

Preserving the Harvest: Canning Basics



Today we will learn

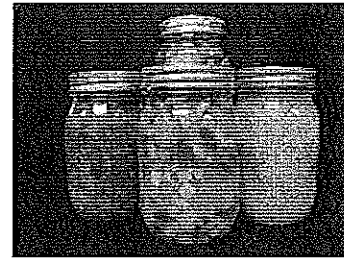
1. Factors that determine which canning method to use for home food preservation.
2. Proper canning practices for **home** food preservation.
3. When, why, and how to sterilize jars.
4. How lids seal. Why it is important to get a good seal to assure a safe product.
5. What to do if you think that a canned product is not safe (and what to do with it).

Canning Basics

How does canning (processing) preserve food?

1. The heat kills any bacteria that can cause illness or spoilage.
2. Creates an airtight seal of the lids

Photo courtesy of the National Center for Home Food Preservation.



Two Methods of Canning

Boiling water bath

Pressure

- Method depends on the acidity of the food.
 - High acid foods (\leq pH of 4.6) \rightarrow water bath canner
 - Low acid foods ($>$ pH 4.6) \rightarrow pressure canner

Photo courtesy of National Center for Home Food Preservation



The pH of food decides which canning method to use

pH = \leq 4.6 High Acid Foods		pH > 4.6 Low Acid Foods		
Pickles	Apricots	Okra	Beans	Hominy
Apples	Raspberries	Squash	Potatoes	Olives
Apricots	Strawberries	Pumpkins	Spinach	Shrimp
Oranges	Blueberries	Carrots	Peas	Clams
Grapefruit	Blackberries	Turnips	Corn	Meat
Peaches	Pineapple	Cabbage	Poultry	Asparagus
Grapefruit	Kraut	Onions		
Plums	Pears			
Figs				

WATER BATH CANNER	PRESSURE CANNER
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Source: *So Easy to Preserve*, 5th edition, University of Georgia,

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Use the right canning method to prevent botulism.

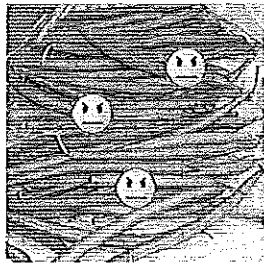
Clostridium botulinum

Often found in the soil; found in 2 forms

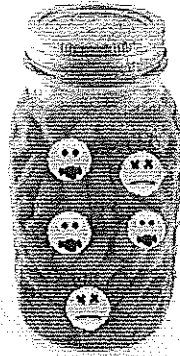
- Vegetative cells (active cells – produce a deadly toxin)
 - Anaerobic (can live without oxygen)
 - Killed by boiling in water (**212 degrees**)
 - Spores (often in the soil; inactive; in hibernation)
 - Spores can only be killed if they are boiled at **240 degrees (must be done with a pressure canner)**
- Loves a low-acid environment

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How botulism can be a problem



Fresh green beans with inactive spores.



Green beans canned in a water bath canner instead of pressure canner. The lids sealed, creating an anaerobic environment. The spores wake up and become active. They divide, become overpopulated and start to die off. When this happens, they produce the botulism toxin.

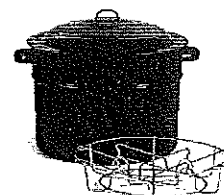


The green beans are now contaminated with the botulism toxin. You can't see the toxin!

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Types of Canning Methods

- Boiling Water Bath
 - Large covered cooking pot with a rack
 - Must be deep enough so at least 1 inch of water covers the top of the jars during processing
 - Diameter of the pot should be no more than 4 inches wider than the diameter of the burner
 - Most often used for canning high-acid foods such as tomatoes, most fruits, jellies, jams, and pickles



Boiling water bath canners and cooktops (the stove)

- If the cooktop is electric, the canner must have a flat bottom.
- A flat, ridged, or concave bottom canner may be used on a gas range.
- If the cooktop is solid surface, check the manufacturer's instructions **before** doing any canning.

Pressure Canner

- A special type of canner that has a lid which is able to be tightly closed so steam cannot escape.
- The pressure generated in this type of canner allows the food to be heated at temperatures higher than 212 degrees (boiling temperature).
- **The** recommended method of canning for low acid foods like vegetables, meat, & poultry.



Unsafe Methods of Canning

- Open kettle
- Steam canning
- Microwave oven canning
- Oven canning
- Dishwasher canning

Recipes

- Use **only** recipes that have been tested using research-based methods.
- Recipes from cookbooks, family, and some internet sites may not be safe to use.
- **Do not** alter or make up your own recipes – it is not safe!

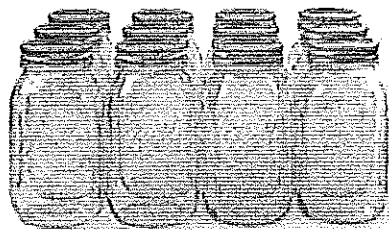
Where to get tested Recipes

<i>YES!</i>	<i>NO!</i>
<p>Current Extension publications</p> <p>USDA</p> <p>Makers of home canning equipment & ingredients</p>	<p>Personal internet sites</p> <p>Cookbooks</p> <p>“Back to nature” publications</p> <p>Out-of-date Extension publications</p>

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Equipment for Canning

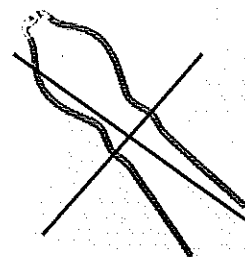
Jars



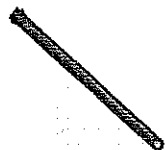
Jar lifter



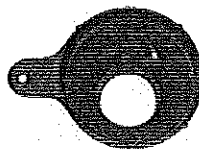
Jar wrench – *NOT RECOMMENDED*



Lid lifter



Funnel



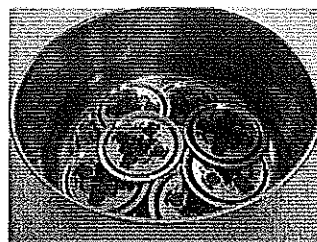
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Canning Jars

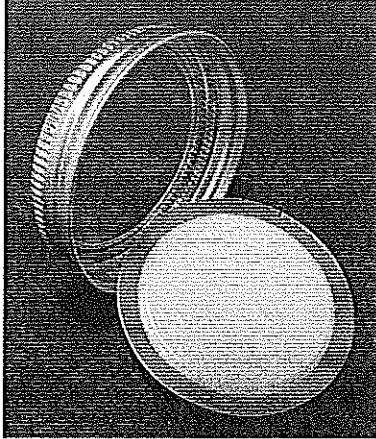
- Mason-type jar that is made for home canning use.
- Sizes of jars vary; pint and quart sizes are most common. Half-pint jars are used most often for jellies and jams.
- Regular and wide-mouth jars are available
- Most canning jars have a life span of about 13 years.

Lids

- 2-piece lid is recommended
 - Self-sealing lid + a screw band (ring)
- Buy the amount of lids that will be used in a year; old lids may not seal well
- Bands can be reused; Lids are used **only once**.
- Most lids need to be treated before they can be placed on the jar. Check the manufacturer's instructions.



Yes!



No!



Can I use mayonnaise jars for home food preservation?

- These jars are thin and can break if used (especially in a **pressure canner**).
- It **may** be possible to use the jars in a boiling water bath canner but the risk of breakage remains.

Prepare jars before use

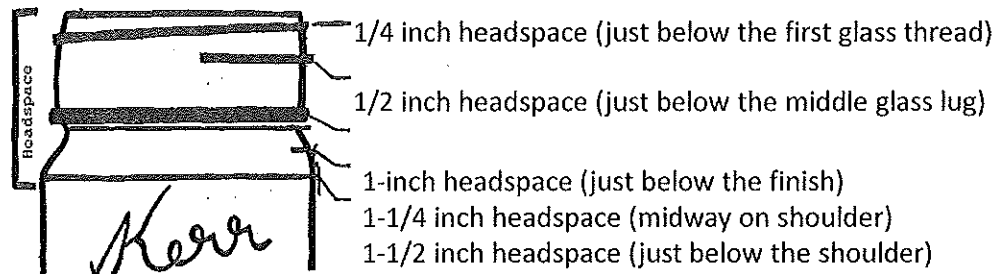
- Check for cracks and chips.
- Wash in hot, soapy water and rinse. Keep them hot until they are ready to be filled.
- If the jars are processed in a boiling water bath canner for **less than** 10 minutes they **must** be sterilized.
 - **Boil for 10 minutes; then keep hot until filled.**

If jars are processed in a pressure canner (no matter how long) **or** if they are processed in a boiling water bath canner for **10 minutes or longer**, they do not have to be sterilized.

Headspace

- The space in the jar between the underside of the lid and the top of the food or its liquid.
- Amount of headspace needed depends on the type of food and the method of canning.
 - This will be stated in the recipe.
- Too little headspace → food may boil over onto the rim of the jar and prevent it from sealing.
- Too much headspace → the processing time may not be enough to get all the air out of the jar, resulting in a poor seal. May also result in discolored food.

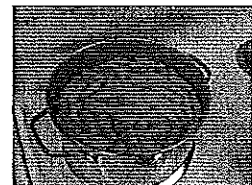
Headspace



Packing Methods

- Raw pack
 - Place raw, **unheated** foods in the jar
 - Pour boiling water, juice or syrup over the food until proper headspace is reached
- Hot pack
 - Food is heated for a recommended amount of time; then packed in jars
 - Add boiling liquid until right headspace is reached

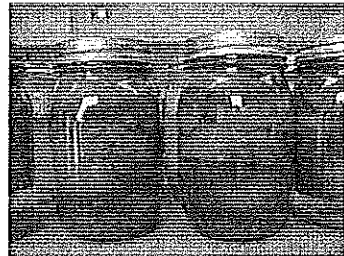
Preparing pickled carrots.



Packing Methods

- Foods often have a preferred method for packing (follow recipe instructions).
- If you have the choice between raw and hot pack, hot pack has some advantages:
 - Food is easier to pack (compared to raw)
 - Less floating of the food
 - Color and flavor is better

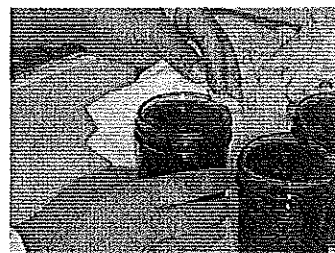
Raw packed tomatoes that have been canned. Photo courtesy of National Center for Home Food Preservation



Filling and Sealing jars

- Once jars are filled, release air bubbles
 - Place a flat plastic spatula between the food and the jar.
- Adjust the headspace.
- Wipe the jar rim with a damp paper towel.
- Place lid on the jar; add screw band and slightly tighten (not too loose or too tight)

Wiping the rims of jars. Photo courtesy of National Center for Home Food Preservation

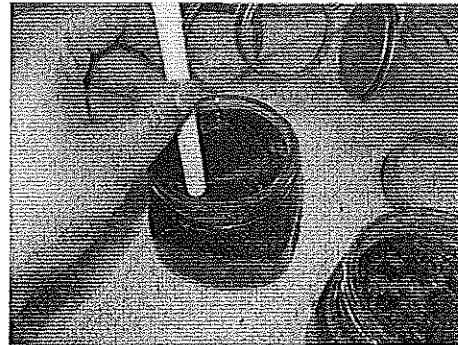


The wrong way



A metal knife can scratch the inside of the jar, causing it to become weak and breaking later during processing.

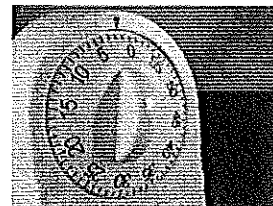
The right way



Using a bubble freer, plastic or rubber knife or spatula will get the air out without causing damage to the jars.

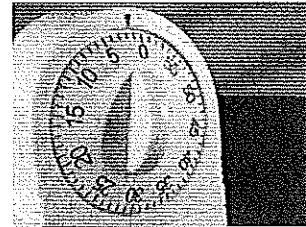
Processing Times

- The length of time jars are in the canner so foods are properly heated and the lids seal.
- Kills bacteria in the food so spoilage or foodborne illness doesn't happen.
- **This is a critical step in food preservation!**
- Processing times depend on:
 - Food (type, thickness, how it is packed)
 - Size of jar
 - Type of canner



Processing Times

- Processing times are based on **RESEARCH** and **should not** be adjusted.
 - Exception: locations with high altitude
- Under processing can lead to food that is spoiled or unsafe
- Over processing can lead to overcooked food



Why adjust processing times at high altitude?

- At high altitudes, water boils at a lower temperature and is not hot enough to kill bacteria.
- Solution?
 - Boiling water bath canner - boil longer
 - Pressure canner - raise the pressure
- Use tested recipes and guidelines for canning at higher altitudes.



How high altitude changes processing times

Food	Jar size	Usual time (< 1000 feet)	1001-3000 ft	3001-6000 ft
Water bath canning				
Crushed tomatoes	quart	45 minutes	50 minutes	55 minutes
Jelly	quart	varies	Add 1 minute of processing time per 1,000 ft of altitude	
Pressure canning				
Green beans	quart	25 minutes	Process (canning) time depends on altitude and type of pressure canner (dial vs. weighed gauge)	

Source: *So Easy to Preserve*, 5th edition, University of Georgia,

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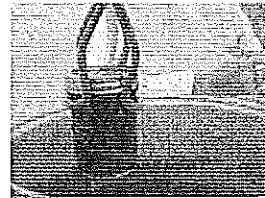
What happens during “processing?”

- Heat kills bacteria that can cause illness or spoilage.
- Air is pushed out of the jar during the heating process; as the jar cools afterwards a vacuum seal is formed.
- The vacuum seal keeps air and bacteria from getting back into the food.

My jars are “done” – now what?

- **Boiling water bath canner:** turn off heat and remove the canner lid; **wait 5 minutes** before removing the jars.
- **Pressure canner:** Let the canner depressurize; then wait 10 minutes before opening and removing the jars.
- Remove jars with a jar lifter. **Do not** tilt the jars.
- Place hot jars on dry towels or cake cooling rack to keep jars from touching a cold surface.
- Do not disturb while jars cool (12-24 hours).

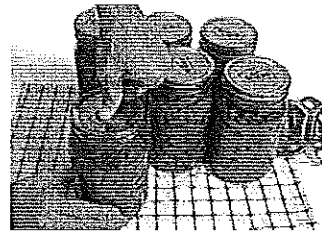
Photo courtesy of National Center
for Home Food Preservation



Make sure your jars are sealed

Press the middle of the lid with your finger. If the lid springs up when you lift your finger, the seal is not good.

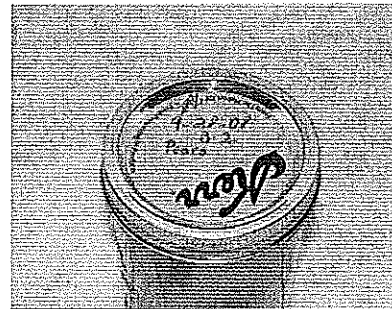
While cooling, you may hear a “pop” noise coming from the jars. This is a sign that the lids have sealed but it is a good idea to check them again 12 to 24 hours later.



Storing Canned Foods

- Remove screw bands; wipe jars to remove any food residues.
- Label and date the jars.
- Store in clean, cool, dark, dry place.

9-28-08 = date jars were processed
B-2 = second batch of jars processed
Label with the food processed (Pears)



What if the jars didn't seal?

- If you notice a jar that did not seal within 24 hours of processing, you have 3 options:
 - Refrigerate the contents and eat in a few days
 - Freeze
 - Reprocess using a **new lid** and the **full processing time**
- If the jars did not seal and it has been longer than 24 hours, those jars **should be thrown away**.

Why would a jar not seal?

- Chips or cracks in the jars.
- Food particles left on the jar mouth.
- Too much headspace.
- Using old lids (toss lids older than 1 year)
- Lifting jars by the tops.
- Tilting the jars while they are hot.
- Fat on the rim of the jar.

What causes jars to break?

- Setting a hot jar on a cold surface.
- Not keeping the heat steady when pressure canning.
- Using a sharp metal knife to remove air bubbles
- Dropping, hitting, or bumping jars.
- Using commercial “mayo” jars.
- Imperfections in the jars.
- Using old jars (average life span is 13 years).

What causes liquid loss?

- Jars packed too full (not enough headspace)
- Starchy foods absorbed some of the liquid during processing.
- Air bubbles were not removed before processing.
- Pressure canner was not used correctly.

The loss of liquid may cause the food to darken; however, as long the jar sealed the food should be safe to eat. Do not open the jar after processing to replace the liquid.

When to throw out home-canned foods

- Jars not processed correctly (e.g. canning green beans in a water bath canner).
- Unexplained cloudy canning liquid
- Strange odor
- Mold growth
- Jar did not seal and it has been longer than 24 hours.
- Bulging lid

Throwing out home canned foods

- For high acid foods, use a garbage disposal.
- If low-acid foods and tomatoes and if there is the possibility of spoilage:
 - Place unopened jars in a heavy garbage bag and place in the trash.
 - If jars are opened or leaking, boil the food for **30 minutes** then throw away. Place jars and lids in trash.
 - Clean and sanitize all cooking areas; **throw out** any sponges or washcloths used in the cleanup.

Questions?

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Acknowledgements

- National Center for Home Food Preservation.
- Georgia Cooperative Extension, *So Easy to Preserve*, 5th edition.
- *Food Safety Advisor Volunteer Handbook*, Washington State University & University of Idaho