

Making Garlic- and Herb-Infused Oils At Home

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Introduction

Endless culinary possibilities exist for preparing and using herb- and garlic-infused oils at home. Herbs are easy to grow in home gardens or containers, providing an inexpensive and plentiful supply for infusion. Many ethnic cuisines are characterized by specific combinations of garlic and herbs that transform ordinary ingredients into culinary classics. Popular uses for infused oils include dipping breads, making salad dressings, and flavoring pastas.

Infusion involves immersing garlic, basil, oregano, or rosemary in oil to extract their flavors. Infused oils have the potential to cause botulism, however. Before getting too creative, make sure your infused oils are safe to eat by following the food safety guidelines in this publication. Our procedure for acidifying garlic and herbs will allow you to safely store your infused oils at room temperature. Refrigeration of the oils will maintain their fresh flavor for a longer time.

Botulism and flavored oils

A number of cases of botulism, a debilitating and potentially fatal form of food poisoning, have occurred as a result of improperly stored, home-prepared, garlic- or herb-in-oil mixtures. Garlic and herbs can be a source of *Clostridium botulinum*, widespread bacteria that produce the botulism toxin under certain conditions. When garlic or herbs are placed in oil, the low-acid, oxygen-free environment favors the growth of these bacteria.

Commercially available oils flavored with garlic and herbs either have been acidified to prevent the growth of bacteria or they contain specific levels of microbial



inhibitors. When purchasing from boutique or small scale producers, check the label or ask the producer to ensure this required safety treatment has been applied.

Procedures for preparing garlic- and herb-flavored oils at home without acidifying the flavoring materials are available, but the food safety control for these products is refrigeration for a maximum of 2 to 4 days or freezing. It is unsafe to store these home-prepared garlic or herb-infused oils at room temperature.

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The acidification procedure described in this publication was based on research conducted at the University of Idaho and reported in *Food Protection Trends*, <http://www.foodprotection.org>. The research identified the conditions necessary to prevent growth of the botulism bacteria when garlic and herbs are immersed in oil. Refrigeration of these infused oils is recommended for quality, but not required for safety.

Procedure

Acidification of garlic and herbs

Raw, chopped garlic or fresh herbs (basil, oregano, or rosemary) are immersed in a 3 percent solution of citric acid. After soaking for 24 hours, the acid is drained away and the acidified garlic or herbs are ready for addition to your vegetable oil of choice.

Citric acid. Citric acid imparts less flavor than lemon juice or vinegar. It is often available at health food stores, pharmacies, grocery stores, and other retail outlets that carry canning supplies (figure 1). The price does vary (from \$0.50 to \$4.51 per ounce in a 2011 Idaho survey), so you may want to shop around. Lemon juice and vinegar have not been tested for acidifying the garlic and herbs for making infused oils and cannot be substituted for citric acid. It is important not to confuse citric acid with ascorbic acid (vitamin C); ascorbic acid does not have the same acidifying properties as citric acid.

Garlic and herbs. The acidification procedure was developed for garlic, basil, oregano, and rosemary. Do not use it with other vegetables or herbs until the appropriate research has been conducted.

Soaking. The garlic or herbs are soaked in 3% citric acid at room temperature for 24 hours to allow the acid to fully penetrate the ingredients and bring the acidity beyond the growth limit for the botulism bacteria. Less-concentrated acid solutions or shorter soaking times can result in an unsafe product.

For garlic, the soaking ratio is one part garlic to 3 parts 3% citric acid solution, by weight (table 1). This is equivalent to 2/3 cup coarsely chopped, peeled garlic cloves to 2 cups of citric acid solution. Garlic cloves must be peeled and coarsely chopped prior to soaking, with pieces no larger than 1/4-inch in any direction to allow complete penetration by citric acid.

The soaking ratio for the three herbs (basil, oregano, rosemary) is one part of fresh herb (stems with leaves attached) to 10 parts of 3% citric acid solution, by weight (table 1). This is roughly equivalent to 1 1/2 cups of loosely packed herb to 2 cups of citric acid solution, but it is best to weigh out 1.7 ounces (47 grams) of

Table 1. Soaking ratios for acidifying garlic and herbs in 3% citric acid solution.

Flavoring material	Soaking ratio by weight	Soaking ratio by volume
Garlic	1 part garlic to 3 parts 3% citric acid solution	2/3 cup coarsely chopped garlic cloves to 2 cups citric acid solution
Herbs	1 part fresh herbs (leaves still attached to stems) to 10 parts 3% citric acid solution	1 1/2 cups (1.7 ounces) loosely packed herbs (leaves still attached to stems) to 2 cups citric acid solution



Figure 1. Use citric acid to acidify garlic and herbs.



Figure 2. Weigh the herbs to keep them completely submerged in citric acid solution.

herbs. Weighing the herbs is more accurate than using a volume measure because the density of fresh herbs can be quite variable. During soaking, a weight should be placed on the herbs to keep them under the soak solution for the full 24 hours (figure 2).

Infusion

After the garlic, basil, oregano, or rosemary has been acidified, it can be used to impart flavor to oil. Consider the type of oil and the time and temperature of infusion.

Oils. Olive oils often are infused with flavoring materials. Garlic and herbs offer a nice complement to olive oil's distinct flavor. If you are interested in having the garlic or herb flavor predominate, consider using a blander oil, such as canola oil. Canola and olive oils are nice because they contain fewer polyunsaturated fatty acids than many other vegetable oils and thus oxidize and turn rancid less quickly.

Infusion ratio, time, and temperature. The proportion of flavoring material to oil and the temperature of the infusion affect how quickly the flavoring material will infuse into the oil. Experiment to determine the conditions that produce a flavored oil most suited to your taste. The ratio of flavoring material to oil used in our research was 1 part acidified garlic or herb to 10 parts of oil, but the ratio may be increased or decreased to suit personal tastes.

Successful infusions were conducted at room temperature (about 70°F) for 1 to 10 days, with the intensity of the infused flavor increasing over time. Oils may also be heated to more quickly infuse the flavoring materials. Our research successfully used acidified herbs to flavor oil at an infusion temperature of 140°F for 5 minutes. Significantly hotter temperatures would damage oil flavor.

Because flavors will continue to intensify with time, it is best to remove the acidified garlic or herb from the oil when it has reached the desired flavor. However, it is acceptable to leave the garlic or herb in the oil, particularly rosemary, for an attractive look, a practice sometimes used with commercial flavored oils.

Storage of infused oils

While oils infused with flavors from acidified garlic, basil, oregano, and rosemary can be safely stored at room temperature, oil flavor quality is maintained for a longer period of time with refrigerator or freezer storage. It is also best to protect infused oils from light by storing them in dark-colored bottles. Make sure the bottles are clean and food grade. All vegetable oils retain quality better at cold temperatures and when protected from light.

Q & A

Do I have to acidify the garlic and herbs that I want to use for infusing oils?

Yes. If you want to infuse or store the oil at room temperature, you must acidify the garlic or herbs to avoid potentially deadly toxin production by Clostridium botulinum, the bacterium that causes botulism. If you mix oil with raw garlic or herbs that have not been acidified, refrigerate the mixture and use it within 4 days or freeze it for long-term storage.

How do I can my infused oil?

There are no recommended procedures for canning flavored oils. If you follow the procedures described here, canning is not necessary.

Can I use the recipe for acidifying garlic, basil, oregano, and rosemary with other materials such as peppers, mushrooms, or other herbs?

No. Research to determine acidification procedures for ingredients other than garlic, basil, oregano, and rosemary has not been conducted at this point.

Can dried garlic or herbs be used to flavor oils?

If you season oil with dried garlic, dried herbs, or both, you must refrigerate the mixture and use it within 4 days or freeze it for long-term storage.

In theory, dried garlic and herbs cannot support the growth of bacteria because they contain too-little moisture. However, without specialized laboratory equipment, it is not possible to determine if the garlic and herbs are truly dry enough. Even a very small pocket with sufficient moisture can allow bacteria to grow and produce toxin.

Whole garlic is more attractive than chopped garlic when left in my garlic-infused oil. Can I use whole garlic instead of chopped?

No. Whole garlic acidifies much more slowly than chopped garlic and does not reach the required level of acidity within 24 hours.

Can I acidify two herbs at the same time; for example, use 3/4 cup each of basil and rosemary in 2 cups of 3% citric acid?

Yes. The herbs tested so far (basil, oregano and rosemary) can be acidified together as long as you use the correct ratio of total herbs to acid solution. Garlic must be acidified separately because the ratio of garlic to acid solution is different.

It is OK to leave the garlic or herbs in the acid solution for longer than 24 hours?

Soaking the garlic or herbs a few hours longer than 24 is fine, but leaving them in the acid longer will result in a less-desirable appearance and flavor.

Can I use any mixture of garlic and herbs to flavor the oil?

As long as you acidify the garlic, basil, oregano, and rosemary according to the instructions provided here, you can use them in any combination to produce flavor-infused oil.

Acidified garlic for oil infusions

2 cups water
1 tablespoon citric acid
about 8 ounces garlic bulbs

To make the 3% citric acid solution, pour 2 cups warm water into a mixing bowl. Add 1 level tablespoon of granular citric acid and stir gently, dissolving the citric acid completely.

Separate the garlic bulbs into cloves and peel garlic cloves. Chop the peeled garlic into pieces about 1/4-inch square and no larger.

Place 2/3 cup chopped garlic into the acid solution and stir gently. Cover and hold at room temperature for 24 hours to allow garlic to become fully acidified.

After 24 hours, remove the acidified garlic from the solution; drain well.

Add the acidified garlic to your choice of oil and allow its flavor to infuse the oil to taste. Start with 1 part garlic to 10 parts oil, by weight; add more garlic to taste if you wish.

Additional useful information

Kendall, P. and J. Rausch. 2012. Flavored vinegars and oils. Fact Sheet no. 9-340. Colorado State University Extension. Available at <http://www.ext.colostate.edu/pubs/foodnut/09340.pdf>.

Raab, C. and M. Woodburn. 2011. Herbs and vegetables in oil. SP 50-701. Oregon State University Extension Service. Available at http://extension.oregonstate.edu/fch/sites/default/files/documents/sp_50_701_herbsandvegetablesinoil.pdf.

Simmons, A. 2013. Herbs and garlic-in-oil mixtures: Safe handling practices for consumers. FCS8743, University of Florida Extension. Available at <http://edis.ifas.ufl.edu/pdf/FY/FY48700.pdf>.

Acidified herbs for oil infusions

2 cups water
1 tablespoon citric acid
1 1/2 cups (47 grams or 1.7 ounces) fresh rosemary, basil, or oregano, loosely packed, leaves attached to stems

To make the 3% citric acid solution, pour 2 cups warm water into a mixing bowl. Add 1 level tablespoon of granular citric acid and stir gently, dissolving the citric acid completely.

Rinse the fresh herb and pat dry.

Place 1 1/2 cups of herb into the acid solution. Make sure the acid solution completely covers the herb. Use a clean dish to weigh down the herb and keep it submerged. Cover the bowl, and allow the herb to soak up acid solution for at least 24 hours.

After 24 hours, remove the herb from the solution, drain well, and gently pat dry.

The herb is now safe to place in an oil of your choice.

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