

Food Preservation

Canning Foods at Home



The goal of food preservation is to increase the shelf life of food and to keep food safe. Microorganisms causing food spoilage include molds, yeasts, and bacteria. These microorganisms can be found anywhere and can easily contaminate foods. Under ideal conditions, bacteria can easily grow on food and multiply very quickly. Controlling the growing conditions for these harmful microorganisms is the best way to prevent food spoilage and decrease the risk of foodborne illness.

Factors contributing to bacterial growth:

- Moisture
- Food
- Acidity
- Temperature
- Oxygen
- Time

Selecting Produce

Preserving food does not improve its quality. Select good-quality fruits and vegetables that are free of disease and mold and not overripe or insect-damaged.

Choose varieties best suited for canning, as quality varies among varieties of fruits and vegetables. Process most vegetables shortly after purchase or within 6 to 12 hours after harvesting. Process fruit within one day.

If unable to process fruits and vegetables within the recommended timeframe, store them in a shady, cool, dry location to minimize deterioration.

Use a Tested Recipe

A significant amount of science and chemistry is involved in home food preservation. When canning food at home, it is important to acknowledge this fact and understand that small variations in recipe measurements of ingredients will impact the quality and safety of products.

Canning foods at home requires using a scientifically tested recipe specifically designed to ensure that it will result in a safe, quality product when accurately followed.

These tested recipes have been extensively researched to ensure density, viscosity, pH, processing times, and methods to destroy harmful microorganisms and produce a consistent, safe product.

Safe Recipe Resources

- [So Easy to Preserve](#), University of Georgia Extension
- [USDA Complete Guide to Home Canning](#)
- [The Ball® Blue Book Guide to Preserving](#)
- [National Center for Home Food Preservation](#), University of Georgia

Canning Jars

Mason Type Jar

Always inspect jars before using them. Jars may become brittle, scratched, cracked, or chipped with repeated use, causing them to break during processing or preventing the lids from sealing.

- Only use glass jars designed for home canning.
- Mouth of the jar has screw threads on the outer perimeter.
- Start with clean jars. Before every use, wash empty jars in hot water with detergent, rinse well by hand, or use a dishwasher.

Canning Lids

- Use two-piece self-sealing lids.
- Never reuse lids.

Headspace

Unfilled space above the food in a sealed container and below the lid is called headspace and is needed to expand food while processing.

- The amount of headspace depends on the type of food being processed.
- Starchy foods tend to expand and swell when heated.

Sterilized Jars

- Use sterilized jars for products processed in less than 10 minutes.
- To sterilize jars, boil for 10 minutes in a canner before filling.

Product	Headspace
Jams and jellies	¼ inch
Fruits and tomato-based products	½ inch
Foods processed in a pressure canner	1 to 1 ¼ inch

Adding Acid to Tomato-Based Products

Why Acid Matters When Canning

Foods containing high acid levels, those with a pH value of 4.6 or lower, inhibit the growth of *C. botulinum* spores.

- The pH is a measure of acidity.
- The higher the pH value, the less acidic the food is.

Whether using a boiling-water bath or a pressure canner for processing, all tomato products must have acid added.

Most fruits can be processed using a boiling water bath because they are naturally high in acid. Tomato products, pickled foods, and figs must have acid added to them because they are not acidic enough on their own to prevent spoilage.

Form of Acid	Pint	Quart
Bottled lemon juice	1 tablespoon	2 tablespoons
Citric acid	¼ teaspoon	½ teaspoon
Vinegar	2 tablespoons	4 tablespoons

Types of Canning

Home food preservation items are NOT the same as those manufactured by the industry. Canning is the process in which food is placed in jars and heated to a high temperature for a prolonged period.

During this process, air is driven from the jar, and a vacuum seal is formed as it cools. High temperatures in pressure canning destroy harmful microorganisms and enzymes that can lead to food spoilage.

Boiling-water bath canning:

- Reaches a temperature of 212 F at sea level.
- Destroys most molds, yeasts, and microorganisms.
- Does not destroy the dangerous toxins produced by the bacterium *C. botulinum*.

Pressure canning:

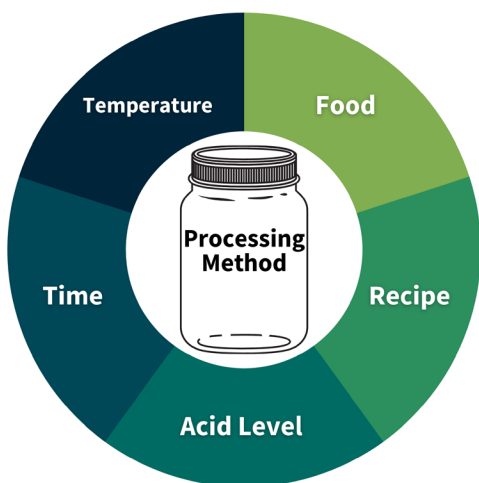
- Used to process low-acid foods.
- Will reach a temperature of 240 F at sea level, at 10 pounds of pressure.
- Hot enough to destroy bacterial spores created by *C. botulinum*.



Low-Acid Foods

These low-acid foods require processing in a pressure canner for safe preservation:

- Asparagus
- Beans
- Beets
- Carrots
- Corn
- Mixed vegetables
- Mushrooms
- Okra
- Peas
- Peppers
- Pumpkin
- Potatoes
- Squash
- Soups
- Spinach & greens
- Succotash
- Tomatillos
- Winter squash
- Red meat
- Poultry
- Fish
- Crabmeat
- Clams
- Oysters
- Shrimp



Clostridium Botulinum

C. botulinum is commonly found in soil and exists either as vegetative cells or as spores. These spores can be found on many fresh food surfaces and are harmless on fresh foods. However, these spores become deadly during the canning process.

C. botulinum spores can become deadly when improperly canned. During canning, air is vented out of the jar, and a vacuum seal is formed. This process creates an anaerobic environment, which is the ideal growing condition for spores to grow. These spores produce vegetative cells, which then multiply rapidly and may produce a deadly toxin in a matter of days.

It was once thought that the longer you cooked canned goods, the safer the food. However, advances in science have proven this not to be true. This is because harmful microorganisms, such as *C. botulinum*, produce harmful toxins when improperly canned, leading to botulism. Once toxins are present, they cannot be destroyed.

C. botulinum is a tough germ that wants to stick around no matter how long you process it in a water bath canner. Therefore, using a pressure canner is the only way to destroy it and safely process low-acid foods.

Low-acid foods must be heated to a temperature of 240 F and held there for a specified amount of time. Only a pressure canner can achieve the intense temperature required to ensure your food will be processed safely at home.

The amount of processing time depends on the type of food and recipe being used. The combination of high temperature and prolonged processing time destroys the bacteria and toxic bacterial spores produced by *C. botulinum*.

IMPORTANT: If pressure goes below the recommended amount at any time, bring the canner back to pressure by increasing the heat. Restart the timing process using the tested recipe recommendations. This is important for the safety of the food.

Pressure Canner Testing

Test dial-gauge pressure canners annually to ensure accuracy. Many local Illinois Extension offices provide free pressure canner testing. Find the nearest testing location:

go.illinois.edu/PressureCannerTesting.

- If a pressure dial reads too low, a high enough temperature will not be reached to destroy the bacterial spores created by *C. botulinum*.
- If the pressure dial reads too high, over-processing will occur and impact the product's quality and texture.
- Replace the pressure dial gauge if it is off by over two pounds.



Pressure Canner Lid Care

- Thoroughly clean the lid after each use, keeping it free of food and hard water residue.
- Clean the edges of the lid and inspect the vent port or steam vent to ensure it has not become plugged.
- Inspect gaskets for cracks. Replace brittle gaskets or gaskets that do not fit properly; they will not be able to maintain a seal.
- A proper seal is critical to ensure a high enough temperature will be reached to destroy the bacterial spores created by *C. botulinum*.
- Purchase new seals at hardware and home improvement stores or by contacting canner manufacturers.

Storing Canned Goods

- Remove screw bands.
- Label and date lids.
- Store in a cool, dry, dark location.
- Ideal temperature 50 to 70 F.
- Use within one year for best quality.

Commercially Testing Your Recipe

Check out the website to learn more: go.illinois.edu/FoodTestingLabs.

References and Resources

- [Home Canning and Botulism](https://www.cdc.gov), CDC.gov
- [General Canning Information](https://www.nationalhomecenter.org), National Home Center for Home Food Preservation
- [So Easy to Preserve](https://www.uga.edu), University of Georgia Extension
- [USDA Complete Guide to Home Canning](https://www.nationalhomecenter.org), National Home Center for Home Food Preservation
- [The Ball® Blue Book Guide to Preserving](https://www.ball.com)
- [What's Cooking with Mary Liz Wright](https://www.youtube.com), YouTube.com
- [Cottage Food](https://www.illinois.edu), University of Illinois Extension
- [Food Preservation Resources](https://www.illinois.edu), University of Illinois Extension

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