

Growing Garlic In Kentucky

Dennis Morgeson
Agent For Horticulture
Washington County



Garlic - The Plant

- Garlic, *Allium sativum*, is a root crop (meaning the bulb grows underground) of the family Alliaceae
 - It is among the oldest of all cultivated plants; in fact its species name, *sativum*, means cultivated
 - The leaves are long, narrow and flat like grass
 - It is a member of the same group of plants as the Onion, Chive, and Leek
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Garlic Flower

- The flowers are placed at the end of a stalk rising directly from the bulb, grouped together in a globular head, or umbel, with an enclosing leaf-like structure called spathe, and among there can be small bulbils
- Garlic flowers, though pretty, were rarely picked as ornament because of their strong odor
- Young flowers can be sautéed for a mild garlic flavor



Garlic Bulb

- The bulb of *Allium sativum* generally is the only portion of the plant that is eaten
- The bulb is compound consisting of several bulbils or “cloves”
- The cloves are grouped together between the membranous scales and enclosed within a whitish skin



History

- Originated from Central Asia, garlic have been used as a spice, food and folklore medicine for over 5000 years, and is the most widely researched medicinal plant
- Through trade, garlic spread in popularity throughout Asia and eventually to Egypt and Europe. The Age of Exploration helped to propagate the use of garlic to other parts of the world
- Today somewhere between 300-400 varieties of garlic cultivate worldwide. In the United States, over 250 million pounds of garlic is consumed each year



Harvesting Garlic, from *Tacuinum Sanitatis*
15th Century (Biblioteque Nationale)
Source: Wikipedia

A bowl of miso soup with a slice of yellow pickled radish on top. The bowl is white with a blue and white striped pattern around the rim. The background is dark and textured.

Medicinal History

- In traditional Chinese medicine, Islamic medicine, and folklore medicine, several spices and herbs including garlic are described to possess medicinal properties
- In China, garlic tea has long been recommended for fever, headache, and cholera
- In rural Japan, miso-soup containing garlic is used as remedy for the common cold with headache, fever and sore throat

Medicinal History

- The Egyptian medical Codex Eber papyrus dating to about 1550 B.C., includes 22 therapeutic formulations that mention garlic as an effective remedy for a variety of ailment including heart problems, headache, bites, worms and tumors
- Dioscorides wrote of garlic ability to “clear the arteries” dated back to the first century A.D.
- It is reported that in ancient Egypt , the workers who had to build the great pyramids were fed their daily share of garlic as a form of healthy prolongation
- From the Roman antiquity through World War I, garlic poultices were used to prevent wound infections

Medicinal History

- Early 1853, the famous microbiologist, Louis Pasteur, performed several original work showing that garlic could kill bacteria
- In 1916, the British government issued a general plea for the public to supply it with garlic in order to meet wartime needs.
- Garlic was called “Russian penicillin” during World War II because, after running out of antibiotic, the Russian government turned to this ancient treatment for its soldiers
- After World War II, Sandoz Pharmaceuticals manufactured a garlic compound for intestinal spasms, and the Van Patten Company produced another for lowering blood pressure

Types Of Garlic



Softneck

Garlic can be classified broadly into two categories: hardneck and softneck



Hardneck

Hardneck

- Produce a flower stalk or scape, often called bolting varieties
 - Flowers (if produced) usually abort and form bulbils instead
 - Considered to be most closely related to wild garlic
 - Bulbils will take 3 seasons or so to produce good sized bulbs
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Hardneck

- The bulbs typically consist of four to twelve cloves around a flower stalk
- Difficult to impossible to braid
- Some hardnecks do not store as well as softnecks
- Hardneck varieties include Rocamboles, Purple Stripe, Glazed Purple, Marbled Purple, and Porcelain (more on this later)



Softneck

- Do not produce a flower stock
- Usual the type that is used for mass production
- Not suited for cold climates, however we can grow both hardneck and softneck in Kentucky
- Generally more productive than hardnecks because no energy goes into producing a flower stalk

Softneck

- Bulbs consist of 10-40 cloves arranged in multiple layers like an artichoke
 - Generally has a much longer shelf life than hardnecks
 - Typical varieties include Artichoke and Silverskin
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Types and Varieties

Rocamboles – Moderately sized plant (3 to 4 ft tall with scape uncurled), characterized by a scape that coils 2-3 times before straightening out. Bulbils are numerous and generally a purple color. Bulbs are off-white with purple streaks. Clove skins are brownish and easy to peel. Bulbs store for about 4-5 months. Prone to double cloves.

- Typical named selections include:
German Red, German Brown,
Spanish Roja, Russian Red,
Killarney Red, Montana Giant



Types and Varieties

Purple stripe – Moderately sized plant (3 to 5 ft tall with scape uncurled), characterized by a scape with $\frac{3}{4}$ of a coil and others just form a downwards U before straightening out. Bulbils are numerous and generally a purple color. Bulbs have purple streaks. Clove skins are brownish and more difficult to peel than rocamboles. Bulbs store for about 5-7 months. A typical bulb has 8 to 12 cloves and one pound of garlic will supply about 60 cloves. Double cloves rarely occur.

- Typical named selections include:
Chesnok Red, Persian Star
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Types and Varieties

Glazed Purple Stripe – Similar to Purple Stripe except clove color is more intensely purple and fewer cloves per bulb. One pound of garlic will supply about 60 cloves. Scape tends to form a full coil before straightening out.

- Typical named selections include:
Purple Glazer, Red Rezan



Types and Varieties

Marbled Purple Stripe – Bulbs actually look more similar to Rocamboles than Purple Stripes, but genetic analysis places them closer to Purple Stripes. Scapes tend to be weak in some strains and form somewhat random coils. A typical bulb has 4 to 7 cloves and one pound of garlic will supply about 50 cloves.

- Typical named selections include: Siberian, Brown Tempest, Krasnodar Red
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Types and Varieties

Porcelain – Large and vigorous plants (4 to 6 ft tall with scape uncurled). They are characterized by a scape with loose and somewhat random coils before straightening out. Bulbils are numerous, small, and generally a white color. Bulbs are large and typically contain 4 to 6 cloves. This characteristic is great for cooks, but growers need to save more of their crop for seed. Clove skins smooth and white. They tend to be more difficult to peel than Rocamboles. Double cloves are rare. Bulbs store for about 5-7 months. One pound of garlic will supply about 35 cloves.

- Typical named selections include:
Romanian Red, Georgian Crystal, Music, Polish, Hardneck, Zemo, Georgian Fire, Northern White, German White, Krasnodar White



Types and Varieties

Artichoke – This garlic type is usually a softneck but may partially bolt following cold winters. In some cases the bulbils form just above the bulb making the bulb unmarketable. In a mild winter only 1-2% will bolt. In a cold winter without snow cover, 70 to 100% will bolt. Bulbils that do appear are usually purple. Bulb color is whitish to purple blush. Bulbs typically contain 12 to 20 cloves and one pound of bulbs will supply about 80 cloves. This is usually the most productive softneck type in cold climates. Cloves are difficult to peel. Bulbs store for 6 to 9 months.

- Typical named selections include: Inchellium Red, California Early, Susanville, California Late, Early Red Italian, Machashi, Red Toch



Types and Varieties

Asiatic – A shorter garlic plant that is about 3 ft tall when the scape is mature. Originally thought to be closely related to artichoke varieties, but further genetic analysis suggests it is a hardneck type. A flower stalk almost always forms under cold conditions. Scapes generally do not curl and may be somewhat drooping with a long characteristic bulbil capsule. Bulbils are much larger than those produced on other garlic types and are usually dark purple. There are usually four to eight large cloves per bulb and one pound of bulbs will provide about 50 cloves. Double cloves do occur in this type. Cloves are brownish and bulb color varies from white to pink to purple striped. Clove skins are somewhat tight making it difficult to peel. Cloves are very prone to splitting through the bulb skins if harvested too late. Bulbs typically can be stored for 5 to 7 months.

- Typical named selections include: Asian Tempest, Japanese, Wonha, Sakura, Pyong Vang



Types and Varieties

Turban – Genetically related to softneck types, but often forms a flower stalk under Cold conditions. Scapes are weak and tend to form a downwards U. The purple bulbils are numerous and small. There are usually 7 to 11 cloves per bulb and one pound of bulbs will supply about 60 cloves. Double cloves are not common in this type. Cloves are brownish and bulb color is usually dark purple striped. Clove skins are loose making it easy to peel. This type does not store well and typically only lasts 3 to 5 months. The advantage of this type is that it matures 1 to 3 weeks earlier than most other garlic types.

- Typical named selections include: Red Janice, Blossom, Xian, Tzan, Chinese Stripe



Types and Varieties

Creole – Genetically related to softneck types, but often forms a flower stalk under cold conditions. Scapes that do form are weak and curl randomly sometimes just forming a downwards U. Bulbils are small and usually white to pink. There are usually 8 to 12 cloves per bulb and one pound of bulbs will supply about 80 cloves. Creole garlic is most suited for warm climates and mild winters. For this reason, bulb size is small (usually less than 2 inches) under cold conditions, especially after a cold open winter. However, the dark purple clove skins and generally sweeter taste make this garlic type unique and desirable. Bulb size can sometimes be improved by planting early. Clove skins are somewhat tight making peeling difficult. Bulbs typically can be stored for 6 to 8 months.

- Typical named selections include: Ajo Rojo, Burgundy, Creole Red



Types and Varieties

Silverskin – A true softneck type even under cold conditions most years. The lack of a flower stalk makes this garlic type the best for braiding. Occasionally flower stalks will form following a cold winter. Clove number per bulb ranges from 8 to 40 and one pound of bulbs will supply about 90 cloves. Silverskin garlic is most suited for warm climates and mild winters. For this reason, bulb size is small (usually less than 2 inches) under cold conditions, especially after a cold open winter. Bulb size can be larger than 2 inches following a mild winter. Because of their weak necks, the plants will lay down (lodge) about one week before harvest. Bulb size can sometimes be improved by planting early. Clove skins are somewhat tight making peeling difficult. Bulbs typically can be stored for up to one year.

- Typical named selections include: Silver White, Nookota Rose, Mild French, S&H Silver, Idaho Silver
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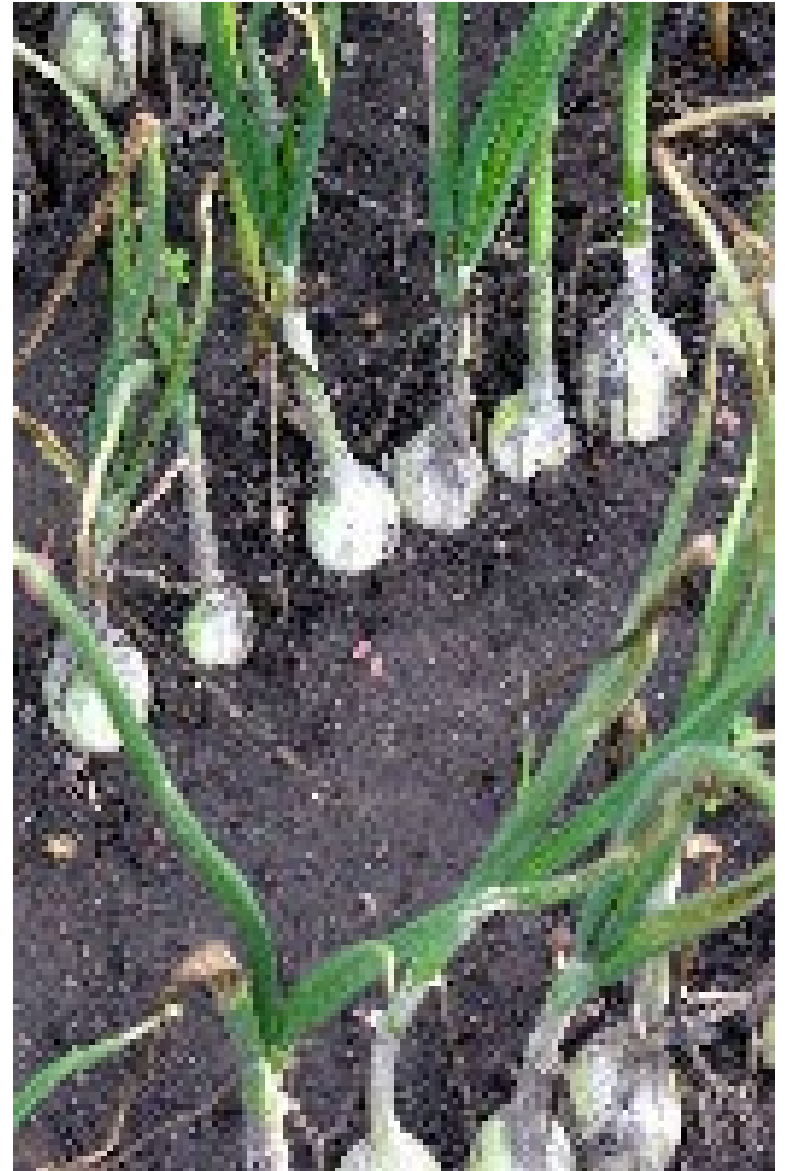
Types and Varieties

Note: Elephant garlic is not true garlic, but is actually a type of leek, *Allium ampeloprasum*. It can grow much larger than true garlic with each bulb of five to six cloves weighing as much as one pound. The taste of elephant garlic is much milder than true garlic.



Culture

- Grows best in full sun in a well drained soil with high organic matter
- Loam Soils are best
- Drought or excessively wet conditions will reduce yields



Culture

- To improve soil properties till in a green manure crop a few weeks before planting
- Well composted manure will add organic matter, nutrients, and improve soil tilth
- Optimum pH is 6-7 (like most food crops)
- Get a soil test!!!



Fertilizing

- Garlic has a moderate to high demand for nitrogen
- Apply 8 pounds of Urea in March for every 1000 square feet of bed if soil test indicates nothing else is needed or apply 28 pounds of 10-10-10 per 1000 square feet if no soil test was done
- Garlic is relatively non demanding with regards to fertilizer however a balanced soil will give you best results

Planting

- Fall planting will give best results
 - Spring planted garlic is lower yielding and an overall weaker crop
 - Seed garlic is generally purchased from dealers however even 15-20% of commercial growers save their own “seed” garlic
 - Homeowners can save garlic from year to year making this a “perennial” crop so to speak
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Planting

- For best results plant garlic in rows 30 inches apart with six inches between bulbs
 - This can be done in wide rows as well
 - More spacing equals larger bulbs
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Planting

- Plant cloves not bulbs!
- Each clove will yield a bulb with multiple cloves
- Plant them right side up!



Mulching

- Apply mulch in the fall after planting, it is best to wait until we have had a few good freezes...around Thanksgiving
 - Use seed free or clean straw (WARNING) or even bark mulches
 - Mulch keeps weeds down, insulates the soil, and conserves moisture
 - Weeds can reduce harvest!
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Irrigation

- Garlic generally doesn't need to be irrigated in Kentucky neither for homeowner or commercial production!
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Scapes

- The hardneck varieties generally produce scapes a decision needs to be made?
 - Scape formation can reduce bulb size but?
 - Let them form and cut them out early!
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Problems?

Garlic is a relatively easy crop to grow but a problem can arise from time to time

Onion Thrips: Control with insecticidal soaps, and labeled insecticides



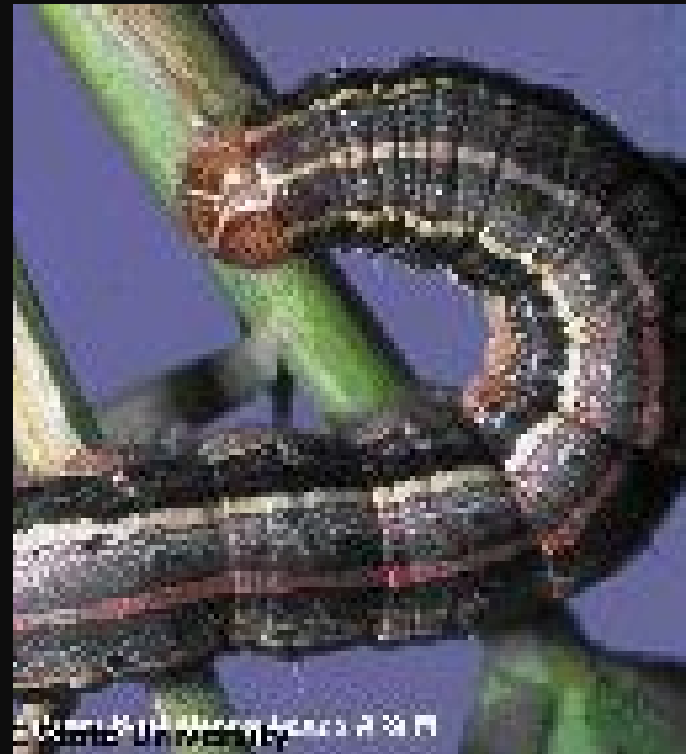
Problems?

- Onion Maggot-eggs are layer near the base of garlic plants, larva bore into the garlic bulb to feed causing it to rot
 - Pressure is highest in early spring, pull out any stunted or yellowing plants and destroy
 - Don't plant garlic following onions or other alliums
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Problems?

- Armyworm-generally armyworm will pick a plant or group of plants and destroy them before moving on to other plants
- Use labeled insecticides for armyworms on garlic if a problem arises also organic Bt's are available



Problems?

- Wireworms-the larva of yellow/brown beetles that are half to one inch long.
 - Damages roots and bulbs especially in garlic planted following sod
 - Allow one year after turning sod before planting garlic
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Problems

- White Rot-Occurs in cool weather generally early spring causing premature yellowing and dying of older leaves, stunting, tip burn, and eventually bulb rot.
 - Control by crop rotation and planting disease free stock
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Problems

- Fusarium Rot-present in all soils and generally considered a secondary invader when plants are weakened or damaged by mechanical means or insects. Most active in high temperatures. Bulbs decay slowly and it can continue in storage.
 - Control by crop rotation and removal of infected plants and bulbs
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Problems

- Pink Rot-Occurs primarily in warm weather. The fungus infects the roots turning them pink. Root dieback occurs and new roots form which also become infected. Above ground symptoms include tip burn.
 - Control by crop rotation
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Problems

- Botrytis-attacks leaves following periods of warm wet weather and bulbs in storage.
 - Symptoms include water soaked stems and spots on bulbs
 - Severe infections cause bulbs to rot in mild infections the diseased may not be noticed
 - Control by promoting air movement to promote drying
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This is onion but looks the same on garlic

Harvesting And Curing

- Timing! Harvest when the lower leaves start to turn yellow about half the leaves should be green
- Pull a few plants and cut open the bulb, if the bulb fills the skin then they are ready
- Waiting too long to harvest will cause the skin or jackets to come off the bulbs reducing storage longevity



Harvesting And Curing

- Harvest the bulbs by digging keep the roots attached
 - If the soil is dry or sandy don't wash them, if it is wet and sticking to the bulbs rinse them with the hose
 - Allow the plants to dry in a well ventilated area
 - Tie the plants in bundles of 10-15 or braid
 - Allow to cure in a cool dry place for 3-4 weeks until the plants turn completely brown
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Storage

- You can store garlic hardneck or softneck longer if kept at 60-70% relative humidity at 32 to 40 degrees
- At room temperatures hardneck garlic should last 3 to 4 months and softnecks should last 6 to 8 months
- Temperatures between 42 and 52 will cause sprouting and humidity above 70% will cause rooting

Questions?