



# BACKYARD FARMING

→ *Make your home a homestead* ←



## GROWING GARLIC

“EXPERT ADVICE MADE EASY”



Kim Pezza



**hatherleigh**

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Kim Pezza

 hatherleigh



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# INTRODUCTION

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**G**arlic is perhaps one of the most well-known, well-loved, and frequently used spices in the world. But for all its popularity as a spice, it is considered to be a root vegetable, related to the onion family, all of which are part of the lily family.

Also called the “stinking rose,” a name that dates back to the Greeks and Romans, though the reason is not clear, garlic can be found in the culinary roots of many cultures, including Italian, Asian, Greek, French, Spanish, South American, and of course North American cuisine. It has played a part in forming traditions, legends, and lore, from being used in the mummification process to its use as a vampire repellent, as an element to ward off evil, and as being eaten by Roman soldiers for courage before a battle. It was even considered good luck in some cultures if one should dream about garlic in the home.

Today, garlic remains a favorite, not only for its strong flavor and versatility as a foodstuff, but for its health benefits as well. Toasted, roasted, braised, and sliced, we use garlic in a seemingly endless stream of recipes, handed down through the generations, even as we continue to create new menu options from scratch. It is available for purchase fresh from the farm or prepared in the grocery store as peeled, diced in oil or water, and powdered. We have even taken to growing it in our own vegetable, herb, and flower gardens, as garlic takes its place as part of the recent resurgence of home-grown foods.

Garlic has therefore remained a staple in many households. Just like salt and pepper, there are those who take garlic for granted in their daily menu plans, and do not even consider leaving garlic out of their spice rack. Over the course of the chapters that follow, you'll have the chance to learn a little bit about this oh-so popular spice, including various growing techniques and new and exciting ways to use garlic in your daily life.

## MEET THE EXPERT

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**Kim Pezza** grew up among orchards and dairy and beef farms having lived most of her life in the Finger Lakes region of New York state. She has raised pigs, poultry and game birds, rabbits and goats, and is experienced in growing herbs and vegetables. In her spare time, Kim also teaches workshops in a variety of areas, from art and simple computers for seniors, to making herb butter, oils, and vinegars. She continues to learn new techniques and skills and is currently looking to turn her grandparents' 1800s farm into a small, working homestead.





## CHAPTER 1

# A BRIEF HISTORY OF GARLIC

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**E**verything has its story, and garlic is no different. The word **garlic** originates from the Old English word *garleac*, which means “spear leek.” By contrast, the botanical name of garlic, *Allium sativum*, is thought to have come from the Celtic word *all*, meaning “pungent.” Originally native to central Asia, garlic is perhaps most recognized as being a staple in various Mediterranean dishes. This special vegetable, considered both a root vegetable *and* a spice, has actually been in use for over 7,000 years in a variety of places and cultures. Used for both culinary and medicinal needs, garlic is also one of the earliest-documented plants to be used for both general health needs as well as a treatment for disease. In other words, besides being used to treat specific illnesses, it was generally agreed upon that eating garlic was good for you, whether you were ill or healthy. Discussions about its uses have even been found in ancient medical books.

But there is more to this odd little root vegetable and spice package than meets the eye. Let’s take a brief look at some of the history behind garlic, along with a bit of the folklore that goes with it.

## Garlic's Role in Ancient Times

In ancient times, garlic's potent odor led many to believe that it was powerful in some way. The question was in what way. In some places, garlic was thought to be an aphrodisiac. But in central Europe it was said to ward off werewolves and vampires; it was thought that, by either wearing it on your person or hanging it on your door, you would keep away evil. In India as well, hanging garlic (along with red chili and lemon) was, and still is, believed to ward off evil when hung at the door. Even as far as the Philippines garlic was thought to drive away nearby monsters. But, in complete contrast, the Mongol Empire used garlic as currency.

You can find instances of people using garlic as far back in time as the pyramids themselves—and indeed, the root vegetable is still grown in Egypt today. In fact, garlic was worshiped by the ancient Egyptians and included in many of their most sacred of ceremonies, with preserved garlic even being found in the tomb of the pharaoh Tutankhamen. Garlic was also believed to both increase and maintain the strength of the kingdom's laborers, so much so that it became a daily staple of the laborer and working class diet.

In ancient Greece, soldiers would eat garlic with the belief that the spice would provide them with the courage they would need in battle. And they aren't the only ones; soldiers in other ancient cultures participated in this practice as well. During the first Olympics, the athletes consumed garlic with the understanding that it would enhance their performance during the competitions. Garlic has also been found in Greek temples as well. As far as its health uses, Hippocrates and his fellows discussed the merits of garlic for treating respiratory and parasitic problems, and noted its use in aiding digestion difficulties. During the time of the Roman Empire, these experiments into the uses of garlic continued, as Nero's army used garlic for cardiovascular "cleansing," believing that garlic could clean the blood vessels. And yet, for all the uses it had (or was thought to have) by those in the ancient world, garlic was consumed primarily by the working class, notably in Greece, Egypt, and the

Biblical Middle East. At around 2000 BC, garlic began to be used in China, which saw value in its consumption with raw meat. Garlic was also used in Chinese medicine.

In both China and Japan, garlic was also used to **preserve food**, as well as used to treat and prevent intestinal worms. It later became a staple part of their diet. In ancient India, in medieval Britain (where it was used for everything from toothaches to the plague), during the Italian Renaissance, and as far back as the Hanging Gardens of the Babylonian Empire, garlic had its place in the food and folklore of the region. But despite many countries (and continents) having their own uses for the spice, there are surprising commonalities between them. As mentioned earlier, in terms of warding off evil and ill will, garlic's use as a potent charm was seen across continents and oceans alike.



Given the hundreds of varieties of garlic that exist in the world today, garlic festivals like this one provide a valuable opportunity to sample a wide range of garlic. Photo by Kimon Berlin under the Creative Commons Attribution License 2.0.

Even in the New World, garlic found itself in use, with the Native Americans using the spice to make a tea good for flu symptoms. And yet despite this history, garlic in America was seen as an ethnic food, having been brought over primarily by the Italians, Poles, and Germans. It wasn't until the 1940s that the rest of the country began to embrace the little "stinking rose."

Today, we can find garlic still being considered an important culinary and medicinal food. It can be seen in households and eating establishments throughout the world, as well as maintaining its place in superstition and folklore, as it was hundreds or even thousands of years ago. Medicinally, it is shown to be able to boost the immune system, nourish the heart, and help prevent some cancers, even while it continues to remain a popular ingredient in the cuisines of many cultures, with many garlic festivals now being held throughout the United States, where farmers, chefs, and consumers celebrate the bulb and its many uses.







## CHAPTER 2

# TYPES AND STRUCTURES

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**A***llium sativum* (the Latin term for what we all know as garlic) belongs to the onion genus, *Allium*. Garlic has two distinct subspecies. The first is *Ophiscorodon*, also known as Ophius, a hard-neck garlic, and which can be thought of as being the “original” garlic. *A. sativum*, by contrast, belongs to the soft-neck variety, and was developed from the hard-neck variety through a selective process over the course of hundreds of years.

Garlic contains over 200 chemical compounds, including volatile oils and sulfurous compounds like **allicin** (which gives garlic its characteristic odor), **alliin** (which contributes to garlic’s antioxidant properties), and **ajoene** (an antioxidant with anticoagulant properties and possible virucidal properties), as well as the enzymes allinase (which combines with the alliin to create allicin), peroxidase, and myrosinase. It also contains citral, geraniol, linalool, A-phellandrene, and B-phellandrene, as well as allyl, which is found in a number of members of the onion family. Garlic is also an excellent source of vitamin B6, C, and B1, selenium, and calcium, to name a few.

Garlic itself is a **bulbous (bulb) plant**. The bulb can further be broken up into sections or cloves. Not only are the bulbs edible, but

the blossom and green stems can be used as well. The garlic plant can grow up to four feet in height, and its flower heads (the primary means of reproduction for new plants) are actually **hermaphroditic**. This means that the blossoms are technically both male and female, unlike, for example, squash plants, which have both male blossoms and female blossoms, separately.

## Getting to Know Garlic

The garlic plant has four parts: the leaves, the scape, the neck, and the bulb, though the entire plant is edible. The **leaves** are the green shoots that appear in the spring, and that, as they grow, will alternate as they come from the stem. As harvest time nears, the leaves will turn brown. Both the hard and soft-neck subspecies (which includes most varieties of garlic) have leaves; it is these leaves that allow the soft-neck garlic to be braided.

The **scape** is basically a flower stalk, located at the end, where the flower head is found. The scape is curvy, and can have what looks like tiny garlic bulbs or bulbils forming at the base, and that can vary in size depending on the type of garlic. Found on hard-neck garlic, the scape is edible with a mild flavor, and can be an onion substitute.

The **neck** is the area directly above the bulb, and the part that is either “hard” or “soft,” giving the varieties their designation.

The **bulb** is that part of the garlic that grows underground, and is what we picture when we think of garlic. This root, which is attached to the stem, forms the cluster that constitutes the garlic cloves. The familiar paper-like covering acts as protection for the bulb while it is growing. The most used (and useful) part of the garlic, it is the bulb that contains all the protein and minerals.

Although garlic is now usually grown and harvested on farms and home gardens, there are a number of species that grow wild as well. Although these are usually considered weeds, some of the names they go by may be familiar, such as wild onion and meadow garlic. Others, such as crow garlic, may be less recognizable.



Wild garlic, flowering. Photo by Michael Clarke under the Creative Commons Attribution License 2.0.

## Types of Garlic

Garlic comes in different sizes, colors, shapes, flavors, and clove types. Along with the two subspecies of garlic, there are about **ten major variety groups**, as well as over 600 cultivars (all of which are believed to have originated with the original major ten). Let's take a look at the difference between the hard and soft-neck garlics, as well as the key points of the major ten and some of the various types within them. Keep in mind that, although there are a vast number of varieties of garlic, it is all used in the same way, with the only difference being how mild or spicy a bulb you are wanting to use.

## Hard-Neck Garlic

The **hard-neck garlic**, just as it sounds, is notable due to the neck area of the garlic being stiff and thick, giving it a hard feeling. The hard necks are more like their wild counterparts, and do not store quite as well as the soft-neck varieties, typically topping out at a shelf life of 3 to 10 months, depending on specific type. However, it is easier to remove the paper skins of the hard-neck varieties than soft.

The hard necks have eight of the ten major variety groups. These include Porcelain, Purple Stripe, Marbled Purple Stripe, Glazed Purple Stripe, Rocambole, Creole, Asiatic, and Turban.

The **Purple Stripe** “family,” which includes the Marbled and Glazed varieties as well, is distinguished by having purple stripes (which will vary with each variety), and will usually appear quite vivid, appearing on thick, paper skins. They have a good flavor, ranging from mild to strong, and store well, although the number of cloves in the bulb will vary with each type.

The **Porcelain** is quite white in color, and has a thick paper skin and large cloves. They have a strong taste and store well (up to 10 months).

The **Rocambole** also has some faint purple striping. It has a very good flavor, and is great for those who are looking for a hotter garlic flavor. However, Rocambole does not store well, and should be used quickly.

The last of the major hard-neck varieties (the **Creole**, **Asiatic**, and **Turban** varieties), while considered hard necks, are actually known as Weakly Bolting. This is because the neck is not nearly as hard as the other, “true” hard necks, and are rather more “hardish.” The Creole is a very good garlic to eat raw, and grows well in the South. The Asiatic is the first to sprout in the season, and is therefore the earliest to harvest. Storage is average, at approximately 5 months. The Turban is similar to the Asiatic, except it has much more bulb color.

## Soft-Neck Garlic

The **soft necks** are the type that you'll see most often in the grocery store, and include the last two major garlic varieties: the Artichoke and the Silverskin. They have a mild flavor and are the type that the classic garlic braid can be made from.

The **Artichoke** is one of the most prevalent types found in stores and is usually the California Early or California Late type. The Artichoke tends to be large, stores well, and has a range of flavors, just as the Purple Stripes do. Due to the ease of growing it and its large size, it is a favorite of commercial garlic farmers.

The **Silverskin** can be a strong, hot garlic. It is smaller than the Artichoke type, but has more cloves. It has the longest storage life of any garlic variety, and is the type that is most commonly braided.

## Varieties of Garlic

Now, let's take a look at a list of a few names of the varieties you might see in relation to these ten major varieties: *Soft Necks*:

- Polish White
- Creole Red
- Chelote
- Sicilian Gold
- Western Rose
- Kettle River Giant

### *Hard Necks:*

- Siberian
- Choparsky
- German Red
- Melody
- Spicy Korean Red

### *Weakly Bolting Hard Necks:*

- Keeper
- Burgundy

Sweet Haven  
Rose de Lautrec

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### **Elephant Garlic**

There is another well-known variety of garlic sold in stores that doesn't fit into either the hard or soft-neck categories. The ever-popular **Elephant Garlic** (*Allium gigantum*) is technically a leek. And, although it is not really a garlic, it is often used as such.

Approximately twice the size of "regular" garlic, Elephant Garlic is a mild but tasty bulb, and stores better (and longer) than the common variety. It is hardy, which gives it more of a resistance to some of the diseases, insects, and other pests that plague garlic. In addition, and to great benefit for the gardener, Elephant Garlic can reseed itself.

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These are only a few of the literally hundreds of varieties of garlic that exist in the world. It would present a considerable (albeit rewarding) challenge to try them all. As many are available only through specialty food shops, seed catalogs, farmers' markets, or similar niche produce outlets, the best way to learn about these varieties is to try as many as you can get your hands on, and decide which types and flavors work best for your culinary palate.







## CHAPTER 3

# GROWING AND COMPANION PLANTING

**G**arlic is fun to tend and, after learning the basics, is not that difficult to grow. If you're considering gardening, but aren't ready to commit to a larger-scale vegetable garden, garlic could be the perfect starting point for you. Garlic serves as a good starter for someone contemplating a vegetable garden, but who only wants to plant one or two things. Garlic is a relatively low-maintenance plant, as there is not much to do after planting. However, as a result, garlic tends not to give a new gardener the true, "regular" gardening experience. This is due primarily to garlic having an easier planting and harvesting schedule, which doesn't coincide with most other planting (depending on where you live). For this reason, garlic serves best as an add-on, perhaps with tomatoes and basil, as opposed to being planted solo. But, when it comes time to expand into a larger garden setup, don't leave garlic behind! Like so many other plants, garlic can also act as a companion plant in the garden, aiding and enhancing the growth of certain nearby plants. As companion planting needs to be taken into

consideration as the garden is being planned—and *before* its planted—let's take a look at companion planting first.

## Why Use Companion Planting?

The big question you might be asking is: what exactly are the benefits of companion planting? **Companion planting** can protect some plants from pests and disease, or help other plants grow while also encouraging beneficial insects, all through the use of other plants. It is a chemical-free way to maintain the garden while still gaining much of the benefit of modern pesticides and fertilizers. Garlic not only makes a good companion plant, but can itself benefit from having some plants to assist it, as well.

What makes garlic such a good “companion?” Simply put, garlic accumulates sulfur, a natural fungicide, which provides protection from disease. And, even as the planting of garlic will help deter pests and even disease, it will encourage beneficial insects as well. Let's now take a look at what are some good companions to garlic:

- Tomatoes
- Potatoes
- Sweet peppers
- Eggplant
- Spinach
- Broccoli
- Cauliflower
- Kale
- Carrots
- Most fruit trees and strawberries

When used with vegetables, garlic can repel aphids, cabbage worms, cabbage loopers, cabbage maggots, and slugs. Garlic repels the red spider mite on tomatoes, and is said to confuse carrot flies when planted with carrots, as well as helping to protect from root

maggots. It is also of note that rabbits will stay away from gardens where garlic is planted.

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## Garlic in Herb and Flower Gardens

Garlic can also be a good companion for herbs. For example:

- Yarrow
- Dill
- Rue
- Chamomile

Garlic helps to repel spider mites, which can affect dill. However, this is also a case in which the garlic is itself helped by the companions. Rue will help repel maggots that can affect the garlic, while the yarrow can help with the garlic's health in general, and chamomile can improve the garlic's flavor.

When working in tandem with flowers, especially some that already act as "good companions" to the garden, there can be opportunity for a "**double punch.**" For example, when garlic is planted with marigolds or nasturtiums, pests will be repelled both above *and* below ground. And, when garlic is planted with roses, you can help prevent your roses from being eaten by aphids, Japanese beetles, and snails.

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## Tips for Companion Planting with Garlic

But despite the many "companions" that garlic works well with, there are also some plants that it doesn't behave quite as well with, and should not be planted anywhere near. For example, when planted near beans or peas, garlic can affect both growth and taste.

As a result, these two items should never be planted next to the garlic.

When laying out garlic for use in companion planting, it is best to do so by **scattering the garlic** throughout, rather than keeping it in its own patch. The benefits of companion planting depend on the companion plants being in close proximity to each other. If it is not planted near other plants, then it can neither sow nor reap the benefits of companion planting. Rather, the garlic should be scattered throughout the garden, up to and including planting between other plants. In addition to letting garlic do its job, it also helps by reducing garlic's risk of onion-maggot infestations.

## Alternate Methods of Companion Planting

Although companion planting isn't foolproof, it can make a real difference in the garden, especially if you are going for a completely **pesticide-free garden**. We have already discussed garlic itself, as a plant, and what it repels. There are actually other ways to implement garlic as a "companion" to other plants. **Garlic oil**, for example, will deter such pests as onion flies, aphids, and ermine moths, while garlic tea (or spray) can help against potato blight, as well as tomato blight.

## Planting Garlic

Now that the companions are set, and you've had a chance to plan out your garden's layout, let's take a look at planting and growing the garlic itself.

When deciding on which garlic varieties to plant, it is worthwhile to keep in mind a few of the differences between hard and soft-neck garlic (besides the hard and soft necks, obviously). The hard-neck varieties will usually have **more color and be larger**, but tend to have **fewer cloves** making up the bulb. Consider *where* you will be doing your planting; when planting in southern climates, some

varieties don't do well, while other varieties do well, depending on *where* you are in the south.

Soft necks, on the other hand, will have **more cloves**, and tend to **do much better in warmer southern climates**. For the best results, try using a variety of garlic types in the garden. Make note of what does and doesn't work for you and your garden, and weed out the varieties that aren't well suited to your area. If you don't feel like experimenting, you can always research the specific types that are known to do well in your area, and prioritize their planting.

Garlic should be planted in the fall, in loose, well-drained soil of 6.0 to 7.0 pH. pH, remember, is not a measurement of soil's fertility, but is rather a measurement of the soil's acidity or alkalinity. If the measurement is off, in one direction or another, it can be adjusted to fit the particular plant's needs. Home test kits and pH meters can be purchased from gardening and home supply shops, while soil samples can be sent to labs for testing. In looking for sufficiently loose soil, remember that garlic prefers a sandy loam, but will still do pretty well in most any soil. The primary need is good drainage, a requirement which cannot be stressed enough; if drainage is poor, the garlic will be too wet and will rot as a result.

To prepare a plot for planting, turn or till the soil, removing rocks and other obstructions while making the soil as loose as possible. Remember that **the looser the soil, the larger the bulbs will be able to grow**. Then, add compost with an animal manure/plant matter composition.



Garlic awaiting germination. Photo by Crispin Semmens under the Creative Commons Attribution License 2.0.



A field of garlic, growing. Garlic performs well in looser, well aerated soil, as seen here. Photo by Tim Sackton under the Creative Commons Attribution License 2.0.

As garlic is planted in the fall, the **timing** of planting is key, particularly in colder areas. Make sure to plant after the first,

heavier frost, but at least 6 weeks (if possible) before the first hard or “killing” frost. This will allow the garlic time to establish strong roots before the ground begins its winter ritual for heaving through the freezes and thaws, which will enable the garlic to “hang on” through the movements. Be that as it may, garlic doesn’t really like all the heaving that comes from the freeze and thaw cycles, nor does it do particularly well in extreme heat. Therefore, garlic planted in warmer climates will benefit from mulching, which will be covered later in this chapter.

## Planting with Cloves

When planting garlic, typically one starts with **garlic cloves** rather than **garlic seeds** (although seed can be used). And, although the garlic is basically cloning itself when planted from cloves, this method allows for faster growth than with seed. When selecting the garlic bulbs that will provide the cloves for planting, look for a nice shape to the bulb, and cloves that are fat. Although selecting bulbs with both qualities is ideal, if you can choose only one, select for clove size over bulb shape, as this will usually give you an idea of the size of the resulting bulb. That is, if the cloves are small, you will end up with small bulbs. But don’t throw those small cloves away; use them for cooking instead!



Garlic, just beginning to sprout. Ideally, garlic should be planted before it begins to sprout.

Photo by Antanas Kaziliunas under the Creative Commons Attribution License 2.0.

To remove the cloves from the bulb, remove the paper or wrapping on the bulb (but not on the cloves), and break apart or “crack” (as it is called) the bulb down into cloves. The breaks should be clean, and the cloves should be intact. If cloves are broken during “cracking,” keep for culinary uses; they are no longer suitable for planting. Do not allow the cloves to dry out either; if you are not planning to plant that same day, the cloves should be planted within a few days (at most) of cracking the bulb. If you notice that some of the garlic has begun to sprout *before* you crack it, it is still fine for planting.

But if the bulbs feel light and dried out, throw them away. As a side note, if you are using cloves from garlic that you had originally purchased to cook with, make sure that you liked the flavor—the resulting new bulbs will taste like the garlic that you planted.



When peeling garlic, avoid moving too quickly. While broken cloves still have their uses, you'll want to make certain your early harvests have as much variety as possible. Photo by Liz West under the Creative Commons Attribution License 2.0.

When planting a clove, plant with the root (flat) end down, in single or double rows. If planting in beds, or if you're planning on utilizing companion plants, make sure to scatter the garlic throughout (being careful as to who the "neighbors" are). Ideally, the rows themselves should be 18 inches apart, with the cloves planted 4 to 6 inches apart. If need be, you may plant a bit tighter, but the end result will be smaller bulbs. Cloves should be planted 2 to 4 inches down, with the deeper number being used for northern climates with colder topsoil temperatures. In areas that get killing frosts, some choose to plant even deeper, but not much beyond 7½ inches.

## Mulching

Once the cloves are planted, it is a good idea to spread mulch over the planting site; note that this is pretty much a necessity in colder climates. The best mulch to use is **straw**; however, leaves will also work. Wood-chip mulch should not be used, and while hay can be used in a pinch, you will have a *lot* of weeding to do when the hayseeds shake off and begin to grow with the garlic.

When mulching, simply lay the straw or leaves over the entire garlic plot, up to 8 inches deep. Remember: **the colder the climate, the deeper the mulch**. This mulch layer will remain over the newly planted garlic for the entire winter. One drawback to mulch, however, is that it can encourage rodents to nest; this is especially the case with straw, which provides a warm bedding. But again, especially in cold climates, the benefits of mulch outweigh the risks; although you as the gardener have the final decision, mulching is a highly recommended step, best not to be ignored. If the garlic is scattered, do the best that you can; just cover the spots where you planted.

Finally, and this goes for all gardening, don't forget to label your patch, bed, or wherever the garlic was planted. If you planted different varieties, list the variety on the marker as well.

The garlic should remain under the mulch for the entire winter, with no watering. In the spring, after the threat of frost is over, remove the mulch. At this time, you can also give the garlic some composted manure or fertilizer, and then water well. After this initial watering, water again only when dry, as over-watering will cause bulbs with poor storage capabilities, poor wrappers, and broken skins, and may encourage mold to grow. Caution is a must when watering the garlic patch.

Once the mulch is off and the garlic is beginning to grow, **weeding** is essential. Garlic does not like to compete with weeds, and tiny garlic shoots can easily be choked out by the weeds. Therefore, to ensure a healthy garlic take, make certain to keep the weeds in check. Then, 2 to 3 weeks before harvest time, let the soil dry out. This will help prevent mold.

If you have planted hard-neck varieties, it is recommended that you remove the scape (with the notable exception of the Turban

varieties; they seem to do better with their scapes left on). The removal will prevent the flower from going to seed, which in turn reduces the size of the finished bulbs. Don't throw the scapes away, though; they may be cooked and eaten!

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## Growing Garlic Indoors

Although garlic may be grown outdoors in containers quite easily, indoor growing can be quite a different story. Although it is not a total impossibility, planting a clove and having it develop into a full bulb is quite difficult to accomplish indoors. You will need to replicate the stages that the garlic would go through naturally as it grows outdoors, including its cold, dormant period. It can be fun to try, and you might even be successful, but you have a better chance of failure than you would success.

However, when planting garlic indoors, success will yield some very nice **greens**, and it is for these greens that gardeners choose to raise garlic in indoor containers during the winter. The greens are easy to harvest (snip them just as you would chives) and may be used like chives, only with a wonderful garlic flavor that will be appreciated during the winter months, after the last of the homegrown garlic is gone.

Garlic greens are easy to grow; simply plant garlic cloves in your chosen pot, with the number of cloves selected depending on the size of your pot. Keep in mind that you are growing strictly for greens, and not bulbs, so the cloves may be planted closer together than you normally would in a garden. Use a lightweight soil in the pots, as this will allow for drainage that will prevent the cloves from rotting, and make it easier to handle the pot itself. Set in a sunny area and water as needed.

It's relatively low maintenance, and makes a great winter project for the kids.

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## Planting Garlic from Seed

The easiest (and most popular way) to plant garlic is through the planting of cloves, as we have just discussed. However, garlic may also be planted from seed or top sets.

Starting garlic from seed can be a longer process, and is not always a good way for beginners to start; however, it is far from impossible. Usually, the most difficult point in seed planting is the first generation of seed, as in just starting out. Planting from seed will get easier with each generation that follows.

Growing garlic from cloves or bulbils is actually an example of **“asexual” reproduction**, as it technically creates a clone of the parent plant. While growing using this method is easier and faster, this method may eventually pass along disease and cause problems with genetic diversity if done for too long (planting clones from clones from clones can cause a general degradation of the crop).

Using seeds when planting garlic allows for greater variation in your possible harvest, as growing from seeds allows garlic to go through “sexual” reproduction. Although planting seeds is typically more work, especially if you are planning on harvesting the seeds yourself, it will produce a healthier plant and greatly reduce the risk of diseases that can be passed on through “asexual” reproduction.

## Growing Seed Garlic

When growing garlic to *produce* seed, select a hard-neck variety instead of a soft-neck. Soft necks cannot produce flowers, and therefore cannot produce seeds. The garlic seed itself is a little larger than an onion seed, which is itself quite small.

Unless you are purchasing garlic seed, there are two necessary steps to consider when growing garlic plants from seed: producing

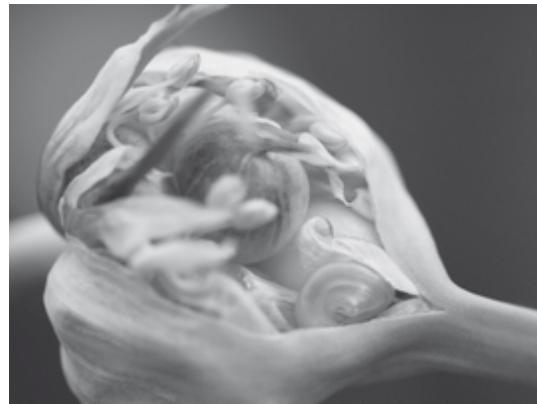
the seed (which is the step eliminated by purchasing seed from elsewhere) and growing the seed into the plant itself, which you will later harvest (and gain more seed from).

As the garlic plant matures, the scape emerges and the umbel develops. The **umbel** is a group of tightly packed flowers and bulbils, which are found in the spathe or the leafy covering. To expose the flowers and bulbils, you can either gently slit open the **spathe**, or else allow it to dry naturally. At this point, the scape may be cut from the garlic and kept in water (like a flower) or else left on the garlic. You should, of course, use whichever way works the best for you, but there are a few things to consider when leaving the scape on the garlic. As the scape is heat sensitive, too much heat can wilt the flowers and reduce the viable pollen count. And, being cold sensitive, temperatures that are too cold can prevent the seed from setting. Both of these issues can be dealt with through the use of shade cloths or portable hoops over the garlic. However, there is also weather damage and pests to consider, and those with smaller garlic crops may want to seriously consider storing them in water, inside. Either way, the survival of the scape is essential to successful seed harvesting.



When garlic begins to flower, as shown, remove the scape. By removing the scape, you ensure that all available energy and nutrients go toward growing cloves. Photo by Rebecca

Siegel under the Creative Commons Attribution License 2.0.



If you are planning to grow garlic from seed, splitting open the spathe and removing the growing bulbils is an important step, as it will result in larger, healthier flowers. Photo by Becks under the Creative Commons Attribution License 2.0.

Should you choose to remove the scapes (as many will do) and keep them in water, it is a good idea to add some liquid fertilizer as well. You may also find that the base of the stalk turns dry, or becomes slimy and turns brown. As it is essential that the healthy stem be in contact with the water, simply trim the undesired end off and return the rest to the water.

Once it is developed, the bulbils will need to be removed, as it will begin to compete with the flowers (which are necessary to produce seed). This will be further discussed in the following section of this chapter. The garlic flowers themselves are **protandrous**, meaning that the flowers cannot fertilize themselves. The job of pollination needs to be done by insect pollinators, such as bees (or any other available pollinator).

The **ovaries** of the garlic flower are located at the base of each little flower. Each ovary has three chambers and each chamber has two ovules, resulting in each flower being able to produce as many as six viable seeds. As the seeds develop, the ovaries will swell (usually 40 to 60 days after pollination).

The seeds will be ready to harvest when the umbels and ovaries are completely dry. The easiest way to harvest garlic seeds is to remove the dried flower heads from their stems, place them in a bag, and gently shake it to release the seeds. If the collected seeds

are thoroughly dry, they may be stored in an envelope or seed envelope.

Note that garlic seeds should *not* be planted immediately, as they need a period of dormant time between harvest and planting. Spending a bit of time in the refrigerator will mimic the natural cold exposure necessary. To help protect the seeds from contamination, soak them for 20 minutes in a mixture of 1 teaspoon of bleach to 2 cups of water. Rinse well, place on a moist paper towel, and then place in a plastic bag. Refrigerate for approximately 4 weeks.



When growing garlic from seed, it is important to remove the bulbils, as they will compete with the flowers for nutrients. Photo by Oli Bac under the Creative Commons Attribution License 2.0.

## Planting the Seeds

When the seeds are ready to be planted, it may be best to start indoors first, either in a greenhouse or in the house itself (best in-house results are usually seen with a grow light). Start in deep seed trays, making sure that there is plenty of room for the roots to form. Germination can take up to a few weeks.

When it comes time for the seedlings to go out and be planted in the garden, they need to be hardened off first before transplanting. This process gets them used to being out in the cooler air. **Hardening** seedlings off can be done in one of two ways: putting the seedlings in a cold frame (a small box like a greenhouse) or else the seedlings may be brought outdoors during the day and back indoors at night until they have acclimatized and it becomes safe for them to be planted (usually a week or so, depending on weather and temperatures). The seedlings should be ready for harvesting in late summer or early fall. This constitutes the first **generation** of this crop.

The first generation's growth may be good, or it may be a bit disappointing. Yields may be low, and some of your garlic may actually look like green onions. This is normal, but this doesn't mean it was a failure; things will improve with each generation.

The next step is to take this first-generation garlic, let it hang for at least a month to cure, and longer if harvest was in the summer; you are aiming for a fall planting now, just as you would when planting cloves. Many may, this time around, produce garlic bulbs large enough to use. If not, dig the bulbs up in the spring and replant again in the fall. Any seed taken from this crop of garlic will produce the second generation of garlic. And the cycle begins again.

## Planting Bulbils

The **bulbils** is the third option available when growing garlic. It, like the clove, produces a clone of the parent. There are pros and cons to starting off with this part of the garlic. Some of the advantages include the fact that there are more bulbils than cloves, so you have a larger starting crop, and can eventually have a larger

harvest. Using bulbils can also help to avoid soil-born diseases in the resulting garlic, as they do not touch the soil until planted. The main disadvantage is that, like seeds, it can take a few years to get full-size bulbs from bulbils. You will need to harvest and replant until the full bulb is obtained. The final decision is up to the gardener, however, as all three methods are viable solutions for garlic production.

Bulbils can be found located with the flowers, and look a bit like little cloves. As stated earlier, if you are trying to produce seeds, the bulbils needs to be removed as soon as it is ready, as they compete with the flowers for nutrients, and can cause the flowers to die before they have a chance to produce seeds. Again, you may cut the scapes off or leave them on the garlic. If you cut them off, follow the same procedure of keeping in water. Removing the bulbils allows the flowers to fully develop, thereby allowing the flowers to produce seeds.



The third option for growing garlic, bulbils allow for a larger starting crop, which makes future harvests easier when using the other methods. Photo by Jen under the Creative Commons Attribution License 2.0.

Removal of bulbils is done with tweezers, and can be time consuming, but it is not a difficult task. Bulbils can be tiny, tightly packed, and hard to detach from the flower area. Other varieties of garlic have larger bulbils, which are fewer in number and loosely packed. Regardless, they can be carefully plucked out (using tweezers as the removal tool of choice). However, note that all of the bulbils may not be ready to dislodge at the same time. If this happens, just let the flower head sit for a few days and try again. Check back daily for a few weeks, as all bulbils may not form at the same time. Remove as necessary. If you are not going to save the seeds, there is an easier way, especially if the scape has been cut off: simply hang it up to dry long enough so removing the bulbils will be easier.

Keep in mind that bulbils have a naturally high moisture content. If they are not dried properly, then no matter how they were harvested, they can still mold. Once dry, the bulbils should be stored at room temperature, *not* in the refrigerator. Bulbils should be planted in the fall, when you would normally plant garlic cloves (although some do plant as early as possible in the spring). Prep soil like any other planting.

Planting space for small bulbils is as follows:

*½ to 1 inches apart*  
*1 ¼ to 1 ½ inches deep*  
*4 to 6 inches between rows*

Planting space for large bulbils is as follows:

*3 inches apart*  
*1 ½ to 2 inches deep*  
*6 to 12 inches between rows*

If slight adjustments need to be made for your space, go ahead and experiment. For areas with hard frosts, plant bulbils deeper so freezing doesn't kill them.

The first year's harvest can be done right along with any other garlic that you are harvesting. This first year's growth is called a "round," and looks like a green onion. Cure and replant in the fall.

By the second year, the bulb should be developing. However, it will most likely be smaller than a bulb from a clove. Harvest and replant in the fall.

By the third year, the garlic bulb should be the correct size and well adapted.

With multiple choices available to gardeners to produce garlic in the garden, whichever method you choose will produce good, homegrown garlic.

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## Tips for a Happy Harvest

As we will be discussing the harvest in [Chapter 4](#), let's take the time to look at some tips to keep in mind when planting garlic:

- Remember that garlic is pollinated by bees. The more bees you can attract, the better; not just for the garlic, but for the entire garden.



Proximity to pollinating insects can be valuable when planting garlic, particularly if you decide to let garlic go to seed, as opposed to removing the scape.

- Do not replant your garlic in the same spot(s) year after year, or where any member of the onion family has been planted in the last 3 years; this will help reduce the risk of disease. Take the time to practice crop rotation.
- As part of your rotation schedule, use **green manure** or a **cover crop** during the winter in the area that the garlic was planted. Cover crops will improve the structure and fertility of the soil, as well as help prevent weeds and aid in pest and disease control. There are a variety of plants that can be used as green manure, so you should be able to find one that will work best for your area or climate. It is important to remember, however, that the cover crop will need to be killed at flowering time. This can easily be achieved through cutting the plant off at its base or by mowing it over. Once the plants are cut, let them lie in place and allow them to dry, before turning them into the soil. In about 2 to 3 weeks (more or less, again depending on area) you will be able to plant. Cover crops may be utilized throughout the garden, not just for garlic.
- Gophers like garlic, so make sure to take appropriate measures to protect your garlic if you've had problems with the little critters. Check with local regulations to see what you are able to do, and always try to use non-lethal methods first.

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## CHAPTER 4

# HARVESTING AND CURING THE BULB

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Most types of garlic will be ready for harvest by late July or early August, approximately 90 days after sprouting (although weather and garlic type will have an effect on the harvest time). Different types of garlic will naturally mature at different rates. As a general rule, the Asiatic and Turban types will be the earliest ready to harvest, while the Silverskins will normally be the latest. There can be up to 8 weeks between the first and last harvest for your crop, especially when planting different varieties of garlic.

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### Removing Scapes

When the scapes appear, many gardeners will remove them so the garlic bulbs grow bigger. Removing the scape can increase bulb size up to 30 percent, as the energy and nutrients once used to produce flowers are now directed to the bulbs. The harvested scapes may be used immediately, or may be refrigerated for up to 3 months in a plastic bag. Remember: if

you are planning to produce seeds, you *will* want the flowers, so you would leave the scape on for longer. For our purposes now, we are removing scapes that can be used for culinary purposes, as well as increasing bulb size. It is interesting to note that the scapes contain lots of garlic oil and have the same health benefits as the bulb itself.

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Garlic harvesting has changed very little over the years, as we continue to use the tried and true methods for gathering in garlic. Photo by Brian Boucheron under the Creative Commons Attribution License 2.0.

## When to Harvest

When it comes to harvesting, it can come down to a judgment call. As the bulb is underground, and is not growing above ground, like a tomato or squash would be, the gardener cannot always be certain

of when harvesting should begin. For the most part, however, the leaves seem to hold the key to harvest time.

Each leaf that you see on a garlic plant is a wrapper on the garlic bulb. If all of the leaves turn brown, the garlic will be over-ripe, meaning the bulbs may not be as tightly packed as they should be. This in turn will result in shorter storage. Over-ripe bulbs may also begin to form new little shoots on the cloves. Should this happen, the garlic is still edible, but will not store well and needs to be used as quickly as possible.

On the flip side, if the garlic is harvested too early, the bulbs will not have reached their full size, and again, storage time will be shorter. That said, some gardeners will purposely harvest garlic early and use these smaller bulbs like scallions. These are also known as “**green garlic**,” and are usually available in late spring or early summer. When the plants are about 12 inches in height, some of the greenery may be cut for culinary use.



Popular as both light flavoring and especially for use as garnish, green garlic provides a use for early harvests, when circumstances require. Photo by Will Sackton under the Creative Commons Attribution License 2.0.

The garlic plant leaves will begin to dry out from the bottom up. The rule of thumb for harvesting garlic (which is by no means foolproof) is that, when about half of the leaves on the bottom begin to dry, harvest time is very near. Some growers will suggest that you begin paying close attention when a third of the leaves on the bottom have dried, or when 30 percent of all the leaves have dried.

The drying of the leaves indicates that the nutrients and moisture being supplied to the leaves have reduced. This is when the judgment calls begin coming into play.

It is at this time that watering should cease for about a week, to allow the soil time to dry out for an easier harvest (this can also help to prevent rot.) After the soil has dried, loosen the dirt around a couple of bulbs, but do not remove them. You should be able to feel them and get an idea of their size while they are still in the ground by using just a couple of fingers. You may even be able to expose the top of the bulb a bit, and judge the size from there. If the bulb looks large enough, it is ready to harvest, and most of the others should be as well, if they are of the same variety. If the bulbs still look a bit too small, just cover over and wait another few days. If you have plenty of garlic planted, and don't mind "sacrificing" a bulb, you can harvest a "test bulb" to see if it is ready. Look at the size of the bulbs, and cut them open to see what the cloves look like. If the bulb is done, harvest the remainder; if not, leave it in longer. The "test bulb" needs not to be thrown away, as it can still be eaten.

## Bringing In the Harvest

When you are ready to harvest, you may be very tempted to pull the garlic up by the stems, but refrain from doing so. Instead, **dig it out**; you will need to loosen the soil around the bulbs using a shovel or fork. Don't get too close to the bulbs, as it would be quite easy to either stab some of them or else tear them apart. Once the soil around the bulbs is loose, pull upward from the base of the stem at the neck. It should be noted that garlic is very delicate at this stage, and can easily bruise. Any garlic that is bruised, stabbed, or cut during harvest will have a shortened storage life and may not store at all.

Once the garlic is out of the ground, do not wash the bulbs or remove the wrappers. Brush off the soil. Some, who grow their garlic in heavier soil that resists being brushed off, have had some

success in lightly rinsing in cool water immediately after the harvest, which will remove the soil without affecting the curing.



Washing garlic can be particularly useful during harvests from wet, clingy soil, but exercise care in doing so, as not to affect the curing process. Photo by Dwight Sipler under the Creative Commons Attribution License 2.0.

The next step is to get the harvested garlic out of the sun immediately, as the bulbs can burn and/or blanch in the sun fairly easily. After they've been placed outside of direct sunlight, it is time to prepare them for curing.

## Curing Garlic

The process of **curing** garlic is simply letting it dry. Preparing garlic for cure is also quite simple: tie the garlic, with the stems attached, in bunches of 4 to 12 (this number will depend on the size of bulbs:

the larger the bulb, the less in the bunch). For better drying, it may be advisable to sort and bunch the bulbs by size. Then, find a dry place with good air circulation and no moisture or direct sun, and hang the bunches of garlic bulbs out to dry.



Hanging garlic is the preferred method for drying garlic, but any method used is going to rely on a reliably dry space with good air circulation. Photo by Zoe Morrison under the

Creative Commons Attribution License 2.0.



Once the stems have lost their moisture and the garlic has taken on its traditional dry, papery texture, the harvest is complete, and ready to cure. Photo by Will Meredith under the Creative Commons Attribution License 2.0.

Acceptable places to hang would be a barn, a porch that gets no direct sun or sunlight, or even a cool, dark room in the house. If you

run into some hot and humid days during the curing period, it may be necessary to hook up a fan to keep the air circulating and the moisture down. Some may choose to lay their garlic out flat, placing a couple of large dowels, brooms, or mop handles between two chairs, and then laying the garlic across the dowels. As long as there is good air circulation around the garlic, this will work. However, it can also take up lots of space, especially if drying a lot of garlic. This is a good “last resort” method if you have no other way to dry the garlic.

The curing process takes 3 to 8 weeks, depending on weather and bulb size. The garlic can be used at any point during the curing process, and can even be used directly after harvesting. However, the flavor of the bulb will continue to increase and improve as the bulbs dry. The garlic has finished curing when the stems have lost all moisture and are completely dry.

Once the bulbs are cured, cut the stalks off at about 2 inches above the bulb. Then, cut the roots on the bottom of the bulb to about a  $\frac{1}{4}$  inch (this does not need to be a perfect measurement). If the outer wrappings are quite dirty, the outer paper may be carefully removed to further clean the clove. However, do not expose the cloves as you do so.

With both the harvest and curing completed, the garlic bulbs are now ready to store, use, and sell. If you are planning to grow more garlic from cloves for the following year, remember to save your largest bulbs for fall planting, keeping in mind that **one clove planted equals one bulb harvested.**





## CHAPTER 5

# STORAGE AND PRESERVATION

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The garlic is harvested, cured, and now ready to store or preserve. Although there are specific ways to go about preserving garlic, including its flavor, there is no *exact* way to store it. And when you do store it, there are variables that come into play that determine whether garlic storage is successful. If the garlic wasn't properly cured before storage, it can mold. If it is stored in humidity that is too low, the garlic can dehydrate. Likewise, if the humidity is too high, the bulb can mold or a fungus can appear. If it is too cold, the garlic will begin to sprout when brought up to room temperature; if too warm, the garlic can dehydrate. All of these scenarios can result in the loss of your garlic.

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### Ideal Storage Conditions for Garlic

The ideal storage conditions for garlic are temperatures of 55 to 60°F, with 60 percent humidity and good air circulation. However, as most of us don't have the luxury of this ideal garlic storage setup, the best alternative is to store the garlic in a cool,

dry place away from direct sun, such as in a cupboard or closet, at room temperature. A setup such as this, which is less than ideal but still perfectly practicable, can work well in the home. Just as important, if not more so, is ensuring proper air circulation, as has been stressed in the previous chapter in regard to curing. The only difference is, in terms of storage, proper air circulation will help in extending the garlic's shelf life.

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## Options for Storage

There are a variety of techniques that can be utilized in storing garlic. Some may like the look of the hanging bunch of garlic, and keep it that way until it is ready to use, preserve, or sell. Some like to braid their garlic to both cure and store. **Garlic braids** are attractive to look at, and provide a sort of usable, edible house decor. The braiding can be done during the curing process, but only while the stems are still pliable. If the stems are too crisp, they may break during the braiding process. Once the braiding is done, allow the garlic to complete its curing process. Even after curing, the braid needs to be stored away from direct sun, in conditions not too hot and not too cold. When you want to use a bulb, simply cut it off from the braid. There are a number of ways to braid your garlic, and plenty of directions and walkthroughs may be found via online sources.



Braiding garlic is an unnecessary, but attractive and enjoyable part of the curing process, and provides a distinctive look to any home harvest. Photo by David Goehring under the Creative Commons Attribution License 2.0.

If you don't want to store the garlic as a braid or as a hanging bunch, prepare (cure) it as discussed in [Chapter 4](#). Then, you can store in some of the following ways:

**Baskets:** Works well for storing garlic, as it allows good air circulation. People who use a lot of garlic in their cooking will often have a basket of garlic sitting on the counter, out of the sun and in a cool spot. Wicker baskets, or else baskets made from other natural materials, will work the best, and are the most attractive when left out on your counter or open shelf.

**Brown Paper Bags:** Perhaps one of the easiest ways to store garlic, simply put the prepared bulbs into paper lunch bags, and then roll down the top and store as we have discussed. Do not pack the garlic

tightly into the bags, as you still want to allow the air to circulate inside the bag.

**Mesh Bags:** If you are raising garlic, save the mesh bags that your onions and citrus come packaged in (from grocery stores or food markets). Fill them with garlic and hang as discussed earlier. These bags make great storage vessels for your garlic, and is also a great way to recycle and repurpose.

**Stockings:** Stockings or panty hose (new or old; just wash them first) are examples of other good (and old) ways to store garlic. You may even remember your grandparents storing their fresh garlic this way. If using old-fashioned stockings, cut each in half, tie a knot in the toe, and then tie a knot in one end of the cut piece, and drop a cured bulb in the stocking. Tie a knot above it, and then drop in a second clove, knot above it, and so on, until the stockings are full. As you need to use a bulb, start from the bottom and cut the first bulb off, right below the knot above it. Do *not* cut the knot, as the next bulb will also fall out. If you are using panty hose, just cut the legs off, and then follow the same process. This is a great way to store garlic, as it provides excellent air circulation, and keep the bulbs clean. And once again, recycle and repurpose.

**Garlic Keepers:** These are little containers with holes around it for circulation, and are available glazed or plain, ceramic or terra cotta. While they do look nice, from personal experience with many types and styles of these keepers, they seem to work no better than the above methods, which have the advantage of using things that you already have at home. However, should you wish to give one a try, they are easy to find online, in culinary shops, and from similar providers (and can usually be found quite easily at thrift stores).

## Storage Methods to Avoid

Now that we have discussed some ways to store cured garlic, let's look at a couple of ways *not* to store it:

**Plastic Bags:** Storing garlic in plastic bags can cause the bulbs to rot. Remember: if any moisture forms in the bag, that moisture will also get onto your garlic.

**Refrigeration:** All throughout our discussion, we have been mentioning how detrimental refrigeration is to garlic. Storing cured garlic is no exception. As stated many times, refrigerated garlic will sprout when brought up to room temperature, as the bulb will think it has gone from dormancy to growing time. This will cause the garlic to naturally start sprouting, and while the sprouted garlic is still usable, the sprouts are quite bitter when eaten. This can be taken care of (if the shoots are small) by slicing the clove in half and removing the entire sprout. If the sprouts are too large, use of the sprouted cloves will depend on your taste buds; many will usually discard those cloves with large sprouts. Refrigeration can also make your garlic bitter, or else cause them to mold.

**Canning:** This is a definite no-no! Garlic will lose all of its flavor during the heating process when canned.

## Preserving Garlic

But what about preserving garlic, and not just storing it? There are a number of ways to preserve garlic. Some methods are short term, but many will keep your garlic for quite some time. Let's take a look at some of the most popular methods to preserve the cured garlic.

### Raw Garlic in Oil

We are beginning with this method, as it is a very popular preservation method to try; that being said, it can also be the most dangerous. You *may* store garlic in oil, but only if you do so *carefully*. It must also be refrigerated, *without* exception. Raw garlic in oil, when stored at room temperature, can cause **botulism**. As garlic grows underground, it develops the *clostridium* bacterium that causes botulism. When the garlic is exposed to the open air,

these spores can't grow, which is why cured garlic does not carry any sort of botulism warning. However, when the raw garlic is put into oil for storage, the oil does not allow for that needed oxygen exposure, thereby creating a perfect atmosphere for the spores to grow. This doesn't mean that raw garlic in oil will *always* make you sick, but the risks can run quite high when kept at room temperature, or when kept too long in the fridge.

As a result, if you are putting raw garlic in oil, it should be used immediately; any leftovers need to be refrigerated immediately after opening, where it will last between 1 to 3 weeks (with 1 week being the safest rule of thumb). Keep in mind that, if your raw garlic in oil has gone bad, you will not necessarily know it. Raw garlic in oil won't always smell rancid or even look like it has anything wrong with it. In fact, it may still look and smell fine even when it has gone bad. So while this is a method that can be used (with caution), there are better, safer techniques available that require less effort and last longer. If using this method, refrigerate and consume quickly. Raw garlic in oil can also be put in the freezer, which makes the process safer and will allow it to last longer.

## Preserving Cloves

But what if you want to preserve whole cloves? There are a few ways that you can do so, without having to worry about botulism:

**Red or White Wine:** Peeled cloves may be stored in red or white wine. Refrigerate and use the cloves as needed. This method should keep the garlic for up to 4 months; however, if mold or yeast should begin to form, discard the garlic and liquid.

**Vinegar:** Storing peeled cloves in vinegar, usually white (but there is no reason other types of vinegars cannot be tried) can give you two benefits of preservation. You have the garlic, which you can use in dishes of your choice (remember: it will be a bit vinegary) as well as the vinegar itself, which will have preserved the flavor of the garlic within the liquid. Excellent in salads or anywhere else you might want a little garlic flavor, garlic in vinegar can safely remain

at room temperature, because the acid of the vinegar will not allow the bacteria spores to grow.

**Garlic Butter:** Finely or coarsely minced garlic can be mixed with butter, and then rolled into a log shape and frozen. Slice as needed. This makes a great finishing butter. You can also mix in a bit of salt and pepper or herbs of your choice for different variations.

**Roasted Garlic:** Roasted garlic is a delicious treat and a valuable culinary ingredient. Directions on how to make roasted garlic are included in the “Recipes” section of this book. The garlic comes out soft and creamy, but it does have a short storage life, and storing it in oil can have the same dangers as storing the raw garlic in oil. However, there are ways to keep roasted garlic at least for a few days:

- Wrap the entire bulb in foil and use the bulb as needed. Will keep in the refrigerator for a few days.
- Squeeze the cloves out of the wrappings (which is very easy to do) and into a jar. Cover in olive oil and refrigerate. However, this should be used immediately; as stated above, this carries the same risk as raw garlic in oil.
- Smash the cloves (removing the wrapping first) and add a pinch of salt to form them into a paste. Mix into softened butter and roll into logs (as with garlic butter) and freeze. Use as needed. For flavor variations, add the herbs of your choice, to taste.



Freezing garlic is a quick, convenient way to store garlic for long periods of time, but somewhat reduces the flavor's potency.

**Puree:** Puree garlic cloves in a blender or food processor. Add oil at two parts oil to one part garlic and mix. Freeze in ice-cube trays, and once frozen, remove from the trays and put into freezer bags. Return these bags to the freezer immediately, using pureed cubes as needed. It is important not to let the pureed cubes thaw in the bag, as this will cause them to stick together. A quick hint for this preservation method: instead of randomly filling the ice-cube trays, measure first, making sure that they all measure out to be the same. Once frozen and bagged, you can mark the bag with the measurement so you know exactly how much puree each cube contains and can just grab what you need.

## Drying Garlic

Drying or **dehydrating** your garlic will preserve the garlic for the longest time possible. Some say it will preserve the garlic indefinitely, so long as no moisture gets into it. Although whole cloves may be dried, garlic is usually sliced first, and then dried, so it is easier to use in recipes. This also ensures that the garlic is dried completely through. The sliced garlic can be dried in the oven, on a "low and slow" setting. Put the sliced garlic on a cookie sheet (with a silicone pad or tin foil so it doesn't stick to the cookie sheet). Place in the oven at the lowest temperature. Drying can take a few hours to a day, depending on how much you are doing, how low the temperature is, and how many pans are in the oven at once. In most cases, you should figure on setting aside at least part of a day for drying. Keep a close watch as the garlic gets closer to being finished so it doesn't burn. Make sure both sides are dry. Turn if necessary so both sides dry thoroughly.

## Dehydrating Garlic

You can also put the garlic slices into a dehydrator. Any can be used, but you will tend to see best results using one with a fan and temperature control. You can process more garlic at once and, if it is a hot day, you won't need to keep the oven going. When completely dried, store the garlic in an airtight glass jar. A silica gel pack will help keep moisture out of the jar, but this isn't necessary. When you're ready to cook with the dried slices, as long as there are liquids in the recipe, the slices will reconstitute when added in. If there happen to be no liquids in the recipe, rehydrate the slices in some water or stock, and then drain before using.

It should be noted that this is an excellent way to preserve garlic that has been damaged, i.e., sliced or speared during harvesting. Do not use bruised cloves.

**Garlic Powder:** Using your dried slices, grind in spice or coffee grinder into powder form.

**Dried Garlic in Oil:** Contrary to raw garlic in oil, this is quite safe and can be stored at room temperature. As the garlic is dried, the bacteria spores are no longer able to grow.

**Pickling:** Yes, garlic can be pickled. There are a number of variations in this method, a few of which can be found in the "Recipes" section of this book. Pickled garlic may be used as a culinary ingredient, condiment, or snack.

**Freezing:** Although this is not the best method to use, particularly without the peeled cloves being in oil first, and then frozen (which, as we have said, is safe), this can be used as a last resort, especially if you have an overabundance of garlic. Freezing the peeled cloves by themselves can change the texture and flavor, and the cloves will

be mushy when thawed. However, if adding to a stew or a recipe where a firm clove or slice is not needed, this method could work in a pinch.



Pickled garlic with feta cheese, one example of using pickled garlic to create savory treats for later use.





## CHAPTER 6

# DISEASES AND PESTS

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**A**lthough garlic is quite resistant to pests, it still has its share of problems to watch for in regard to both pests and disease. For some of these problems, the gardener will have some ability to control or else address the situation. But in other cases, it may be the gardeners themselves who are at least partially responsible for spreading the disease or pest. In this chapter, we take a look at some of the problems that can plague a garlic patch. Keep in mind that many of the things that affect garlic will also affect onions and the rest of the root vegetable family.

### Pests

#### Bulb Mites

**Bulb mites** are a creamy white, bulbous pest about  $1/25$  of an inch long. They can usually be found clustered under the roots of the garlic. The damage resulting from the bulb mite's interference is stunted growth of the plant and bulbs either rotting or withering in

the ground (or even, possibly, during storage). The damage the bulb mite causes can also allow other pathogens to invade the plant.

The bulb mite can survive from season to season, so the best defense against this pest is the use of crop rotation, meaning planting something other than garlic, onions, or leeks in the infested area for the next few years. Let the bulb mite die out or move on before you plant garlic or similar crops in that field.

## Pea Leafminer

The **pea leafminer** appears first as eggs that have been laid within the garlic's leaves. Once the eggs have hatched, the white larvae tunnel inside of the leaves. When the larvae turn into adults, which are small, black and yellow flies, they will ignore the leaves entirely, causing no further damage. The life cycle of the pea leafminer completes approximately every 30 to 60 days, producing five to six generations per year.

Although the damage the pea leafminer causes to garlic can be mostly cosmetic, it can cause serious damage to the plants that are *surrounding* the garlic. Unfortunately, the pea leafminer has proven to be difficult to control, although some gardeners have had success with certain insecticides.

## Leek Moth

Originating in Europe, the **leek moth** prefers the *Allium* genus of plants, which includes garlic. The adult moth is brown and nocturnal, making it difficult to find. It will lay its eggs on the selected host plant, and once the yellow larvae make their appearance, the feeding begins. The first generation will begin eating at the leaves. Then, as subsequent generations appear during the summer, they will begin to eat the inside of the plant, making their way down to the bulb. This will cause the bulb to either rot while still in the ground or during the curing process.

The best way to combat the leek moth is to destroy all damaged foliage early on. Then, at the end of the season, remove all debris

from the garden, which will help limit the number of adults that will be able to over-winter in the garden. The following season, try to plant your alliums, including your garlic, a little later in the season. This can help you to avoid the first generation of leek moths altogether. Finally, if you do happen to see any moths themselves, squash them!

## Black Aphids

Called **black aphids** for their distinct coloration, these small, black bugs will suck the sap out of the leaves and the stem of your garlic. An organic, oil-based spray will clog their spiracle (the small openings that allow the critters to breathe), and suffocate them.

## Millipedes

**Millipedes** are the caterpillar or worm-like creatures that have all those legs! For some people, they are the things their nightmares are made of, and they can certainly be on the creepier side of creepy-crawlies. Millipedes will eat potatoes, bulbs, and tubers. The millipede lives in areas that have moist mulch or compost. Therefore, to help reduce the threat, clean out all of the old mulch around a plant and swap it with new mulch. Something else that seems to work with them is the following mixture:

6 tablespoons eucalyptus oil

6 tablespoons Dawn® dishwashing liquid (original scent)

1 quart water

Mix and spray on the ground at night.

## Onion Maggot

The adult **onion maggot** is a gray fly that lays long, white eggs around the base of the plant. The larvae are tiny and white, and will bore into the plant. The mature larva is about  $\frac{2}{5}$  inches long, with feeding hooks attached. The onion maggot only has a 2 to 4-week

lifespan, but one maggot can lay several hundred eggs during that short life. Winters do not kill them, either, as the pupae will overwinter in the soil.

The damage that the onion maggot causes includes stunted and/or wilted seedlings, breakage of the plant at the soil line when you try to pull it, and deformed bulbs, which may be more susceptible to storage rot. To try to get the onion maggot under control, good sanitation is key. In addition, make sure to remove all bulbs from the soil at the end of the season so there is no food available.

## **Wheat Curl Mite**

Common to the central plains area of the United States, the **wheat curl mite** is a microscopic mite that transmits wheat streak mosaic. Noticeable damage from this infection usually only appears when the infestation is severe. Leaves are streaked or twisted and growth is stunted. The worst damage may be found on stored bulbs, as the cloves may dry and crumble. If affected bulbs are planted the following season, the plant can then be affected by yellow streak virus and the leaves will be damaged. The risk of wheat curl mite may be lessened by a hot water treatment for the cloves, which is where they are quickly dipped in hot water, below boiling (which can kill the clove).

## **Eriophyd Mite**

The **eriphyd mite** is a very common garlic pest. The mite is very, very tiny and may not even be noticed until the damage has begun and the leaves are twisted with yellow or light-green streaks. At this point, the leaves are virtually destroyed. Early on, the leaves may not sprout, and if they do, the leaves may not separate. In addition, if bulbs are stored for too long, they may come under attack as well, with withered cloves and soft bulbs being the primary aftereffects. Predatory mites will help keep these under control, which just goes to show the benefits of “good” pests.

## Thrips

The **thrip** is quite common in warm weather. At only  $1/25$  of an inch in length, they can hide in the angles of the leaves. The adults are pale yellow to light brown, while the nymphs are lighter in color, as well as smaller. The thrip feeds on the surface of the leaves, which in turn will cause them to lighten to a white or silver color. Again, there are some predatory mites that will help in the control of the thrip.

## Nematodes

The **nematode** is a little, worm-like creature, which lives inside the host. They don't need water, so they can survive for years in the soil and will continue to survive until there are no more hosts available to them. There are various types of nematodes, with specific symptoms presenting themselves once infestation has begun. However, there are a few common symptoms, including stunted plants, yellowing, swelled stems, and deformed bulbs.

One type of nematode is the stem/bulb nematode. Almost invisible to the eye, it is a very tiny worm that invades the garlic's tissue, causing the base area of mature plants to swell, and can cause sponginess with long splits. The tissues, leaves, and stems will rot, with the leaves and stems also twisting. The plant will also have stunted growth.

As nematodes are soil borne, they are usually introduced through the movement of the soil, which is typically the result of humans. To help manage this problem, a hot water bath may help kill bulb infestation. However, once an area of the garden is infested, rotational planting for a few years with something other than garlic or onion is the only thing that will help in getting rid of these pests.

## Disease

Please note that treatments are not included in these disease descriptions. If you suspect a problem, take a sample to a professional to look at, verify the presence of any illness, and have them suggest proper treatment.

## **Garlic Rust**

**Garlic rust** is a fungal disease that not only affects garlic, but the other alliums as well. The fungus appears as orange and black specks on the leaves. It flourishes when the weather is cool, with low sunlight and high humidity being its ideal environment. As a result, when these conditions occur, do not water until late in the day. The spores are transported by the wind, and as a result, an infection in one part of the garden where your garlic or onions are could affect the other parts of the garden where onions, garlic, and leeks are planted. Unless the infection is severe, the garlic will still be edible. However, severe cases can drastically affect bulb development, with the possibility of killing the crop, especially if it occurs early in the season.

Although no resistance to garlic rust is known, there are a few things that can help keep it at bay. Plant your garlic, onions, or leeks in well-drained soil, in the sunniest spot you can find, with plenty of space between the rows for good air circulation. Clip affected leaves as soon as the first signs of rust appear and throw the leaves in the garbage. This should not affect either the stalk or the garlic. Do not compost. If you have been around garlic rust, wash your hands and clothes, and disinfect your shoes. Finally, once again, use crop rotation and do not plant anything from the *Allium* genus in that area for at least 3 years.

## **Downy Mildew**

**Downy mildew** is a furry, whitish growth with yellow discoloration in the leaves. The pathogens can survive for many years as oospores. Downy mildew needs moist conditions to spread, and one stage of the spore can even swim, allowing it to spread and infect through

the use of free water, as well as wind and rain, which in turn make it airborne as well.

Downy mildew will kill young plants and stunt the growth of older ones. If diseased bulbs are stored, the necks will turn black and shrivel, the outer scales will become wet, and sprouting may occur.

## **Garlic Mosaic Virus**

Transmitted by aphids, symptoms of **garlic mosaic virus** include chlorotic mottling and stripes on the first leaves to appear, with mature leaves having light-yellow, broken stripes. The mature leaves will also have what looks like a mosaic pattern to them, from which the virus gets its name. Symptoms are usually mild on young leaves, but growth will be stunted and bulbs will be small with few cloves. Because the virus's effects are so mild, however, there may be no symptoms at all showing.

## ***Cercospora* Leaf Blight**

***Cercospora* leaf blight** appears as ash-colored, irregular spots on the leaves, eventually resulting in foliage blight.

## ***Stemphylium* Blight**

***Stemphylium* blight** appears as small, yellow/orange specks or streaks on the leaves, which in turn develop into spindle-shaped or elongated spots, which can stretch to the tips of the leaf, after which it turns from gray to brown or dark olive.

## ***Botrytis* Rot**

***Botrytis* rot** is a fungus that attacks plants after there has been warm, wet weather. Also called neckrot, symptoms include wet stems and a gray, fuzzy fungus. It can also develop on stored bulbs. Steps for prevention include drying the garlic as quickly as possible

after harvest and providing good air circulation. Store in a cool place. When planting, use healthy bulbs and allow plenty of room between rows.

### ***Penicillium Decay***

***Penicillium decay*** is a form of degrading that affects the cloves that are being used for seed, causing the resulting plants to be stunted, wilted, and yellow. It appears as a blue/green mass.

### **Purple Blotch**

**Purple blotch** consists of small, white, water-soaked lesions that are sunken into the leaves. The centers enlarge quickly, turning to brown, then to red or purple surrounded by a yellow margin. The lesions may eventually cause tissue death between the lesions and the tips of the leaves, many times resulting in the death of the foliage. Purple blotch favors wet foliage with high humidity, particularly at night.

### **Rot**

Two of the most frequently found rots in garlic are **basal rot** and **white rot**:

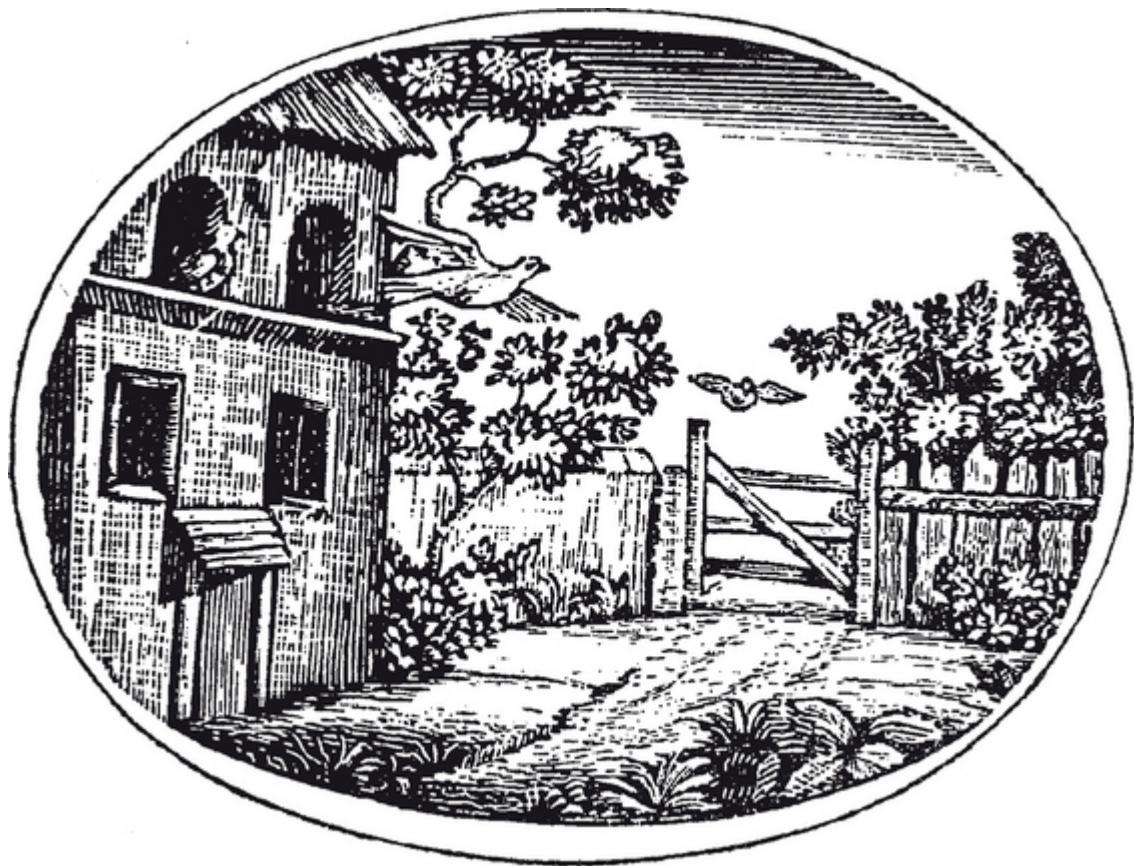
**Basal Rot:** The signs of basal rot appear slowly, usually beginning with the leaves yellowing and eventually dying. There can also be a white fungus at the base of the bulb, which will then lead to rot either before or after the harvest, affecting some or all of the cloves. Basal rot prefers high temperatures and will attack already diseased or pest-damaged plants. Not all infected bulbs will show symptoms, so make certain to check each plant carefully.

Basal rot is spread through infected cloves, contaminated soil movement, or contaminated tools or equipment use. Tips for management include removal of infected plants immediately after detection and avoiding planting infected cloves. Do not move infected soil and disinfect tools and equipment that have come in

contact with the rot. This includes shoes! A quick hot water treatment for cloves may reduce the risk of basal rot by about half as well, helping to keep your stored garlic safer.

**White Rot:** White rot looks like basal rot, and affects the roots and the base of the leaves. But once plants are infected, the disease and rot work much more quickly. Early symptoms include white, fluffy fungus on the stem and around the base of the bulb. White rot is one of the most damaging diseases for allium crops, and worse, can lie dormant in the soil for 20 to 30 years. The rot likes to attack in cooler weather, preferring temperatures below 75°F, and so is most commonly seen in the spring in northern areas.

Like basal rot, white rot is usually spread by movement of contaminated garlic, tools, soil, and even onions. Along with disinfecting contaminated tools and not moving contaminated soil, other management tips include not planting infected cloves, practicing crop rotation, and avoiding the replanting of allium crops in infected soil for up 3 years. Using a hot water treatment on cloves before planting will help to further reduce the risk of rot. Cleaning up well after harvest will also help in preventing the spread of white rot.





## CHAPTER 7

# CULINARY USES

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**G**arlic has been used as an ingredient and as a foodstuff for just as long as it has been used medicinally, and is an important culinary staple in many cultures' cuisine. Garlic is used in almost every type of cuisine in the world, primarily as a **flavoring ingredient**. It can be used in dishes that are sautéed, baked, roasted, and stir-fried, as well as in soups, sauces, and spreads.



Garlic provides a light, yet flavorful option for appetizers and side dishes, while helping to settle the stomach for the main course. Photo by Tim Sackton under the Creative Commons Attribution License 2.0.

It has even been made into ice cream! Garlic can find a place for itself in most any type of cooking. Prepared varieties, such as roasted garlic or pickled garlic, are only slightly less versatile, and tend to find themselves used primarily as spreads on their own or as a condiment.



Black garlic, just one of the many hundreds of garlic varieties available, brings a distinctive sweetness to the traditional garlic flavor, making it one of the more versatile garlic options.

## More Than Just the Bulb

Although the bulb is the most common part of the garlic plant used in cooking, the leaves, flowers, and bulbils are also quite edible (as has been discussed in earlier chapters) and are used in cooking as well. The garlic leaves are used in Asian cooking, and scapes can be made into pesto, sliced into salads, used as a replacement for asparagus, or even grilled, while the immature stalk of the hard-neck garlic and elephant garlic can be used in stir-fries. Garlic can also be used during the green-garlic stage, at which it is used like a scallion and as a round where the bulb is formed (but has no cloves). And, although the paper wrapping that covers the mature bulb is discarded before the garlic is used, when immature garlic is used, some cultures will use the entire head, including the wrappings, which, during that stage of growth, are tender enough to use.



Garlic, like its cousin the scallion, sees plenty of use in wok and stir-fry dishes. Photo by Rusty Clarke under the Creative Commons Attribution License 2.0.

Often paired with ginger, tomato, or onion for flavoring, the **flavor intensity** of garlic can vary with the variety, and its scent in cooking will depend on how the garlic is being prepared. Remember that, as the garlic bulbs age, the cloves can begin to sprout, at which point they are considered to be past their prime.

They still can be used; however, the sprouts themselves can be bitter, and so to remedy this, the sprout is sliced in half and removed before cooking.



Experiment on your own to find new and exciting ingredient combinations with garlic. Culinary curiosity can pay off in a big way! Photo by Charles Smith under the Creative Commons Attribution License 2.0.

## Peeling the Garlic

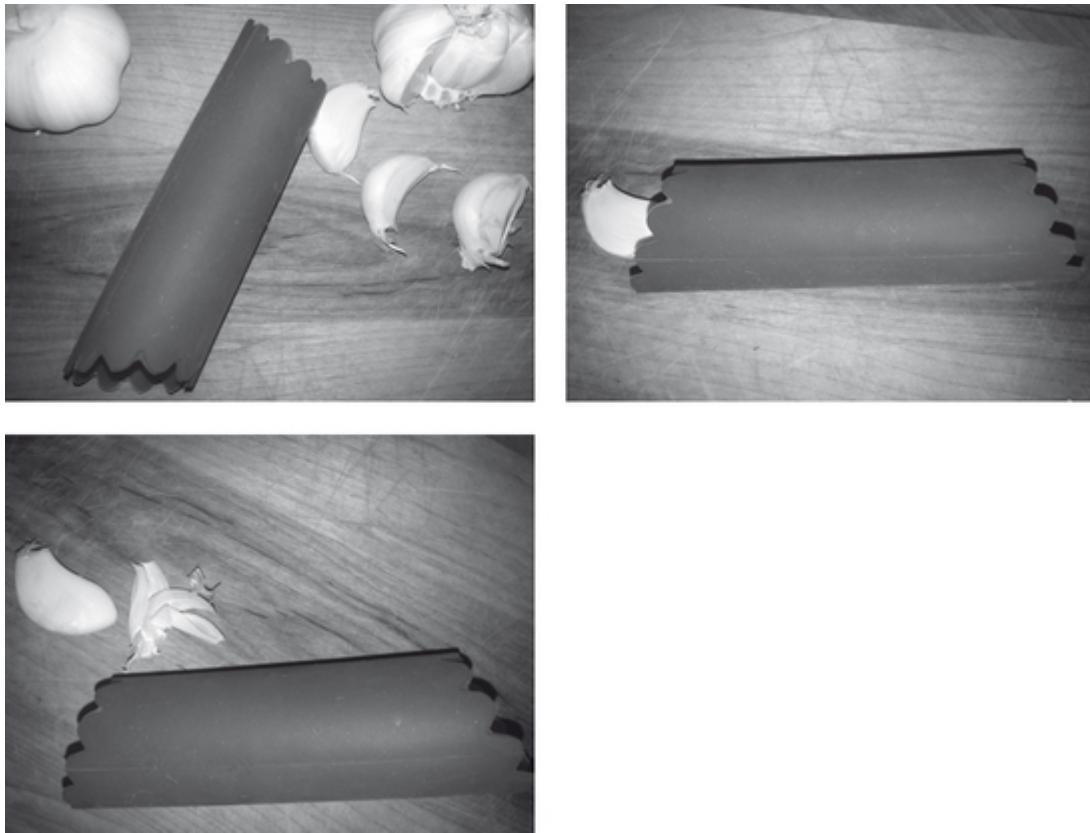
When it comes time to remove the wrapper on the garlic by peeling it, there are a few ways that this can be accomplished.

The first way is to **peel it by hand**. Slice each end of the clove off, and then peel the wrapping off of the clove. The second way to peel garlic is to smash the garlic clove with a knife. The clove needs to be laid on a flat surface. Lay the side of the knife flat on the clove, pushing down on the side of the knife. This will crush the clove while the wrapping falls off, all in one motion.



Lay the cloves out on a flat surface (left), making sure to use a knife large enough to effectively crush the cloves. Lay the side of the knife flat down on the clove (right), crushing in a gentle rocking motion.

Finally, perhaps the easiest way to peel a clove of garlic is with a rubber peeling tube. Simply put one or two cloves inside the rubber tube, press down with your hand, and roll back and forth a few times. Empty out the tube (which is simple, as both ends of the tube are open) and watch the wrapper and clove drop out separately. Although this method may crush the garlic if you push too hard, once you get the knack of it, you will get a nicely peeled whole clove every time.



A rubber peeling tube (upper left) provides a simple, effective means of peeling garlic consistently and easily. Simply place the clove in one of the peeler's open ends (upper right), making sure to insert fully, before rolling it a few times. Be careful not to crush the garlic; it peels easier than you think (lower right).

Once peeled, the garlic clove can be used whole, sliced, minced, pressed, or as a paste. But it has been found that the most health benefits come from garlic that has been sliced, chopped, pressed, or minced, and *then* allowed to sit for 5 to 10 minutes before use. During this time, the various compounds in the garlic mix and meld and the allicin is produced.

As you begin to prepare your dishes, keep in mind that as good as garlic is, too much can hide the other flavors in the food and overwhelm the dish. Garlic is like salt; it needs to be added carefully, and just like salt, once the garlic is in, you can't take it back out. Whereas if you don't add enough, you can always add more.

## Issues When Cooking with Garlic

Once you begin cooking with garlic, keep in mind that garlic does better when **cooked quickly**, over medium heat; cook too long, and most of the nutrients are gone. As a rule of thumb, if the garlic has been cooked for 15 to 40 minutes, there will be a moderate loss of nutrients. If the garlic is cooked longer than 40 minutes, there will be a substantial loss of nutrients. Garlic can also burn, and burn quickly. **Burned garlic** is bitter and can ruin an entire dish. Yet, sometimes you might want garlic slices that are lightly browned. But be well aware that you literally cannot take your eyes off of the garlic while it is cooking; it will go from light brown to burnt in seconds.

Burning can also happen during sautéing. However, especially when working on quick cooking dishes, you may want to consider using sliced garlic, garlic paste, or smashed cloves. As these are less likely to burn, between the allicin factor and burn risk, smashed, minced, or pressed garlic is preferable for use in recipes whenever possible. Likewise, due to the burning factor, if you have dishes that need to cook slowly, garlic should not be added too early, as, again, depending on the recipe, you risk burning.

Sometimes, you may want to include the flavor of garlic, but don't really want pieces of garlic in the dish. This is a great time either to use garlic paste or, if sautéing, sauté a few garlic cloves in the pan in oil first (or butter). Sauté until the cloves begin to turn brown, and then remove. You will have the garlic flavor, retained in the oil or butter, without the garlic pieces.

## Roasting Garlic

Perhaps one of the most popular (and delicious) ways to prepare garlic is by **roasting** it. The roasting process both mellows the flavor of the garlic while at the same time releasing the sugars to caramelize the garlic. The garlic may be roasted in the oven or on the grill, and it is quite easy to do. Take a whole garlic bulb and

carefully peel the outer wrapping away *without* loosening the bulb, keeping the entire bulb intact. Then, slice the top of the bulb off (up to  $\frac{1}{2}$  inch). The individual cloves should now be exposed. Place the garlic on a piece of aluminum foil and put on a tin pie pan, glass pie pan, or lipped cookie sheet. You can also use a terra cotta garlic roaster if you have one, but it is not necessary. Next, pour olive oil over the bulb. Be generous, but don't drown the garlic. A few teaspoons should do, but this can also be a judgment call. Use your fingers to make sure the bulb is well coated. You may also add salt and pepper if you so choose. Wrap the garlic up in the foil, still keeping the garlic in the pan, and bake at 400°F for 30 to 35 minutes, or until cloves are soft. If you are cooking on the grill, you can omit the pan and place the foil-wrapped garlic directly on the grill, away from the flames. Remove from oven and allow it to cool.

Once the roasted garlic has cooled, the cloves are easy to remove from the wrapping. Pull off a clove (careful, as they are very soft) and squeeze into a bowl or jar. Use as a condiment, on garlic bread, crustini, or bruschetta, or as a recipe ingredient—any way that sounds good to you. Have some fun with it. Roasted garlic is best if used immediately, but can be refrigerated in oil for a few days. Roasted garlic in oil is like raw garlic in oil, in that it cannot be kept at room temperature.

## Additional Garlic Options

Of course, there are other things to do with garlic in the kitchen. Some cultures will pickle the entire young bulb in spices, sugar, and salt, while others make black garlic, which is garlic that has been left to ferment at a high temperature. With its versatility, it is no wonder that garlic has remained a staple in so many cultures for thousands of years.

One interesting note about garlic that has been missed: when doing your prep work, if the garlic comes into contact with an acid, the garlic will begin to break down and change its composition. The reaction with the amino acids causes a discoloration, and, if garlic

and onions are cooked together, the garlic can turn blue! To alleviate this problem, cook the onion first, and then add the garlic and cook quickly at high heat; otherwise, cook separately, and then add the two ingredients together.

When you're done working with the garlic and need to get that pungent odor off of your hands and/or cutting board, usually half of a lemon rubbed on your hands and the cutting surface that was used will eliminate the garlic smell.

## Garlic as a Food Preservative

As a food ingredient, garlic is probably one of the most recognized and most consumed foods in the world. Found in recipes in most any culture and country, garlic has also been used to fight disease and illness for thousands of years. So, why not use the combination against the bacteria that can affect foods?

Studies (and history) have found that fresh garlic can serve as an effective **natural food preservative**, preventing food poisoning when used as a food additive, with additional evidence that fresh garlic can kill such bacteria as *E. coli*, *Staphylococcus aureus* (an antibiotic-resistant form of staph infection), and *salmonella*. Garlic has even been documented as being used as a food preservative in ancient China and Japan.

But what makes garlic such an effective preservative? Garlic's ability to act as a food preservative is due, once again, to its antibacterial properties. Although it is not certain as to how it all works, recent studies are showing a link between the diallyl sulfide (which was discussed in [Chapter 2](#)) and garlic's ability to penetrate the bacterial membranes. This in turn combines with sulfur-containing proteins and enzymes, the most important antimicrobial part of the organo-sulfur compounds. And, along with fresh garlic, garlic extracts have proven to be not only a food preservative, but an antibrowning agent as well.

But how can garlic be used for home preservation? Fresh garlic has been shown to have antibiotic properties at temperatures of up

to 120°F, and has been used as a preservative for fried and deep-fried foods. Garlic paste and extracts have antibacterial activity at 40 to 60°F, which makes it work well for fish. There is even the possibility that garlic paste, when used to coat the inside of a plastic container, will help preserve foods longer than when stored in the container.

## Drawbacks to Preserving with Garlic

However, there are a few drawbacks, at least at this time, to using garlic as a food preservative. The two main complications are that the preservation time may be short, as only fresh garlic can be used as the preservation ingredient. Also, the food to be preserved with the garlic needs to be compatible with garlic; although garlic is used as an ingredient in many foods, and this may not be as big a problem as you think, there are foods that do not sit well with garlic. But as more and more consumers demand less and less chemical additives in their foods, more work is being done to see just what makes garlic work as a food additive for preserving.





## CHAPTER 8

# HEALING USES

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**I**n addition to its culinary value, garlic has been used for medicinal purposes for thousands of years. Considered to be one of the healthiest foods there is, to the point of being called a “superfood,” garlic is also considered as one of the closest things to a natural panacea (a remedy for all diseases and illnesses) that has been found to date. Garlic has excellent antibacterial, antiviral, antifungal, antioxidant, and anti-inflammatory properties. Eating it daily may help keep you healthy, and is safe for most people. Later in this chapter, we’ll cover the best ways to utilize garlic in your diet to take full advantage of its health benefits.

Garlic contains approximately 80 sulphur compounds, many of which are directly responsible for that tell-tale pungent odor that we all associate with garlic, especially when using fresh garlic. Of these compounds, allicin is the most important. The allicin, ajoene, alliin, and the other sulfurous compounds have a positive effect on digestive, circulatory, and immunological systems. Garlic is also a good source of vitamin C and B6, manganese, selenium, calcium, and phosphorus.

As mentioned above, the benefits that garlic provides to the human body include antibacterial and antiviral properties, which in

practice help to control worm, viral, bacterial, fungal, and yeast infections.

However, garlic also has been shown to help in many other ways as well, treating a wide array of ailments in different parts of the body. For example:

- Garlic has been shown to reduce both the symptoms and pain caused by **rheumatoid arthritis**
- Daily use of garlic has been found to lower the risk factors of many types of cancer (due to the allyl sulphides)
- A crushed clove of garlic on a tooth helps a **toothache**, due to the antibacterial and analgesic properties that the garlic has (note that this can cause gum irritation)
- Garlic reduces blood pressure due to the allicin blocking angiotensinall, which helps to reduce blood pressure
- Garlic helps the heart by protecting against heart attacks and atherosclerosis
- Garlic is good for treating skin infections, as the ajoene is believed to help treat fungal skin infections such as ringworm and athlete's foot (the ajoene in garlic can also cause blood thinning through the anticoagulant properties, helping to prevent the formation of blood clots)
- The anti-inflammatory properties that garlic possesses can help fight allergies, while the raw juice of the garlic can be used to stop itching caused by rashes and insect bites
- Garlic can reduce plaque formation through its ability to lower blood triglycerides and cholesterol
- A popular home remedy to treat a cold is to eat several cloves of garlic at the first sign of symptoms
- Eating garlic in high doses can help to reduce the possibility of tick bites

## **Garlic as an Antibiotic**

Perhaps garlic's most important medicinal quality is its potency as an **antibiotic**, due to the compound diallyl sulfide. Garlic has been found to be the only antibiotic that can actually kill the infecting bacterium *Campylobacter*, a common cause of intestinal infection, and is far more effective as a preventative measure than the other two most-popular antibiotics. Those with sensitive stomachs usually comment that using garlic as an antibiotic upsets their stomach less than their prescriptions do.

However, garlic can also cause the loss of good bacteria in the digestive system when it is used as an antibiotic. Eating yogurt and other probiotics will counteract this side effect. Note that garlic loses its antibiotic properties when it is cooked or dried. As a result, garlic is best when consumed raw and fresh. But, if it must be heated for any reason, it should be done as little as possible (only about 5 to 10 minutes).

When using garlic for health "upkeep," one fresh clove per day is the usual recommended amount. Preparations that mimic fresh garlic may also be used; the number to look for is an allicin content of at least 6,000 micrograms. Note that prepeeled or preminced garlic that comes in jars (usually packed in water) will not work, as it is not potent enough.

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## Use with Caution

As good as garlic is, it can have a few problems as well. For example:

- Due to garlic's anticoagulant properties, doctors will usually request that patients cease garlic consumption before any surgery, as it can increase bleeding
- Joking aside, garlic really *can* cause bad breath; if you are eating fresh garlic, chewing on fresh parsley can help with the odor

- Using a garlic poultice on the skin can cause something similar to a burn
- Garlic may irritate the gastrointestinal tract, particularly if compounded by pre-existing conditions, which can cause include gas, bloating, and nausea
- When working with fresh garlic, be sure to keep your fingers away from your eyes, as garlic juice can be an irritant

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As you can see, the beneficial health properties of garlic are quite amazing. Most of these health findings are hundreds, if not thousands of years old, and yet are still sworn by today. However, if you are already on medications, garlic can have some reactions or interactions with medicines or pre-existing health conditions. As always, make sure to consult with your physician before making any drastic changes to your diet.





## FINAL NOTES

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**I**n the end, as one of the oldest cultivated crops in the world and an important ingredient in the lives of people and their history for thousands of years, garlic continues to play a major role today, both in culinary and medicinal use. Whether being partnered with parmesan and Chardonnay, shrimp, lamb, and even chicken wings, garlic continues to please the palate of new generations of people. And, as more of the medicinal qualities are brought to the forefront, we are discovering what others have known for thousands of years: that one little bulb of garlic may be one of the single most important foods/ingredients that is available to us today, no matter where we live. There are enough varieties of garlic to keep even a garlic connoisseur busy tasting and cooking for their entire life (if they can even begin to find all that is available). In fact, garlic seems to be one of the constants in cooking, and even medicine, throughout the world. Available almost anywhere you go, and a familiar ingredient even in some of the most exotic dishes, all that is left is to start growing it ourselves at home.



Garlic can make old dishes become new again, and open up a whole new culinary world to enjoy, all with just a little effort and know-how. Photo by Jeffrey W. under the Creative Commons Attribution License 2.0.

*Enjoy!*



# RECIPES

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## **Garlic Parmesan Pasta**

$\frac{1}{2}$  cup butter

2 teaspoons dried basil, crushed

2 teaspoons lemon juice

1 $\frac{1}{4}$  teaspoons garlic powder

$\frac{3}{4}$  teaspoon seasoned salt

8 ounces fettuccine or angel hair pasta (cooked and drained) 1 $\frac{1}{2}$  cups broccoli flowerets (cooked tender-crisp) 3 tablespoons walnuts (chopped)

Fresh, grated parmesan cheese

Melt the butter in a large skillet. Add the basil, lemon juice, garlic powder, and seasoned salt, and blend well. Add the fettuccine, broccoli, and walnuts. Blend well and toss to coat the fettuccine. After tossing, add fresh grated parmesan cheese to top off the dish. As an alternative, chicken or shrimp may be added to the pasta.

## **Garlic-Lemon Dressing**

1 small clove garlic  
1 sprig rosemary  
1 strip lemon peel (1 inch x ½ inch)  
¾ cup olive oil  
¼ cup lemon juice

Place the garlic and rosemary on a cutting board, and lightly crush with the flat side of a heavy knife. Put the rosemary, garlic, and lemon peel in a clean bottle with a tight-fitting cap. Pour in the oil and lemon juice. Cap the bottle and shake well. Refrigerate and use within 1 week. Shake before serving. Drizzle on steamed vegetables, or seafood, pasta, potato, or other salads.

## **Honey Garlic Chicken**

2 chicken breasts, chopped into small pieces Olive oil

Honey (enough to coat chicken pieces)

$\frac{1}{4}$  to  $\frac{1}{2}$  clove garlic

Chop two boneless chicken breasts into small pieces. Coat frying pan with a thin layer of olive oil. Toss chicken pieces into frying pan and cover with honey. Chop up about  $\frac{1}{4}$  to  $\frac{1}{2}$  clove of garlic (quantity depends on your taste). Toss garlic in frying pan.

Heat frying pan on stove at medium heat. Be patient! It sometimes takes more than 30 minutes for the honey/oil mixture to thicken. You will notice that the chicken will cook and the liquid will get darker and thicker. However, don't let it go on too long or the sauce can burn.

## **Italian Garlic and Herb Marinade**

**1/2 cup red wine**  
**2 tablespoons minced garlic**  
**3 sprigs rosemary, finely chopped**  
**2 tablespoons flat-leaf parsley, finely chopped** 1 tablespoon salt  
**1 tablespoon black pepper**  
**2 tablespoons oregano, finely chopped** 2 tablespoons basil, finely  
**chopped** **1/4 cup extra virgin olive oil**

Combine all ingredients in the same dish you plan to use when marinating your food. Refrigerate for up to 2 weeks.

## Rosemary Garlic Pork Roast

1 boneless pork loin roast

Cider vinegar, as needed

1/4 cup chop rub

1 sprig rosemary

Nonstick cooking spray

5 cloves garlic

Generously brush pork with cider vinegar. Apply rub, pressing slightly to aid adhesion. Spray with nonstick cooking spray. Refrigerate at least 1 hour. Place rosemary in the bottom of a roasting pan and place garlic in a circle around it. Place pork on top. Insert an oven-safe probe thermometer into the center and bake at 375°F until internal temperature reaches 140°F. Remove and let rest for 10 minutes. Serve.

## Grilled Eggplant with Garlic Butter

*Making the eggplant “sweat” helps remove the bitter flavors from the eggplant.*

1 tablespoon minced garlic

$\frac{1}{2}$  cup butter

2 medium eggplants, sliced  $\frac{1}{2}$ -inch thick Olive oil

Salt, to taste

Freshly ground black pepper, to taste

Fold garlic into butter. Shape into a narrow log using parchment or wax paper. Refrigerate until needed. Sprinkle all sides of eggplant with salt. Let sit 15 minutes or until it “sweats.” Rinse eggplant. Pat dry with paper towels and brush with olive oil. Season both sides liberally with salt and freshly ground black pepper.

Preheat grill to medium-high. Add eggplant and cook until marked and slightly charred on both sides. Place a pat of butter mixture on top of each piece and wait until butter is melted before serving. Save the extra butter. Use it instead of regular butter for things like chicken, fish, and steak.

## **Tomato Basil Soup with Garlic Toast**

1 cup tomato paste  
18 ounces tomato juice  
¾ cup heavy cream  
½ cup chicken broth  
1 tablespoon kosher salt, divided  
1 tablespoon freshly ground black pepper 2 Roma tomatoes, diced  
(Roma tomatoes allow for a thicker soup) 4 (½-inch thick) slices  
French or Italian bread Extra virgin olive oil  
½ teaspoon garlic powder  
2 large bunches fresh basil

Combine paste, juice, cream, broth, 2 teaspoons salt, 2 teaspoons pepper, and diced tomatoes in a large saucepan. Bring to a boil over medium-high heat. Reduce heat to medium-low and cook, stirring occasionally until liquid has been reduced by a third. Using an immersion blender, puree soup until smooth. Keep warm over low heat.

Toast bread slices in the toaster oven. The second they come out, brush slices with olive oil and sprinkle with garlic and remaining salt and pepper. Set aside. Add basil leaves to tomato puree and let steep for 5 minutes over low heat. Remove leaves. Garnish individual bowls with sprigs of basil and serve warm with garlic toast.

## Rosemary Garlic Baked Potatoes

*A delicious side dish of baked potatoes infused with rosemary and garlic.  
Serves four.*

4 baking potatoes

4 tablespoons olive oil

2 to 4 cloves garlic, chopped

1 teaspoon dried, crushed rosemary (or 1 tablespoon fresh)  $\frac{1}{4}$   
teaspoon sea salt

$\frac{1}{8}$  teaspoon fresh ground pepper

Heat oven to 400°F. Wash potatoes and pierce all over with fork. Lay each potato on an individual 9-inch square piece of aluminum foil (or sized to fit potato). Pour 1 tablespoon of olive oil on each potato. Make sure the entire potato skin is coated in oil. Sprinkle  $\frac{1}{4}$  of the chopped garlic, rosemary, salt, and pepper over the entire skin of each potato. Wrap each potato in aluminum foil and place foil-wrapped potatoes on cookie or baking sheet (to catch any leaking olive oil). Bake for 1 hour.

## California Fusion Peach Salsa

*A delicious combination of hot chili sauce and sweet peaches with Asian spices for a tasty, spicy salsa.*

2 (15-ounce) cans peaches, drained and chopped  
2 green onions or green garlic, sliced thin (including tops)  
2 teaspoons chopped fresh cilantro  
2 teaspoons garlic chili sauce  
2 tablespoons lime juice  
½ teaspoon five spice powder  
¼ teaspoon white pepper

In a bowl, mix the drained, chopped peaches, sliced green onions, chopped cilantro, garlic chili sauce, lime juice, five spice powder, and white pepper. Mix well. Chill before serving.

Serve as a salsa with tortilla chips or as a garnish for meat dishes.

## **Garlic Pickles**

Loosely pack a jar (your choice of size) with peeled garlic cloves. Cover with red wine vinegar and add 1 tablespoon sea salt per cup of vinegar used. Add seasonings of choice, to taste. Cover and shake to mix. Refrigerate for a few weeks to allow flavor to penetrate, shaking occasionally, and making sure that the garlic cloves remain submerged in the liquid. Serve as a condiment or snack, or use as an ingredient for a recipe.

## **Garlic Salt**

Grind dried garlic in grinder (a coffee grinder kept specifically for herbs and spices will work well) till it is in powder form. Using a ratio of 4:1, salt to garlic powder (or 3:1, depending on how strong of a garlic taste you are looking for), mix, and return to grinder. Quickly process again (making sure to process for only a minute or two; if processed too long, the mixture will cake.) Store in an airtight container.

To make garlic *powder*, simply don't add salt.

## Egg Rice

2 cups rice

1 onion (approximately golf ball size)

2 medium-size green chili peppers

1 teaspoon ginger paste

1 teaspoon garlic paste

$\frac{1}{4}$  teaspoon spices ( $\frac{1}{2}$  stick cinnamon, 3 cardamoms, and 6 cloves, ground in coffee grinder) 1 teaspoon salt

2 eggs, beaten

Cook rice as per directions on package and set aside. Sweat onions and green chilies together over medium-low heat. Add ginger and garlic paste. Add rice and mix well. Add salt and spices powder. Add the beaten eggs and cook until everything is mixed well.

## **Tahini Yogurt Sauce**

1 large lemon  
3 cloves garlic  
3 tablespoons sesame butter tahini  
8 ounces plain yogurt  
2 tablespoons olive oil

Squeeze juice from lemon into bowl or small food processor. Chop garlic, combine all ingredients together, and mix well. Makes approximately 1¼ cups of sauce.

## **Pico de Gallo**

2 cups chopped fresh tomato

½ cup chopped white or yellow onion

2 tablespoons chopped cilantro

½ teaspoon salt

1 teaspoon ground black pepper

1½ tablespoons stemmed, seeded, and minced jalapeño 2 teaspoons  
freshly squeezed lime juice 1 small clove garlic, minced

Hot sauce of your choice, to taste

Wash the tomato, onion, and cilantro. Dice the washed ingredients and combine them, mixing well. Add salt, pepper, jalapeño, lime juice, and garlic. Add hot sauce if desired.

Let stand at least 30 minutes to allow ingredients to mesh.

## Pesto

$\frac{1}{4}$  cup pine nuts

Approximately 8 ounces extra virgin olive oil 4 cloves garlic

4 ounces fresh basil (must be fresh)

$\frac{1}{3}$  cup freshly grated Pecorino Romano, Parmigiano-Reggiano, or Romano cheese Freshly ground salt and pepper, to taste

Preheat the oven to 425°F. Toast the pine nuts in an ovenproof pan for 10 to 15 minutes, checking every 5 minutes to prevent excessive browning or burning. In a small skillet, heat 2 tablespoons of the olive oil on medium heat. Crush the garlic and sauté in the oil until soft, about 2 to 3 minutes. Combine the basil, garlic, cheese, pine nuts, and oil in a food processor or blender and chop finely, slowly adding the oil to reach a paste-like consistency.

The sauce can be used immediately or when covered with a thin layer of olive oil and refrigerated in an airtight container for 1 week. Frozen, the pesto may last several months.

## Arroz con Pollo

3 to 4 pounds chicken (cut into serving pieces) Olive oil  
4 cloves fresh, minced garlic  
1 medium onion, chopped  
8 ounces diced red bell pepper  
1 (15-ounce) can diced tomatoes  
½ tablespoon sweet paprika  
½ ounce chopped cilantro  
6 cups chicken bouillon  
Handful of fresh cilantro, chopped  
8 saffron threads (or 1 teaspoon food coloring for yellow rice) 2 cups medium or long-grain rice  
8 ounces canned peas (thoroughly drained) Salt and pepper, to taste

Season the chicken with two pinches of salt and a pinch of pepper. Pour enough olive oil into a large skillet to just barely cover the bottom. Sauté chicken in oil until brown. Either remove the chicken from the skillet or keep it there.

Sauté garlic until brown; be careful: garlic burns easily. Add the onion, bell pepper, tomatoes, and paprika. Sauté until the vegetables are tender. Transfer the ingredients to a large stewing pot. Add the cilantro, bouillon, and saffron (or food coloring). Bring to a rolling boil.

Add the rice and mix well. Simmer over medium heat until the rice is cooked and the liquid is absorbed. Add more broth or water if the liquid evaporates before the rice is cooked. Add the chicken to the pot (if you removed it previously) and cover it with rice. Wait 2

to 3 minutes to allow the chicken to warm. Sprinkle peas on top of the rice.

## **Bruschetta**

*You can adapt this recipe to make as many servings as you need. As a guideline, you can serve one or two bruschetta per person.*

1 loaf Italian or French bread, sliced  $\frac{1}{2}$ -inch thick  $\frac{1}{2}$  head garlic  
Extra virgin olive oil, as needed  
Kosher salt and freshly ground black pepper, to taste  
Toppings of your choice (see examples below)

Toast the bread slices in a toaster oven, under a broiler, or on a grill until they turn golden. Immediately rub the bread with the cut side of the garlic. Sprinkle with salt and black pepper and drizzle generously with extra virgin olive oil.

Serve warm, topped with whatever combinations of seasonal ingredients you choose. Examples include chopped tomatoes with arugula or basil, cooked white beans (topped, if you like, with sautéed kale), sautéed mushrooms (preferably wild varieties), minced anchovies flavored with wine vinegar and herbs, thinly sliced pancetta crisped under the broiler, or a Pugliese-style chopped mixture of summer vegetables (red onion, cucumber, tomatoes, oregano, flat-leaf parsley, basil, and red pepper flakes).

## Le Tourin

*Le Tourin is a type of garlic soup. This recipe is from the village of Le Fleix in Dordogne. Serves 2.*

10 to 12 cloves of garlic, chopped

1 tablespoon olive oil

1 tablespoon flour

4 cups water

1 egg, separated

1 teaspoon vinegar

Salt, to taste

Pepper, to taste

In a frying pan, brown the chopped garlic (or, optionally, an equal mixture of chopped onions and garlic) in the olive oil. Be careful not to burn the garlic. Add the flour. Mix well, and then cook for a moment. Add some boiling salted water, and cook for 10 minutes.

In a separate dish, mix together the egg yolk, pepper, and vinegar. Add the egg white to the soup, first tempering in a separate bowl with a whisk so no large pieces of egg white form. Cook for another 5 minutes before removing from heat and adding the egg yolk mixture, again tempering to avoid coagulation. Place thin slices of bread in each soup bowl, and pour the soup on top. Serve hot.

## Rosemary Garlic Fish

Fish fillets

Plain flour, seasoned with salt and pepper 1 tablespoon olive oil

2 cloves fresh garlic, chopped

1 sprig fresh rosemary leaves, chopped

$\frac{1}{2}$  cup brown vinegar (can use cider or malt)

Toss fillets in seasoned flour. Heat oil in a pan and add garlic and rosemary leaves. Cook slightly, and then add the fish. When the fish is cooked, remove from pan and drain off excess oil. There should be enough flour in the pan (fallen from the fish) to make the sauce. If there isn't, add a tablespoon of flour to the pan juices, and brown. Add vinegar. Add a little water and stir to make gravy. Spoon over fish.

## Hummus

3 cups raw chickpeas, dried

18 cups water (divided in half for equal use) 1 tablespoon cooking oil

Approximately  $\frac{3}{4}$  cup chickpea cooking liquid  $\frac{3}{4}$  cup freshly squeezed lemon juice

$\frac{3}{4}$  cup tahini (ground sesame seeds)

$\frac{1}{2}$  cup extra virgin olive oil

12 cloves garlic (peeled and roughly chopped) 1 tablespoon salt

$\frac{1}{2}$  teaspoon freshly ground black pepper

Soak the chickpeas in water overnight, and then drain. Gently simmer the chickpeas with the next lot of water (generously salted) and the tablespoon of cooking oil until very soft, but still whole (about 3 hours, with approximately 10 minutes cooling time if using a pressure cooker).

Drain the chickpeas, reserving a few cups of the cooking liquid (you will need it later). Rinse the chickpeas with plenty of cold water. While doing so, gently rub them between your hands to release the skins; they should float away with the rinsing water. After several changes of water, and removing a majority of the skins, drain the chickpeas again.

Using a food processor (or other means), mix the lemon juice with the tahini. Puree (or mash) the chickpeas in batches, using the lemon juice and tahini mixture, the olive oil, and the cooking liquid as required to maintain the desired consistency. Add the garlic to the batch with the olive oil, and process until smooth). In a large

bowl, using a spoon, mix the salt and pepper into the other blended ingredients (add additional cooking liquid, if still too thick).

## Corn and Shrimp Chowder

1 teaspoon olive oil  
1 onion, chopped  
1 carrot, chopped  
1 clove garlic, chopped  
3½ cups canned chicken broth  
1 teaspoon dill seeds  
3 cups frozen corn kernels  
1½ pounds medium shrimp, shelled  
¼ cup light cream or milk  
1 tablespoon fresh parsley, chopped  
Salt and pepper, to taste

In a large saucepan, heat olive oil over low heat. Add onion, carrot, and garlic. Cook, stirring occasionally, until the onion is transparent, about 5 minutes. Add broth and dill seeds, and bring to a boil. Reduce heat and simmer, covered, for 20 minutes.

Add corn to broth and simmer, covered, until the corn is just tender, about 5 minutes. In a blender or food processor, puree the newly made chowder and pour it back into the saucepan. Add shelled shrimp. Simmer and cook until shrimp are almost done, about 1 minute. Stir in milk, parsley, salt, and pepper. Bring mixture back to simmer. Serve immediately.

## **Tomato Basil Soup with Garlic Toast**

1 cup tomato paste  
1 (18-ounce) can tomato juice  
¾ cup heavy cream  
½ cup chicken broth  
1 tablespoon kosher salt, divided  
1 tablespoon freshly ground black pepper 2 Roma tomatoes, diced  
4 slices French or Italian bread (½-inch thick, on the bias) Extra virgin olive oil  
½ teaspoon garlic powder  
2 large bunches fresh basil

Combine paste, juice, cream, broth, 2 teaspoons salt, 2 teaspoons pepper, and diced tomatoes in a large saucepan. Bring to a boil over medium-high heat. Reduce heat to medium-low and cook, stirring occasionally, until liquid has reduced by a third.

Using an immersion blender, puree soup until smooth. Keep warm over low heat. Toast bread slices in the oven (toaster oven will work). Immediately after removing from oven, brush slices with olive oil and sprinkle with garlic and remaining salt and pepper. Set aside.

Add basil leaves to tomato puree and let steep for 5 minutes over low heat. Remove leaves. Garnish individual bowls with sprigs of basil and serve warm with garlic toast.

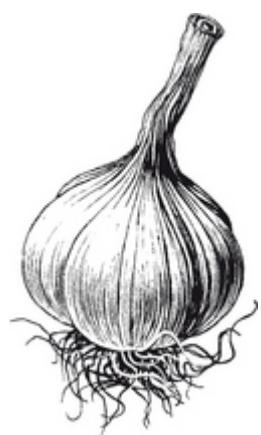
## Quick Garlic Croutons

1 cup  $\frac{1}{2}$ -inch bread cubes from good-quality French or Italian loaf 2 tablespoons olive oil

Pinch of salt

$\frac{1}{8}$  teaspoon garlic powder

Warm an 8-inch skillet over low heat while preparing bread. A minute before you are ready to cook, turn heat up to medium. Toss bread in a bowl with oil, salt, and garlic powder. Cook, stirring often, until crisp and golden brown, about 7 minutes.





# RESOURCES

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## Websites and Online Articles

“Find a Vitamin or Supplement: Garlic.” WebMD.  
[www.webmd.com/vitamins-supplements/](http://www.webmd.com/vitamins-supplements/)

“Garlic Health Benefits.” Garlic Central.  
[www.garlic-central.com/garlic-health.html](http://www.garlic-central.com/garlic-health.html)

“Garlic and Cancer Prevention.” National Cancer Institute.  
[www.cancer.gov/cancertopics/factsheet/Prevention/garlic-and-cancer-prevention](http://www.cancer.gov/cancertopics/factsheet/Prevention/garlic-and-cancer-prevention)

“Garlic for Dogs” Natural Dog Health Remedies. [www.natural-dog-health-remedies.com/garlic-for-dogs.html](http://www.natural-dog-health-remedies.com/garlic-for-dogs.html)

## New Century Homesteader

[www.newcenturyhomesteader.blogspot.com](http://www.newcenturyhomesteader.blogspot.com) Workshops, programs, writings. Feel free to contact with questions on backyard farming, small-space farming, and micro agriculture.

## Urban Farm Online

[www.urbanfarmonline.com](http://www.urbanfarmonline.com)

Urban farming and livestock information.

## Articles

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## **Periodicals**

### **Farming: The Journal of Northeast Agriculture**

[www.farmingmagazine.com](http://www.farmingmagazine.com)

Excellent magazine focusing on multiple aspects of farming in the American Northeast, including beef and dairy cattle and value added.

### **Cattle South Magazine**

Cattle publication for the American Southeast.

### **Acres U.S.A.**

[www.acresusa.com](http://www.acresusa.com)

Excellent magazine for sustainable and organic farming.

### **Countryside & Small Stock Journal**

[www.countrysidemag.com](http://www.countrysidemag.com)

One of the first publications covering self-sufficiency.

### **Grit**

[www.grit.com](http://www.grit.com)

Excellent publication for the small farm, homestead, urban farm, etc.

## Hobby Farms

[www.hobbyfarms.com](http://www.hobbyfarms.com)

Magazines in all areas of urban farming, backyard farming, and more.

## Mother Earth News

[www.motherearthnews.com](http://www.motherearthnews.com)

One of the first publications developed for those interested in homesteading, small farms, and self-sufficiency.

## Books

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## NOTES















