



Edamame

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Introduction

Edamame is the Japanese name for edible soybeans consumed at the green stage. Also referred to as vegetable soybeans, edamame is the same species as the traditional grain soybean (*Glycine max*) commonly grown in Kentucky. However, compared to grain soybean, edamame seeds are larger with a sweet, nutty flavor, and better digestibility.

An important vegetable in Asia, edamame demand in the United States has increased with the popularity of Asian cuisine. Additional interest in edamame stems from its many reported health benefits. The green soybeans are very high in protein, particularly for a vegetable, and contain beneficial phytochemicals.

Marketing and Market Outlook

Marketing edamame is more closely related to marketing processing vegetables than conventional oilseeds. The current market for edamame in Kentucky is primarily associated with specialty produce and farmers markets located near population centers. Produce brokers have indicated that they are willing to handle uniformly packaged, high quality edamame.

Fresh edamame is marketed mainly at farmers markets. Fresh edamame can be marketed in the pod or bunched on the stalk, depending on the market channel, with farmers market and some ethnic market customers more interested in edamame on the stalk.



Frozen grocery and foodservice

products are the main market for edamame. Frozen edamame is sold shelled, in the pod or as part of value-added frozen foods. Most frozen edamame sold in the U.S. until 2012 was imported from Asia, with some U.S. production on the West Coast and in Minnesota. A company based in Mulberry, Arkansas, in 2012 opened an \$11 million processing facility and started freezing edamame for sale to retailers including Sam's Club. Local press and other media outlets said 800 to 900 acres of edamame were harvested in western Arkansas in 2012 with the intent to double contracted acreage in 2013. This makes Arkansas the U.S. leader in vegetable soybean production with no reports of large-scale, commercially viable efforts in other states east of the Mississippi.



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Production Considerations

Cultivar selection

Edamame cultivars vary in terms of such characteristics as plant height, yield, seed size, seed flavor, and time to maturity. While seed may be sold with “days to harvest” information, edamame cultivars should be purchased based on “maturity group.” This designation (0 to V) for soybean cultivars identifies the production region (latitude) for maximum yield potential. Varieties best adapted to Kentucky are generally in Maturity Groups III, IV, and V, depending on the area of the state. Cultivars grown outside their adapted zone will not perform well because they will flower either too early or too late. Producers should determine which soybean maturity group(s) will perform best in their region and select cultivars accordingly. Other desirable, marketable qualities should be considered once the maturity group has been identified.

Site selection and planting

Edible soybeans do well in deep or moderately deep, well-drained, fertile soils. Gently sloping land where flooding, run-off, and erosion are minimal is also recommended. Fields known to have high populations of soybean cyst nematode should be avoided.

Until harvest, edamame production is similar to that of traditional grain soybeans. Because of the larger seed size, green edible soybeans may require changes in planter plate size or planting technique. Seeds require a soil that is warm, moist, and free of weeds. The optimum planting period in Kentucky is from early May to mid-June, when soil temperatures have reached the 65°F minimum necessary for rapid emergence. Kentucky producers have also successfully started edamame in greenhouses for field transplanting.

If edamame is being grown in a field with a history of soybean production, it is generally not necessary to inoculate seed with a nitrogen-fixing bacterium; however, in non-soybean fields, the seed should be inoculated with the *Rhizobium* strain recommended for soybeans.

Alternately, the crop’s nitrogen needs can be met with supplemental fertilizer.

Pest management

Reports currently indicate that the range of disease and insect pests affecting edamame is the same as for grain soybeans. Because edamame is harvested when green, growers will be able to avoid many of the late-season problems that occur on traditional soybeans. Early season diseases, such as seed decay, seedling blights, and root rots will reduce stands but are generally more problematic in wet, poorly drained soils. Foliar diseases and insects typically occur at low levels and do not significantly reduce yields. Pesticides registered for grain soybeans are generally not cleared for use on soybeans harvested as a vegetable crop; however, each product label should be examined to determine this. Weeds can be challenging; however, cultivars that germinate uniformly and grow tall to shade out weeds will have an advantage. Growers in Kentucky often use mechanical and hand cultivation for weed control. The edamame industry in Arkansas has sought state-specific permission to use some pesticides in vegetable soybean production. As of 2009, clethodim was the only herbicide with a federal label for use on edamame in the U.S. As of 2016, fomesafen, imazamox, linuron, S-metolachlor, bentazon, pendimethalin, and trifluralin also have federal labels, although not all of these herbicides are approved for use in all states. Clethodim, imazamox, fomesafen, S-metolachlor, and bentazon are labeled for use on edamame in Kentucky¹.

Harvest and storage

Edamame is generally hand-harvested on small farms, as traditional bean harvesters may be too expensive for a limited planting of this crop. Individual pods may be harvested in the field or cut plants can be removed to another location for harvest. Alternately, plants cut at the soil line can be marketed with pods intact. Larger acreages can be mechanically harvested.

Pods are ready for harvest when they are close

to full size and pods are bright green. Once pods show any yellowing, quality will be unacceptable. Vegetable soybeans have a very short harvest window of only a few days. Immediate post-harvest cooling is essential to maintain product freshness for market. It is recommended that Kentucky growers harvest edamame early in the morning hours when pods are cool. This will help the pods keep longer and reduce the amount of field heat that must be removed after harvest. Cooling may be accomplished using forced air, vacuum, or hydrocooling.

Fresh edamame does not store well. Growers can expect that harvested beans will retain flavor and appearance for approximately one week when properly stored. Ongoing research involving postharvest keeping quality of edamame has focused on specialized films for packaging. Seeds within pods or shelled can be frozen after blanching.

Labor requirements

Kentucky growers have effectively used careful hand picking, grading, and field packing to harvest the crop and prepare it for market. An unskilled, supervised worker should be able to harvest, grade, pack, and transport at least one box (25 pounds) of edamame per hour. A yield of 6,000 to 10,000 pounds per acre can be expected. Marketing the whole plant (bunched on the stalk) requires the least amount of time and labor. A modified green bean picker is used to harvest edamame for freezing.

Economic Considerations

Fresh edamame is a niche product in Kentucky. Basic information about varieties, production practices, and harvest technique is still needed. Budget estimates indicate a greater likelihood for edamame profitability in either direct-marketed, hand-harvested plots of an acre or less, or larger plots wholesaled directly to a frozen foods packer.

Initial investments include land preparation and purchase of seed. The main costs involved

in production are harvesting and post-harvest handling. While hand harvest is the most viable technique for small-scale production, it raises harvest costs.

Machine harvest using a green bean picker is necessary for commercial wholesale production. Contract prices for edamame for freezing are not made public, but returns from edamame production for freezing are estimated in the same range as returns from specialty and organic soybeans. The experience in Arkansas shows large-scale edamame production can be a good way for conventional soybean producers to diversify crop production to manage income risks, if a processing plant is located nearby.

In 2011, UK researchers generated estimates for break-even edamame prices for production on a 200-acre organic farm. Production assumed mechanical harvest, and an edamame price of \$0.37 per pound was determined to be necessary to switch from organic soybean to organic edamame production under a conventional tillage plan. The researchers noted that marketing and production risks could also affect the necessary break-even price for edamame in an organic production system.

Total expenses per acre for hand-harvested edamame, including annual fixed costs, could range from \$8,500 to \$12,000, with labor as the greatest expense. Profitability is dependent on price and market channel, with potential returns ranging from \$(2,000)* to \$2,200 per acre to land and management for the fresh, wholesale market. Mechanical harvest with a modified green bean picker for the direct local market could raise potential returns to the \$4,000 level per acre. While edamame could be a profitable niche crop in the direct marketing mix, large-scale production of edamame using hand harvest for the fresh market is not likely to be widely feasible due to profitability risk.

*Parentheses indicate a negative number, i.e. a net loss.

Selected Resources

- Edamame Soybeans: Estimated Per Acre Costs and Returns (University of Kentucky, 2000) <http://www.uky.edu/hort/sites/www.uky.edu/hort/files/documents/budget2000.pdf>
- Edamame Cultivar Report – 2012 (USDA-ARS and Department of Crop Sciences, University of Illinois) https://www2.ag.purdue.edu/hla/fruitveg/MidWest%20Trial%20Reports/2012/02-01_Williams_Edamame.pdf
- Marketing Challenges for Emerging Crops in Kentucky: Vegetable Soybeans (University of Kentucky, 2001) http://www.uky.edu/hort/sites/www.uky.edu/hort/files/documents/mkt_vegsoy.pdf
- Marketing New Crops: Edamame (University of Kentucky, 2002) http://www.uky.edu/hort/sites/www.uky.edu/hort/files/documents/fact02_edamame.pdf
- Mechanical Harvesting of Edamame (University of Kentucky, 2010) http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/edamame_mechanical_harvest.pdf
- Production System for Extending the Harvest Time Frame of Fresh-Market Edamame in Kentucky (University of Kentucky, 2009) http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/edamame_extend_harvest.pdf
- Edamame: A Nutritious Vegetable Crop (Purdue University, 2002) <http://www.hort.purdue.edu/newcrop/ncnu02/v5-432.html>
- Edamame Vegetable Soybean <http://agsyst.wsu.edu/edamhome.html>
- Edamame and “Gardensoy” (National Soybean Research Laboratory, University of Illinois, 2010) <http://nsrl.illinois.edu/content/edamame>
- Edamame: Vegetable Soybeans (ATTRA, 2006) <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=28>
- Estimating the Economic Viability of a New Crop Alternative for the U.S. Organic Market: Edamame – A Vegetable Soybean (University of Kentucky, 2011) <http://ageconsearch.umn.edu/bitstream/103709/1/12809.pdf>
- How to Grow Edamame: Planting Guidelines (Wannamaker Seeds) <http://www.wannamakerseeds.com/plantingguidelines.html>
- Mulberry Celebrates ‘Super Food’ Cash Crop With Edamame Festival (John Lovett, Times Record Online Edition, March 29, 2015) <http://www.swtimes.com/news/mulberry-celebrates-super-food-cash-crop-edamame-festival>
- Organic Edamame Production (Center for Environmental Farming Systems, North Carolina State University, 2007) <http://content.ces.ncsu.edu/organic-edamame-production>

Commercial websites listed in the resources are provided for information purposes only and their inclusion does not represent an endorsement of the company or its products by the University of Kentucky.

¹National Pesticide Information Retrieval System (Search Kentucky State Pesticide Products) http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=KY

Reviewed by Todd Pfeiffer, University of Kentucky Professor

September 2016

Photo by Todd Pfeiffer, University of Kentucky (harvested plants) and Jun Ohwada, Wikimedia Commons (pods)

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