

Garlic and Elephant Garlic

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Introduction

Garlic (*Allium sativum*) is commonly used as a flavoring for food, as a condiment, and for medicinal purposes. The milder-flavored elephant garlic (*Allium ampeloprasum*) is actually a leek that produces large cloves. In the southeastern U.S., garlic is fall-planted for early summer harvest. The off-season production cycle as well as the opportunity to meet consumer demand for local, high-quality produce can be an asset to growers if markets and production realities are understood. This publication provides information on marketing, production, and economic considerations for individuals considering producing garlic commercially.

Market Analysis

Analyzing the market for garlic involves assessing various factors influencing production, consumption, and pricing on a nation-wide, regional, and local level to gain a better understanding of market conditions and develop strategies to meet consumer demands, mitigate risks, and potentially capitalize on opportunities. The demand for garlic in the U.S. increased in the 1990s due to a rise in the popularity of international cuisine and a greater awareness of garlic's reported health benefits. This led to a large garlic import market to meet domestic demand, with much of the garlic consumed in the U.S. being produced in China. In 2018, domestic production of garlic began increasing to offset lower



imports and to meet the increasing demand for garlic and consumer preferences for locally-produced food. According to Census data from the USDA National Agriculture Statistics Service, 26,000 acres of garlic were planted for commercial purposes in the U.S. in 2022. Approximately 90% of U.S. garlic is produced in California with smaller production concentrations in Nevada, Oregon, Washington, and New York.

Due to the lack of processing facilities in the eastern U.S., garlic is often produced as part of a diversified vegetable operation as it can fit well into a diversified vegetable crop rotation schedule and direct markets well alongside other vegetables as whole bulbs. Garlic also has a long shelf-life and can ensure the producer has the ability to market a number of products year-round to customers. Many garlic producers in the eastern U.S. will grow approximately 3 - 7 different varieties to diversify offerings and meet demand for various flavor characteristics

of well-informed customers. Thoroughly evaluate the consumer awareness and flavor preferences of the customer-base when choosing varieties to produce. Like most vegetables, the price of garlic can vary greatly depending on many factors and producers should seek out current market prices of the market channel under consideration and gain an understanding of factors influencing local prices. The [farmers market price reports](#) are available as a resource for producers direct marketing, with prices ranging \$0.50 - \$4.00 per bulb at farmers markets in Indiana, Tennessee, and Kentucky in 2023

Marketing

Garlic is often direct marketed as individual bulbs, by the braid or rope, as a bundle of bulbs, or by the pound through farmers markets, on-farm stands, and community supported agriculture (CSA) shares or subscription boxes in the eastern U.S. Some producers market garlic to restaurants, but many chefs prefer garlic to be peeled and chopped or minced prior to purchasing to reduce preparation time. Wholesaling garlic to local supermarkets and specialty food stores is becoming increasingly popular with producers. Processing often requires a certification or license, depending on state and local regulations. Consider the additional liability, costs, and labor of processing before pursuing markets of processed garlic products.

Other than the bulbs or cloves, producers market scallions and scapes of garlic, as well as value-added products. Garlic sold in the immature state is often referred to as scallions although scallions can also refer to green onions. Scapes, or the flower stalk of hardneck garlic, can be sold or used to make a spread such as garlic scape pesto. Additional value-added marketing techniques include braiding stalks and dehydrating garlic for seasonings. **Due to the potential risk of botulism, exercise extreme caution and follow all food safety requirements and state regulations when processing garlic for specialty items.**

Furthermore, producers direct marketing garlic must carefully consider the target customers' flavor preferences and awareness of how to cook with garlic and the various flavors. What kind of garlic is the customer interested in? How much and how often does the customer use fresh garlic? Garlic flavors can range from very mild to strong and spicy. Marketing strategies



should be developed to communicate with customers the flavor of each variety offered and increase awareness of how to use the garlic in dishes the customer may be typically cooking. Often, consumers may be intimidated to use garlic and producers direct marketing can use tactics such as sampling, cooking demonstrations, and recipes to encourage customers to try fresh garlic or experiment cooking with fresh garlic for the first time.

Production Considerations

Cultivar Selection

Garlic cultivars are grouped into two main categories: hardneck (produce a scape) or softneck (do not produce a scape); both types can be grown in the Southeast and Mid-Atlantic regions, but research in KY and NC has shown hardnecks yield and survive the winter better than softneck types. Other traits that can differ between cultivars include clove arrangement, number of cloves, size of cloves, color, skin tightness, and flavor. Some of these characteristics can change depending on the production location and environmental conditions, thereby complicating varietal selection. Even hardneck and softneck designations can break down in

different climates. Growers should select only adapted varieties that have the qualities in demand for the intended market.

There is only one cultivar for elephant garlic. Even the hardneck and softneck types, which may be sold under different names, have been identified as the same cultivar.

Site Selection and Planting

Garlic does best in well-drained soil high in organic matter. Heavy soils, which hamper bulb enlargement and stain the garlic, should be avoided. As with any new planting, it is important to take a soil sample about 6 months before you plan to plant your crop so the proper nutrients can be added and any adjustments to pH can be made. Follow fertility recommendations found in your regional vegetable handbooks/guides, such as the Mid-Atlantic Commercial Vegetable Production Recommendations or the Southeastern U.S. Vegetable Crop Handbook.

Garlic is planted by hand in the fall and harvested the following summer. Both planting and harvest dates will vary a bit according to where you are located. Generally, mid-September to mid-November is the planting window. Fall planting allows the cloves' roots to grow before cold temperatures set in. Elephant garlic can also be planted in late winter (early to mid-March). Harvest timing and indicators are covered below.



Planting in raised beds promotes good soil drainage, reduces soil compaction, and increases the ease of harvest. Cloves are planted 1-1.5 inches deep for most types of garlic or 2-2.5 inches deep for Elephant garlic. Following the seeding depth rule for your cloves: planting depth should be two to three times width of the clove at its widest part. Drip or trickle irrigation is recommended during the growing season, especially during bulb formation. Irrigation should be discontinued approximately two weeks prior to harvest. Mulching with 3-4 inches of straw immediately after planting can be beneficial to protect against cold weather. On a larger scale, growers may choose to use black polyethylene mulch on their raised beds.

Pest Management

Disease problems include downy mildew, bulb and neck rots, purple blotch, and Botrytis leaf blight. Purchasing disease-free bulbs, rotating crops, and following good cultural practices can help prevent many of these diseases; however, fungicide sprays may be needed in some years. The most common insect pests of garlic include onion thrips and onion maggot. Scouting to monitor populations can help determine when and how often insecticides should be applied. Weed control is essential since garlic is a poor competitor. Mechanical cultivation, hand hoeing, mulch, crop rotations, and herbicide applications are typical weed management strategies. Consult regional vegetable handbooks/guides for specific pest, disease, and weed control recommendations, such as the Mid-Atlantic Commercial Vegetable Production Recommendations or the Southeastern U.S. Vegetable Crop Handbook.

Harvest and Storage

When growing hardneck types, remove the garlic scape or hard stem when it reaches the curlicue or twisting stage. If the garlic stalk blooms, it takes energy away from the bulb and puts it toward seed production, which can cause smaller bulbs at harvest. The curlicue on the scape is also a good indicator that the bulb harvest is about a month away. In addition to being a pre-harvest indicators, scapes can be sold by the bunch at market, as they have the same garlic flavor in a different form. Scapes also create visual interest in flower arrangements.



Garlic bulbs are ready for harvest when the leaf tops begin to dry and bend toward the ground or 50% of the plant has yellowed. The presence of three to five wrapper leaves is the best indication of maturity. Before harvesting, random bulbs should be pulled to be sure they have reached the desirable size. Mature elephant garlic bulbs are about twice the size of regular garlic. Rain during harvest causes serious problems because wet soil stains the bulbs and can increase the possibility of decay.

Garlic and elephant garlic bulbs are hand-harvested. Soil is loosened prior to pulling using a garden fork, bed lifter or potato digger. Curing is important to enhance flavor, and ensure the longest shelf-life and best quality. The most important factors for proper curing are airflow, ambient light (not direct sunlight), warm temperatures (75 degrees F is ideal), and protection from pests. There are many techniques for curing including by braiding, hanging in a barn, or spreading outdoors under shade cloth. Curing is complete when the outer skins are dry and flaky, the neck has shrunk down, and the center of the cut stem has hardened. Once cured, cleaning and sorting provides the highest quality crop. Trim the roots close to the bulb. Brush off and remaining soil, trim the stems to about an inch and peel the outermost layer of skin. Remove any damaged bulbs or bulbs that are too small. Never wash the bulbs! Properly cured or dried garlic can be stored for up to 3 months in a standard warehouse or up to 6 months in cold storage.

Labor Requirements

Garlic production is labor intensive because the crop is planted and harvested by hand. Labor needs per acre

are approximately 24 hours for production, 32 to 40 hours for harvesting, and 16 hours for curing bulbs and packaging.

Economic Considerations

The cost of seed cloves plus the hand labor for planting and harvest makes the initial investment for garlic production high in comparison to some other vegetable crops. Additional costs include land preparation, mulch, and irrigation.

Garlic returns vary depending on how the crop is marketed. Garlic sold from \$1.50-\$2.00 per bulb could generate estimated returns to land and management of \$250 to \$2,200 per acre, based on a 4000-pound average yield. An acre of well-managed conventional or organic garlic that is directly marketed at or above \$2 per bulb could return more than \$2,000 per acre. Management, price per pound, and marketing will determine the profitability of garlic for the producer. Garlic is also a potentially profitable small-scale crop, with yields of 35 pounds per 100-foot row estimated to produce positive returns land, labor, and management in 2019 when sold at a direct market price of \$2 per bulb.

See pages 5-6 for a Garlic Budget. Note: Assumptions and estimates in the budget provided are based on common production and marketing practices for producers in the Eastern U.S.

Selected Resources

Selected Internet Resources for Herb Marketing (University of Kentucky, 2018)

<https://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/herbmarketing.pdf>

Garlic Production (Penn State Extension, 2015)

<https://extension.psu.edu/garlic-production>

Production and Management of Garlic, Elephant Garlic and Leek, Circular 852 (University of Georgia, 2023) [https://extension.uga.edu/publications/detail.html?number=C852&title=Production and Management of Garlic, Elephant Garlic and Leek](https://extension.uga.edu/publications/detail.html?number=C852&title=Production%20and%20Management%20of%20Garlic,%20Elephant%20Garlic%20and%20Leek)

(continued on page 6)

Garlic Budget

48# hard neck type per 100ft row, 25 cloves average, assumed 1200 cloves per 100ft

GROSS INCOME	Unit	Quantity	Price per unit	1/2 Acre.
Garlic- Scapes	bunches, 12 scapes	1,000	\$ 1.00	\$ 1,000.00
Garlic- Bulbs Green	bulbs	4,000	\$ 2.00	\$ 8,000.00
Garlic- Bulbs Cured	bulbs	4,000	\$ 2.00	\$ 8,000.00
TOTAL				\$ 17,000.00

VARIABLE COST	Unit	Quantity	Cost	1/2 Acre.
Buckwheat Cover Crop	pound	50.0	\$ 1.76	\$ 88.00
Mustard Cover Crop	pound	30.0	\$ 4.00	\$ 120.00
Seed Stock (cloves) 1	pound	252.0	\$ 16.00	\$ 4,032.00
Insecticide				
spinosad	ounce	158.4	\$ 0.78	\$ 123.55
Bacillus thuringiensis	ounce	66.0	\$ 0.68	\$ 44.88
diatomaceous earth	lb.	22.0	\$ 0.50	\$ 11.00
Fungicide				
copper	oz.	28.0	\$ 0.60	\$ 16.80
LifeGard	oz.	3.8	\$ 39.62	\$ 148.58
Lime (pro-rated)	\$/ton	1.00	\$ 90.00	\$ 90.00
Fertilizer				
Harmony 5-4-3 Organic Fertilizer	lb.	0.0	\$ 0.35	\$ -
Fish Emulsion 5-1-1	gallon	4.0	\$ 50.00	\$ 200.00
Feather Meal	lb.	0.0	\$ 0.54	\$ -
Sales Containers- rubber bands	per 2125 bands	1.0	\$ 27.00	\$ 27.00
Sales Containers- box	per container	0.0	\$ -	\$ -
LABOR HOURS				\$ -
Pre-Harvest	hrs.	96.0	\$ 15.00	\$ 1,440.00
Harvest	hrs.	104.00	\$ 15.00	\$ 1,560.00
Post Harvest	hrs.	84.00	\$ 15.00	\$ 1,260.00

Post Season	hrs.	22.00	\$	15.00	\$	330.00
Total Labor Less Owner Portion***	hrs.	306	\$	15.00	\$	4,590.00
Marketing Cost	% of Gross	5%	\$	17,000.00	\$	850.00
Capital Variable Cost	from cap. exp.	1.00	-----		\$	1,002.57

TOTAL VARIABLE COST **\$ 11,344.38**

FIXED COST	Unit	Quantity	Cost	1/2 Acre.
Capital Fixed Cost	from cap. exp.	1.0	-----	\$ 2,460.81
				\$ -
				\$ 2,460.81

TOTAL COST **\$ 13,805.19**

Returns to Land, Capital, and Unpaid Labor **\$ 3,194.81**

*An interactive version of this budget can be downloaded at NC State Extension, NC Farm School portal at <https://ncfarmschool.ces.ncsu.edu/small-scale-budgets/>

Selected Resources, continued:

Organic Production of Garlic, Onions, and Other Alliums (ATTRA, 2023) <https://attra.ncat.org/product/garlic-organic-production/>

Garlic (Cornell Cooperative Extension, 2019) <https://cvp.cce.cornell.edu/crop.php?id=14&list=yes>

Vegetable and Pulses Yearbook Tables (USDA/ERS, 2023) <https://www.ers.usda.gov/data-products/vegetables-and-pulses-data/vegetables-and-pulses-yearbook-tables/>

Suggested Citation:

Painter, R. et al (2024). *Garlic & Elephant Garlic*. CCD-CP-141. Lexington, KY: Center for Crop Diversification, University of Kentucky College of Agriculture, Food and Environment. Available: http://www.uky.edu/ccd/sites/www.uky.edu/ccd/files/garlic_multistate.pdf

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Photos of Galena Garlic, courtesy of Rachel Painter **July 2024**

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