develop-



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ing these diseases in new celery crops. An array of chemical options are labeled for early and late blight management in celery, including strobilurins, sterol-demethylation inhibitors, chlorothalonil, and coppers (always check product labels to ensure compatibility with the crop). Black heart is a physiological disorder associated with a calcium deficiency where the young central leaves break down, turn black and decay. This may spread to the celery heart. It occurs when plants are low in calcium, over-watered, drought stressed, over-fertilized or over-mature. For this reason, in the high rainfall climate of Kentucky, celery may do well under cover in a haygrove or high tunnel environment. The tradeoff is dealing with the crop's heat stress.

Harvest and Storage

Celery is generally ready to harvest 85 to 120 days after transplanting. It is cut when the stalks measure at least 6 inches from the soil line to the first leaf. Alternatively, growers may choose to take selective cuttings of individual stalks, starting with the larger, outer stalks. Pulling the stalks from the base or cutting them off the plant with a knife both work well. Individual stalks can then be bunched for fresh market sales. This allows the plant to continue to grow and give multiple harvests for a longer window. Quality deteriorates over time as the stalks yellow and become pithy. After harvest, remove field heat by using refrigerated forced air cooling, then pack in an upright position and keep them at a constant temperature; 32 degrees F with 98 percent relative humidity is best. Celery will store, if kept properly, for one to two months. Celeriac can be harvested late summer through fall when the swollen root is at a 3- to 4-inch diameter. Some wait to harvest until after the first frost of the season, which is said to "sweeten" the root. During harvest remove as much dirt as possible, cut off the rootlets and remove all but 1 inch of foliage. After harvest, treat just like celery. If

stored properly, celeriac will remain in good condition for six to eight months.

Labor requirements

Labor requirements for celery will vary depending on available equipment and the production system used. Small-scale production (100-foot rows or a similar layout) will require labor for growing transplants and planting, weed control and harvest. Total labor requirements will be similar to cole crops (broccoli, cauliflower and cabbage). Sometimes contact with celery foliage can create a severe rash. When working with this crop even on hot, sunny days, it is recommended to wear long sleeves, long pants and gloves, and wash any exposed skin as soon as possible after contact.

Economic Considerations

Celery and celeriac may be incorporated into existing market gardens and diversified vegetable production systems. Seed, transplant production, weed control and harvest labor time are the most significant costs for celery and celeriac production. Variable costs, including labor costs, are likely in the \$100 to \$175 range per 100-foot row. Fixed costs – including an irrigation system, land and equipment – will vary with the size and scale of production.

Positive celery returns are projected for 2019 in an average small-scale production system in Kentucky, assuming 150 heads are sold for a price of at least \$1.75 per head. Celery returns to operator labor and management, for sales at farmers market and other direct markets, are projected to be similar to returns from cole crops and eggplant.

¹United States, Table 36. Vegetables, Potatoes, and Melons Harvested for Sale: 2017 and 2012

https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1_Chapter_1_US/st99_1_0036_0036.pdf

²USDA, NASS. Kentucky, Table 36. Vegetables, Potatoes, and Melons Harvested for Sale: 2017 and 2012

https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1_Chapter_1_State_Level/Kentucky/st21_1_0036_0036.pdf

Selected Resources

On the Internet

- Agricultural Marketing Resource Center, Celery Profile (2018): <https://www.agmrc.org/commodities-products/vegetables/celery>
- Celery (North Carolina State University, 2001) <https://content.ces.ncsu.edu/celery>
- Celery: Commercial Vegetable Recommendations (E1308, Michigan State University, 2016) https://www.canr.msu.edu/resources/celery_commercial_vegetable_recommendations_e1308
- Celery, in 2019 Mid-Atlantic Commercial Vegetable Production Recommendations (Rutgers, 2019) <https://njaes.rutgers.edu/pubs/commercial-veg-rec/celery.pdf>
- Kitchen Gardener Magazine, How to Grow Celeriac (2000) <http://www.vegetablegardener.com/item/5582/how-to-grow-celeriac>
- Food availability (Per Capita) Data System, Celery: <https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system/.aspx>
- Koike, S. T., Davis, R. M., Turini, T. M. UC IPM Pest Management Guidelines: Celery. UC ANR Publication 3439. (University of California, 2008) <http://www.ipm.ucdavis.edu/PMG/r104100111.html>

In print

- Koike, S. T., Gladders, P., Paulus, A. O. 2009. Early blight and late blight of celery and celeriac. *Vegetable Diseases: A Color Handbook*. Academic Press, pp. 83-91.

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