FILL YOUR PANTRY

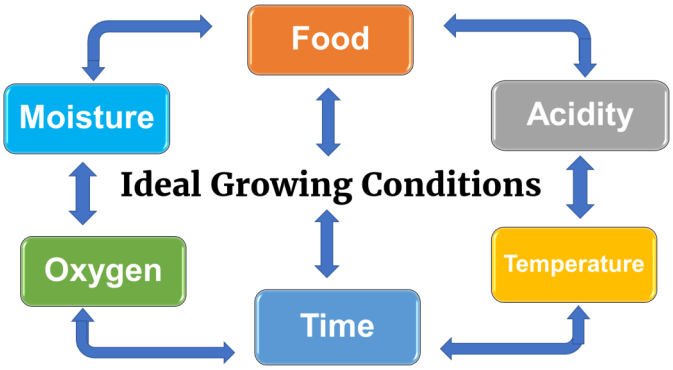
Goal of Food Preservation: Increase Shelf-life of Food and Keep Food Safe

Stop or Slow Down the Rate of Food Spoilage

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. This can increase the rate at which food spoils and can cause a foodborne illness.

Controlling the ideal growing conditions for these harmful microorganisms is the best way to prevent food spoilage and decrease the risk of foodborne illness.



Factors Contributes to Bacterial Growth

Selecting Produce

Preserving Food Does Not Improve Its Quality

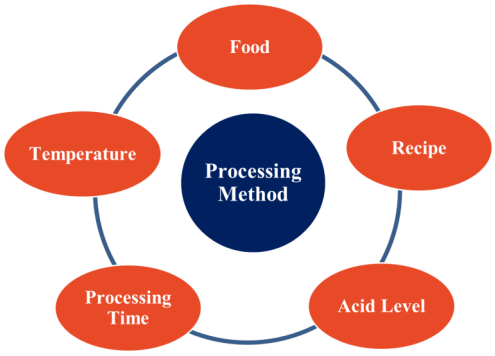
- Select fruits and vegetables that are free of disease, mold, overripe or insect damaged
- Select good quality produce
- Choose varieties best suited for canning, as quality varies among varieties of both fruits and vegetables
- Process produce just after harvesting or shortly after purchase
- If unable to process fruits and vegetables within 6-12 hours of harvest store in a cool, dry location to minimize deterioration

Use A Scientifcally Tested Recipe

There is a significant amount of science and chemistry 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 the use of a scientifically tested recipe. A scientifically tested recipe is one that has been specifically designed to ensure that when accurately followed it will result in a safe, quality product.

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



Safe Recipe Resources

- So Easy to Preserve, 6th Edition
- Complete Book of Home Preserving
- The Ball Blue Book
- National Center for Home Food Preservation

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Selecting and Filling Canning Jars

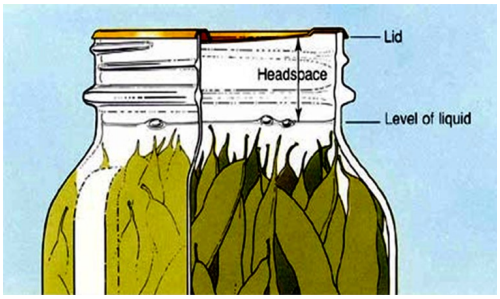
Always inspect jars before using. Jars may become brittle, scratched, cracked or chipped with repeated use. This may cause jars to break while processing jars in a canner or prevent jars from sealing.

Mason Type Jar

- Specially designed glass jar used for home canning to preserve food
- Mouth of jar has screw threads on the outer perimeter

Canning Lids

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



Sterilized Jars

- All products processed less than 10 minutes must have jars sterilized
- To sterilize jars; boil for 10 minutes in canner

Headspace

The unfilled space above the food in a sealed container and below the lid is headspace. This space is needed to allow for the expansion of food while processing.

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

Product	Headspace
Jams and Jellies	1/4 inch
Fruits and tomato based products	1/2 inch
Foods processed in pressure canner	1 - 1 1/4 inch
Follow the processing recommendations for each canning product	

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 greater, inhibit the growth of *C. botulinum* spores.

- The "pH" is a measure of acidity
- The higher the pH value, the less acid is in the food

Whether using a boiling water bath or 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.
However, tomato products, pickled foods and figs must have acid added to them because they are not acidic enough to prevent spoilage.

Adding Acid to Tomato Based Products		
Form of Acid	**Pint**	**Quart**
Bottled lemon juice	1 Tablespoon	2 Tablespoons
Citric acid	1/4 teaspoon	1/2 teaspoon
Vinegar	2 tablespoons	4 Tablespoons

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Home Food Preservation items are NOT the Same those Manufactured by 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 as it cools a vacuum seal is formed. High temperatures must be reached during the canning process to destroys harmful microorganisms and inactivate enzymes that can lead to food spoilage.

Boiling Water Bath Canning

The boiling-water bath canning process will reach a temperature of 212 °F at sea level, which is high enough to destroy most molds, yeasts, and microorganisms. However, it will not reach a high enough temperature to destroy the dangerous toxins produced by the bacterium *Clostridium botulinum (C. botulinum*).

Pressure Canning

Pressure canners are used to process low acid foods and will reach a temperature of 240 °F at sea level at 10 pounds of pressure, which is a hot enough to destroy the bacterial spores created by *C. botulinum.*

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.

Why Do *C. botulinum* Spores 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 the spores to grow. These spores produce vegetative cells which then multiply rapidly and may produce a deadly toxin, in a matter of days.

Why do Low Acid Foods Need to be Processed Using a Pressure Canner?

It was once thought 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.

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

Low-acid foods must be heated to a temperature of 240 °F it and held there for a specified amount of time. Only a pressure canner is able to achieve this intense temperature required to ensure your food will be processed safely at home. The amount of time food will need to be processed will depend on the type of food and the recipe being used. It is the combination of high temperature and prolonged processing time that destroy the bacteria and toxic bacterial spores produced by *C. botulinum.*

IMPORTANT: If at any time pressure goes below the recommended amount, bring the canner back to pressure and begin the timing of the process over, from the beginning (using the total original process time). This is important for the safety of the food.

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Low Acid Foods - Process Using Pressure Canner		
Asparagus	Peppers	Red meat
Beans all varieties	Pumpkin	Poultry
Beets	Potatoes	Fish
Carrots	Squash	Clams
Corn	Soups	Shrimp
Mixed vegetables	Spinach and greens	Crabmeat
Mushrooms	Succotash	Oysters
Okra	Tomatillos	
Peas	Winter Squash	

Testing of Pressure Canner Gauges

Pressure canner gauges should be tested annually to ensure they are working properly. If a pressure gauge is reading too low, a high enough temperature will not be reached to destroy the bacterial spores created by *C. botulinum.* If the pressure gauge is reading high, over processing will occur and impact both the quality and texture of the product.

If pressure canner gauges are off by more than two pounds, it must be replaced.

Clean and Inspect Canner Lid

Thoroughly clean lids after each use, keep it free of food and hard water residue. When cleaning remember to clean edges of lid and inspect vent port (steam vent) to ensure it has not become plugged.

Inspect gaskets for cracks. If gasket has become brittle or is not fitting properly, it will not be able to maintain the seal, and will need to be replaced.

A proper seal is critical to ensure a high enough temperature will be reached to destroy the bacterial spores created by *C. botulinum.* New seals can be purchased by contacting canner manufacturers or at hardware stores/home improvement stores.

Storing Canned Goods

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

Commercially Testing Your Recipe

Check out our website to learn more:
From Garden Gates to Dinner Plates site:
https://web.extension.illinois.edu/cottage/taskforce.cfm

Resources

Additional Resources

- So Easy to Preserve, 6th Edition
- Complete Book of Home Preserving
- The Ball Blue Book
- National Center for Home Food Preservation
- YouTube: What's Cooking with Mary Liz Wright
- From Garden Gates to Dinner Plates: https://web.extension.illinois.edu/cottage/taskforce.cfm
- University of Illinois Extension Food Preservation Resources: https://web.extension.illinois.edu/foodpreservation/

References:

How Do I? ...Can Vegetables. (n.d.). Retrieved May 21, 2020, from https://nchfp.uga.edu/how/can4_vegetable.html

General Canning Information. (2017, February 2). Retrieved May 21, 2020, from https://nchfp.uga.edu/how/general/ensuring_safe_canned_foods.html

Home Canning and Botulism. (2018, June 11). Retrieved May 14, 2020, from https://www.cdc.gov/features/homecanning/index.html

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