



Chinese Chestnuts

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Introduction

American chestnuts (*Castanea dentata*), once prominent in the eastern U.S. landscape, all but disappeared in the mid-1900s when chestnut blight eradicated nearly all of these popular trees. Blight-resistant varieties of Chinese chestnut (*Castanea mollissima*) are a viable alternative for commercial chestnut production.

Chestnuts are low in fat compared with other nuts and are receiving attention from the health food industry. These nuts are eaten roasted, boiled, or sautéed. Chestnuts may be incorporated into various recipes, such as stuffing, vegetable dishes, casseroles, and desserts. Dried chestnuts can be ground into flour as a substitute for wheat flour or corn meal.

Marketing

The most promising outlets for chestnuts include the domestic fresh (roasting) markets, upscale restaurants, and ethnic/specialty food groceries. Chestnuts can also be used to make gluten-free chestnut flour for sale as a specialty food. Specific fresh chestnut markets include restaurants, roadside stands, on-farm markets, farmers markets, retail groceries, and specialty food retailers. A 2005 University of Missouri Center for Agroforestry survey of U.S. chestnut growers indicated that producers received the highest prices when marketing their chestnuts into the fine dining sector. While local sales are most common, many chestnut growers have also advertised their product online, selling beyond a 75-mile radius of their farm.

Chestnuts are often considered a holiday food item, so growers could take advantage of this potential market by timing sales accordingly. Proper post-



harvest handling, including cold storage and marketing the chestnuts from refrigerated containers at retail, is essential for maintaining post-harvest quality. Because consumers are relatively unfamiliar with chestnuts, the producer will want to provide recipes and instructions for use and handling at the point of sale.

Market Outlook

Chestnuts have potential for production on marginal land in Kentucky. Local growers who can consistently supply high quality, good tasting, and weevil-free chestnuts have the advantage of freshness over imported chestnuts that tend to be expensive and of sporadic quality. However, many U.S. consumers are unfamiliar with chestnuts since the decline of the American chestnut tree. Potential chestnut growers will need to be willing to educate and promote their crop to a new generation of consumers.

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California, Florida and Michigan had the most chestnut acreage in 2012, with each state reporting about 440 bearing

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acres. Chestnut acreage is larger by farm, on average, in California and Florida. Oregon, Missouri, Ohio, Virginia and Pennsylvania all reported more than 100 acres, according to the 2012 Census of Agriculture.

Marketing channels for U.S.-grown chestnuts have mainly focused on niche, upscale foodservice and specialty food markets. Production for local sales, such as at farm festivals, is a possible way to add value to small-scale production. The agricultural cooperative Chestnut Growers, Inc., has in the past decade developed as a processing and marketing outlet in Michigan, allowing members access to a commercial-scale chestnut peeler for processing.

Production considerations

Planting material and cultivar selection

Chestnut trees may be established from seeds, seedlings, or grafted trees. Planting grafted trees is preferred for consistency in yield, ripening, size, and quality of the nuts produced. While seedling trees are generally more readily available and less expensive to purchase, grafted trees come into bearing sooner than seedlings. Graft incompatibility can occur several years after planting.

There are a number of Chinese chestnut cultivars and hybrids that are well adapted to Kentucky conditions. Nut characteristics, such as size, flavor, cracking quality, and storage life can vary among varieties. It is particularly important to choose selections resistant to chestnut blight, and cultivars that produce the largest nuts such as Qing. Most markets require large chestnuts. Chinese chestnuts are self-sterile, so two or more different cultivars are required for good pollination. Refer to Nut Tree Growing in Kentucky (ID-77) for recommended varieties. Custom grafted trees may have to be ordered a year in advance.

Site selection and planting

Chestnuts can be grown on land that is considered unsuitable for other crops, such as sandy or gravelly soils. Heavy, poorly drained sites should be avoided. Chestnuts prefer soils that are somewhat acidic (pH 5.5 to 6.5) and will not tolerate high pH soils. While trees are cold hardy when dormant, swelling buds are susceptible to frost damage in the spring. Do not plant in frost pockets or locations with poor air drainage.

Mature chestnuts require a final 40 feet by 40 feet

spacing; however, it may take 20 or more years before trees actually fill this space. Some growers interplant chestnut seedlings at a closer spacing among grafted chestnuts. As the permanent grafted trees mature and come into full production, these filler trees are removed.

Trees are trained to a modified central leader shape, with only limited pruning needed on bearing trees. Young trees require protection against sunscald injury to their smooth bark. Supplemental watering helps promote tree growth and to reduce stress, especially in the first year. Once established, trees are relatively drought tolerant; however, irrigation will help bearing trees to produce larger nuts and improve nut fill.

Pest management

Eliminating undesirable vegetation prior to planting is essential for tree establishment. Weeds should be controlled within three feet of young trees. Weed control strategies include the use of herbicides and mowing between tree rows. Chestnut blight is still present in the U.S., but using blight-resistant varieties may reduce disease incidence. Potential insect problems include aphids, Japanese beetles, and chestnut weevil. Insecticide applications will be required annually for weevil control and as needed to control Japanese beetles.

Young trees are very prone to damage by animal pests, such as rabbits, mice, squirrels, and deer. These pests will need to be controlled to reduce nut losses. Deer fencing and tree shelters should be used until trees are large.

Harvest and storage

The first harvest for seedling chestnuts can be expected in five to six years. Grafted trees will begin to bear within three years, with larger commercial yields beginning six to nine years after planting. Soil moisture is important prior to harvest because half the kernel growth takes place during the last two weeks before ripening.

Chestnuts are hand-picked off the ground once they have fallen from the tree. Daily harvesting is necessary to prevent the fallen nuts from drying out and to ensure that area wildlife does not steal or damage the crop. Alternatively, where deer or squirrel losses are severe, nuts in burs may be shaken from the tree once the burs begin to split. Chestnuts harvested too early

will be smaller, softer in texture and hard to remove from burs.

Harvested nuts are separated from any debris gathered at harvest and cleaned so they are free of dirt. Promptly refrigerate (32° F or slightly above) in ventilated plastic bags. Nuts should not be allowed to dry out. Curing and storing chestnuts is a fairly involved process, and interested individuals should consult the Post-Harvest Quality of Chestnuts article listed in Selected Resources at the end of this document.

Labor requirements

Based on 1,000 to 2,000 pounds produced per acre, labor needs are approximately 80 hours for establishment in the first two years, 25 hours for production, 70 hours per ton for hand harvest, and 16 hours per ton for packaging and grading.

Economic considerations

Chestnuts require three to six years for establishment before any nuts may be harvested, and 10 years before yields are significant. This delay will mean a period without any cash income, presenting a significant financial and production risk. For this reason, many current chestnut growers are experimenting with the crop as a hobby or source of supplemental farm income.

Initial investments for chestnuts include land preparation, the purchase of trees, deer fence installation and possibly the installation of an irrigation system. Other costs may include a good sprayer, a nut shaker, cleaning equipment, a grader, and cold storage. Significant costs may be incurred protecting seedlings from animal pests. Substantial losses due to graft incompatibility may also occur.

Establishment costs will vary depending on production systems and tree costs. Total establishment costs for 1 acre of chestnuts in Kentucky would range from \$4,750 to \$7,500 per acre for the first five years of grafted tree production. Estimates from Michigan calculate a five-year establishment cost at \$7,797, including a \$1,187 deer fence cost. The first crop from grafted trees should be harvested three to five years after planting.

Estimates for Kentucky production (2016), based on a price of \$2.50 per pound, show establishment costs recouped after seven to nine years. Annual returns to labor, land and management of \$1,200 to \$1,600 per acre of chestnuts could be realized after year 7.

Financial returns may increase as trees mature and produce substantially greater yields of nuts per acre. Higher prices will also generate greater profitability from chestnuts. Product quality (particularly, weevil-free) and market development are essential for profitable chestnut production.

Selected Resources

- Nut Tree Growing in Kentucky, ID-77 (University of Kentucky, 2007) <http://www.ca.uky.edu/agc/pubs/id/id77/id77.pdf>
- Chestnuts (Michigan State University Extension) <http://msue.anr.msu.edu/topic/info/chestnuts>
- Chestnut Growers, Inc. <http://www.chestnutgrowersinc.com/>
- Chestnut Grower's Primer (Southeast Iowa Nut Growers, 2002) 1.34 MB file http://www.agmrc.org/media/cms/The_Chestnut_Primer_2002_90B857872BE60.pdf
- Chestnuts (University of Missouri Center for Agroforestry, 2012) <http://www.centerforagroforestry.org/pubs/chestnutpubs.php>
- Chestnuts (Agricultural Marketing Resource Center, 2015) <http://www.agmrc.org/commodities-products/nuts/chestnuts/>
- Commercial Chestnut Costs of Production and Comparative Analysis with Tart Cherry Production (Michigan State University, 2013) http://msue.anr.msu.edu/topic/chestnuts/establishing_orchards/cost_of_production
- Growing Chestnut Trees (Northern Nut Growers Association, Inc., 2009) <http://www.nutgrowing.org/faqchest.htm>
- Growing Chinese Chestnuts in Missouri (University of Missouri Center for Agroforestry, 2012) 6.74 MB <http://www.centerforagroforestry.org/pubs/chestnut.pdf>
- Post-Harvest Quality of Chestnuts: A Challenge for Growers. The Chestnut Grower (Chestnut Growers of America, 2006) <http://www.chestnutgrowers.org/2006july.pdf>

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