



Harvest of Betsey Smith's hardneck garlic – 2008.

FROM GARDEN
TO TABLE:

GARLIC!

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Many cooks find garlic indispensable in the kitchen. Garlic is used to flavor salsa, stir-fry, spaghetti sauce, soups, stews, pickles, salads, salad dressing and breads. While garlic can be purchased in most grocery stores in different forms, growing garlic in your own garden is fun and easy.

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GROWING GARLIC

Garlic (*Allium sativum*) is a hardy perennial member of the onion family. It is thought to be native to Central Asia but has long been naturalized in Southern Europe. Garlic differs from the onion, producing a cluster called cloves rather than one large bulb. Each bulb contains a dozen or more cloves and is covered with a thin white skin. The larger outer cloves produce the best garlic. Garlic has flat leaves rather than the round, hollow leaves of the onion.

All garlic is produced clonally because the plants do not produce true seeds. Instead, garlic cloves are purchased for planting from local or online retail sources. Additionally, gardeners may save the largest cloves from their previous crop and plant them in the fall. The new crop then will be genetically identical to the previously harvested crop.

The cloves from the bulb are planted in an autumn garden plot one to two weeks after the first hard freeze to a depth of 4 inches in clean, well-drained soil that will get full sunshine during the growing season. The two basic types of garlic — the hardneck and the softneck — are grown throughout the northern Great Plains region.

HARDNECK GARLIC

Hardneck garlic (*Allium sativum* var. *ophioscorodon*), the hardiest type for North Dakota, differs from softneck garlic in that it produces a flower stalk (actually a scape) that holds miniature cloves called bulbils. The tender flowering scapes may be harvested just after they begin to curl. The scapes are a delicious addition to pestos and stir-fries. Removing the scapes at this early stage may raise garlic yield at harvest because energy is not expended on bulbil production.

On average, hardneck garlic produces four to 15 cloves per bulb. Although fewer in number, the individual cloves are larger than the softneck garlic cloves. Two varieties of Rocambole garlic have been grown popularly in North Dakota: **German Red** and **Spanish Roja**. Keep in mind that neither variety is suited for braiding due to the hard stem. Furthermore, hardneck varieties will not store as long as softneck varieties.



SOFTNECK GARLIC

Softneck garlic commonly is sold in the grocery store because this type of garlic has a longer shelf life, typically being stored for six to eight months at room temperature. Generally, softneck garlic produces 10 to 40 small cloves. Unlike hardneck garlic, it usually does not produce a flower (scape) stalk. As a result, softneck varieties may be more productive, compared with the hardnecks, because more energy goes into producing a bulb than splitting the energy between a bulb and flower stalk (bulbil) production. The absence of a hard flower stalk allows softnecks to be braided.

Unfortunately, softneck garlic is less hardy than hardneck garlic and is not recommended for northern North Dakota. Gardeners in southern North Dakota will want to protect their softneck garlic plantings with mulch as described in the following section. North Dakota State University is testing softneck varieties for winter hardiness.



CULTURAL PRACTICES FOR GROWING GOOD GARLIC

Garlic does best in a well-drained soil, with ample organic matter, and in an area that receives full sunshine through the growing season. It lends itself beautifully to square foot gardening (SFG), conventional gardening and raised-bed plantings.

Typically, the cloves are spaced 1 to 3 inches apart and in rows 18 to 24 inches apart at a depth of 4 inches. In SFG and container-gardening techniques, the spacing is usually about 5 inches by 5 inches because row spacing is not needed.

The latent heat in the soil will encourage root production on the freshly planted cloves, and the tops also will begin sprouting before the soil freezes. If the tops emerge before they can be covered with a blanket of snow, they should have a mulch layer applied to protect them from extremely low winter temperatures.

In raised beds, a common practice is to mulch the cloves after planting for winter protection. If your part of North Dakota typically has low snow cover, a 4-inch layer of clean straw would provide adequate winter protection. Remove the mulch in the spring, being careful not to damage the foliage. The cloves will begin growing with vigor as the soil warms.

Weeds are the major enemies of garlic. Garlic produces sparse foliage that does very little good at providing competition for emerging weed seedlings. Hand weeding is necessary early in the growing season to encourage maximum bulb formation.

Watering should be managed carefully. Garlic will grow best in moist but not wet soil. While garlic will produce a larger bulb with adequate moisture, too much water will encourage rot, but too little water will reduce yield.

If the home gardener has been successful at growing onions (same family), then applying the same techniques will produce satisfactory to excellent garlic.

As with onions, good fertility is a must: 3 pounds of 10-10-10 fertilizer/100 square feet worked into the soil prior to planting in the fall usually will be adequate. Organic gardeners can use compost or well-cured farm manure to achieve the needed fertility levels that can be determined by nutrient analysis.

Celebrate GARLIC!

Garlic's easily recognized aroma and taste is celebrated around the U.S. Gilroy, Calif., is the home of perhaps the best known garlic festival. Another in Saugerties, N.Y., is known as the Hudson Valley Garlic Festival, and one in Hutchison, Minn., is called the Minnesota Garlic Festival.

HARVESTING GARLIC

- Harvest garlic bulbs between mid- and late August, or when the foliage starts to flag (turn yellow).
- Gently dig the bulbs rather than pulling them because less damage to the bulb and stem will occur.
- Do not allow the tops to dry completely before digging because the unpredictable fall weather may be too wet, which may cause the delicate papery wrappers to rot.
- Place the bulbs — tops and all — on a screen in a well-ventilated location at room temperature for about two weeks.
- Remove the tops about an inch above the bulbs once the leaves have turned brown. The mature bulbs can be stored under cool, dry conditions and will last for months.

IS GARLIC HEART-HEALTHY?

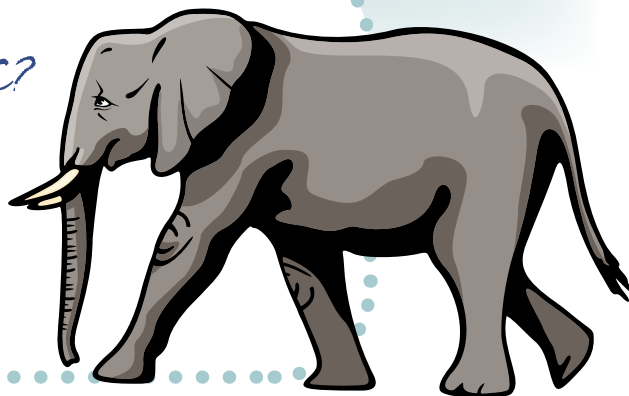
Research about garlic's influence on blood cholesterol levels and blood pressure has shown mixed results. According to a review published in the American Society for Nutrition (2006), 44 percent of clinical trials showed a decrease in total cholesterol among participants. The researchers noted that more in-depth clinical studies should be conducted.

According to research published in the Archives of Internal Medicine (2007), garlic does not have heart-health benefits. Participants in the study had elevated blood cholesterol levels. They consumed the equivalent of one clove of garlic per day, either in raw form or as dietary supplements, six days per week for six months. They had no differences in blood cholesterol levels (HDL or LDL) or triglycerides as a result of consuming garlic.

Garlic enhances the flavor of vegetables, whole grains, beans and other foods known for their heart health benefits. You might eat more of these health-promoting foods because of the added flavor from garlic.

IS ELEPHANT GARLIC REALLY GARLIC?

Elephant garlic is, as the name implies, huge. However, it is not garlic but a relative of the leek. While the aroma from bulbs of elephant garlic can reach across an auditorium, it really has a mild flavor that makes it conducive to being eaten raw and baked as an appetizer.





USING GARLIC IN YOUR KITCHEN

Although garlic is considered a vegetable, it is used as an herb to enhance the flavor and aroma of food. Featured in recipes ranging from simple to gourmet, garlic can be sautéed or used raw. How about some garlic bread, garlic chicken, garlic shrimp or garlic mashed potatoes?

PREsERVING

STORING

Store garlic in a cool, dry, dark location, preferably in a mesh bag. Discard garlic that has become discolored, soft or moldy. Garlic can be stored three to six months in the right conditions.

PREParing

Loosen the paperlike skin from garlic by laying the clove under the flat side of a large knife. Tap the knife once. Chop, mince or crush garlic using a sharp knife. The finer you chop the garlic, the more flavor you will release. To mince garlic, you also can use a garlic press, which is available in most kitchen stores or other retailers.

FreeZING

Garlic can be frozen in several ways:

- Peel and chop garlic as desired. Wrap tightly and freeze.
- Freeze unpeeled garlic, removing cloves as needed.
- In a food processor, puree peeled cloves in oil (two parts oil to one part cloves). Place the garlic in an air-tight, resealable container and freeze. The garlic will not freeze solid, so you can remove what you need for use in sautéing.

Note: When stored in plastic bags, the pungent aroma of garlic could flavor other foods, such as ice cream. Consider using a wide-mouthed glass container as your freezer container.

DRYING

Choose high-quality garlic with no bruises or discoloration. Peel cloves and finely chop or finely slice. You can use a food processor to chop the garlic if you prefer. Using a food dehydrator, line the trays with plastic wrap (or use a fine-meshed tray), spread the chopped or sliced garlic and dry at 140 F for about six to eight hours (until fully dry). Alternatively, you can dry garlic in a preheated oven at the lowest setting (170 F or lower). In an oven, the garlic will dry quickly, so be sure to monitor it. Store dried garlic in a glass jar in a cool, dark, dry place.

SAFETY WARNING FOR GARLIC-FLAVORED OIL

Do not store garlic in oil at room temperature. Garlic may contain *Clostridium botulinum* spores from the soil. In the right conditions, the spores can produce the deadly botulism toxin. Therefore, if you flavor oil with garlic, store the mixture in the refrigerator or freezer. Use the refrigerated mixture within a week.



RECIPES

Key to Abbreviations

- tsp. = teaspoon
- Tbsp. = tablespoon
- c. = cup
- oz. = ounce
- pkg. = package
- g = grams
- mg = milligrams
- lb. = pound

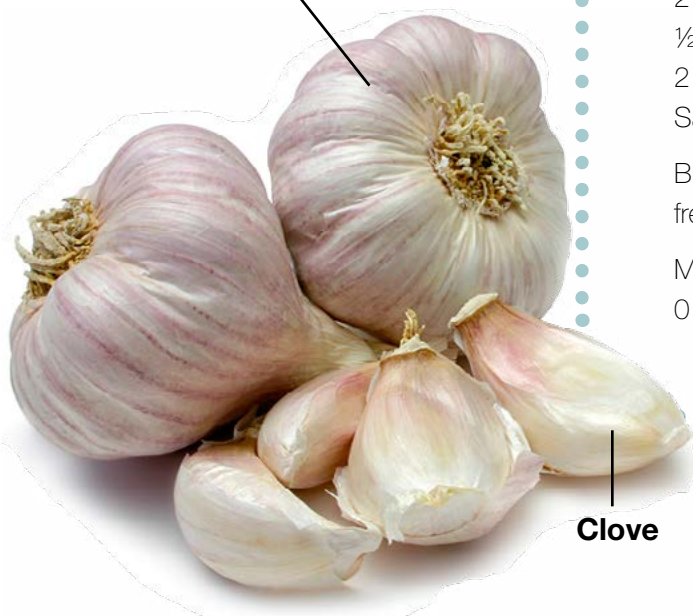
ROASTED GARLIC SPREAD

- 7 medium heads garlic
- 2 Tbsp. olive oil

Preheat oven to 400 degrees F (200 degrees C). Arrange heads of garlic in muffin cups sprayed with nonstick cooking spray. Sprinkle garlic with olive oil. Bake for 40 minutes to one hour. The garlic is done when it is soft and squeezable. Remove, let cool and serve on crackers or bread. Refrigerate leftovers.

Makes 10 servings. Each serving has 30 calories, 1 g carbohydrate, 3 g fat, 0 g fiber and 0 mg sodium.

Garlic head (or bulb)



Clove

GARLIC AND HERB BUTTER

- ½ c. softened butter
- 2 Tbsp. finely chopped parsley, basil or herb of choice
- ½ tsp. minced garlic
- 2 to 3 tsp. lemon juice
- Salt and pepper to taste

Blend all ingredients and form into a roll. Wrap tightly and freeze up to six months. Slice and use as desired.

Makes eight servings. Each serving has 100 calories, 0 g carbohydrate, 12 g fat, 0 g fiber and 0 mg sodium.

**1 fresh garlic clove =
1 tsp. garlic powder**

HOW DO YOU GET THE GARLIC SMELL OFF YOUR HANDS OR CUTTING BOARD?

Try rubbing a cut lemon or pouring some lemon juice on your hands to remove the garlic aroma. You also can try sprinkling table salt on your cutting board followed by rubbing with a lemon or adding lemon juice. Some sources suggest removing garlic aroma by wetting your hands and rubbing them on stainless steel (sink, spoon or knife blade with care).

GARLIC MASHED POTATOES

- 1 lb. potatoes
- ½ c. fat-free milk
- 2 large garlic cloves, chopped
- ½ tsp. white pepper
- 1 Tbsp. fresh chives, chopped (optional)

Peel potatoes, cut into quarters and place in cold, salted water for about 15 minutes. Drain in colander, rinse well and place in a 2-quart saucepan containing 2 cups of boiling water. Cover and cook for 20 to 25 minutes or until tender. Meanwhile, have milk warming over low to medium heat. Add garlic to hot milk and simmer until garlic is soft, about 20 to 25 minutes. Remove cooked potatoes from heat, drain in colander, replace in saucepan and cover to keep warm. Add milk-garlic mixture and white pepper to potatoes, mash with potato masher and whip with an electric mixer. If desired, garnish with chopped fresh chives.

Makes four servings. Each serving has 96 calories, 20 g carbohydrate, 0.2 g fat, 2 g fiber and 23 mg sodium.

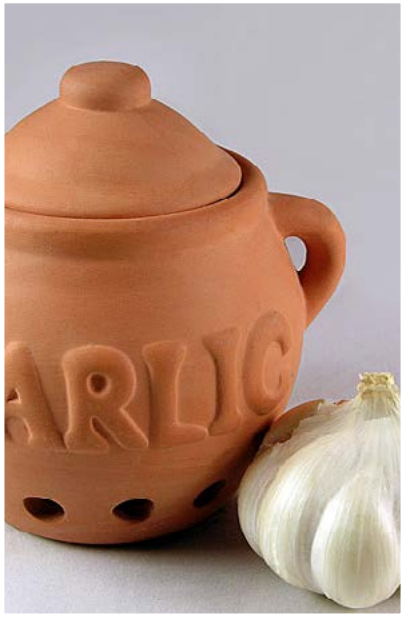
FRESH SALSÁ

- 1 to 2 garlic cloves, finely chopped
- ⅓ large onion, finely chopped
- ½ large green bell pepper, finely chopped
- ½ to 1 whole jalapeno pepper, finely chopped
- 3 to 4 large Roma (paste) tomatoes, chopped
- 1 small bunch of cilantro leaves, finely chopped
- Juice from ¼ lemon

Mix ingredients together and serve, altering the recipe to suit your own taste preferences. Store covered in the refrigerator. To keep calorie and fat content low, serve with baked tortilla chips.

Makes four servings. Each serving has 25 calories, 6 g carbohydrate, 0 g fat, 1 g fiber and 20 mg sodium.

(Note: This salsa recipe has not been tested for safety for canning/processing purposes)



MORE RECIPES FEATURING GARLIC

For more garlic recipes, visit www.garlicrecipes.org/.

For food preservation recipes, such as garlic dill pickles, visit the National Center for Home Food Preservation: www.uga.edu/nchfp/.

REFERENCES

Engeland, R. Growing Great Garlic, Filaree Productions, 1991.

Gardner, C.D., Lawson, L.D., Block, E. et al. Effect of raw garlic versus commercial garlic supplements on plasma lipid concentrations in adults with moderate hypercholesterolemia. Arch Int Med 2007; 167:346-353.

Harris, L. Safe Methods to Store, Preserve and Enjoy. University of California Extension Pub. No. 7231, 1997.

Lorenz, O.A., and Maynard, D.N. Knotts Handbook for Vegetable Growers, Third Edition, John Wiley and Sons, 1988.

Rahman, K., and Lowe, G.M. Garlic and cardiovascular disease: A critical review. Am Soc Nutr 2006; 136(3 Suppl):736S-740S.

Rosen, C., R. Becker., V. Fritz, B. Hutchison, J. Percich, C. Tong and J. Wright. Growing Garlic in Minnesota. www.extension.umn.edu/garden/fruit-vegetable/growing-garlic-in-minnesota/

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