

Canning Vegetables

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Originally adapted in 1980 by Lynn Price, Extension Food Specialist, Washington State University, from U.S. Department of Agriculture recommendations.

Revised in 2011 by Lizann Powers-Hammond, WSU Extension Area Educator. Reviewed in 2011 by Carolyn Raab, Oregon State University Extension Food and Nutrition Specialist; and Sandra McCurdy, University of Idaho Extension Food Safety Specialist.

Canning Vegetables

Home-canned vegetables add variety to the diet. Proper techniques must be used to ensure that they are high quality and safe to eat. Bacteria, yeasts, and molds are present even after washing. These microorganisms may form toxins under certain conditions, and they can decrease food quality.

When food is preserved for long-term storage, it is necessary to make conditions unfavorable for the growth of microorganisms. By canning vegetables with high temperatures, most microorganisms are destroyed. Others cannot grow in the air-free environment.

Following canning directions exactly is vital. Never can vegetables for which you do not have a research-tested processing time. The canning time is dependent upon many factors: acidity of the food, microorganisms which contaminate and grow in that food, type and size of pieces packed in the jar, tightness of pack, ratio of liquids to solids, amount of starch, size and shape of the container, and temperature at which the food is processed.

Selecting Equipment

The acidity of food determines which canning method to use. Because vegetables (except tomatoes) are low-acid foods, *Clostridium botulinum*, the bacteria which cause botulism, can survive and grow in these foods even when they are sealed in airless jars. Botulism is a serious food poisoning which can be fatal.

If you are canning vegetables, the USDA recommends you use a pressure canner large enough to hold at least four quart size jars. Pressure saucepans are not suitable for canning. Only pressure canning produces temperatures high enough (240°F, 28 degrees above boiling) to kill many bacteria which can grow in low-acid foods, including *Clostridium botulinum*. If vegetables are improperly processed, toxin could be present even though the canned vegetable looks, smells, and tastes normal. See PNW421, *Using and Caring for Your Pressure Canner*, for more information.

If you are canning fruits or tomatoes, you may safely use a boiling water canner. These foods are acid enough to keep problem-causing bacteria from growing. See PNW199, *Canning Fruits*, and PNW300, *Canning Tomatoes and Tomato Products*, for more information.

Standard Mason jars are recommended for pressure canning. Other jars are not heat-tempered and may break from the high temperatures inside

the canner. Or, the jars may not seal properly because the rims do not fit standard canning lids. Also, processing times may not be adequate for sizes and shapes other than those of standard canning jars.

Preparing Equipment

Inspect jars for cracks and chips and discard damaged ones. Inspect rings and discard any with dents or rust.

Wash jars, metal screw bands, and lids in hot, soapy water. Rinse. Place jars upside down on a clean, dry cloth, or leave them in the dishwasher until needed.

Check manufacturer's directions for heating lids before use. Don't reuse lids. Jars may not seal if lids are reused. Spoilage could result if jars don't seal, and food is wasted.

Before each use, inspect the pressure canner. See that the petcock and safety valve are not blocked. Clean them several times a year by drawing a string or pipe cleaner through the openings. Be sure the gasket around the cover fits tightly. Replace the gasket if it is loose, stiff, or cracked or there is water or steam leakage. If you have a weighted pressure gauge, keep it clean. Check your dial pressure gauges for accuracy once a year (more often if the canner is used frequently or dropped). It is possible for the dial to read 11 pounds, but not actually be operating at this pressure. Your county Extension office can tell you where the gauge check can be made.

If the dial is inaccurate by more than 2 pounds, buy a new one. Test the new gauge for accuracy before use.

Preparing Vegetables

Select young, tender vegetables. Gather or purchase only as much as you can practically handle in 2 or 3 hours. Work quickly throughout the preparation and canning of vegetables. If food is allowed to stand, quality is lowered and food spoilage is more likely to occur.

Sort for size and maturity. Wash in cool, running water or lift in and out of several changes of water. Avoid soaking. Trim blemishes and peel, if desired. Do not can decayed food.

Packing Jars

Follow either hot pack or raw pack directions in the chart. In the *hot pack* method, heat vegetables briefly by steaming or boiling in water.

How Much Fresh Produce is Needed for a Quart?	
Vegetable	Pounds
Asparagus	2½–4½
Beans, green, wax, or snap	1½–2½
Beans, lima	3–5
Beets, without tops	2–3½
Carrots, without tops	2–3
Corn, cream-style or whole kernel	3–6
Peas, green	3–6
Pumpkin	1½–3
Spinach and other greens	2–6
Squash, winter	1½–3

Then pack in jars and add cooking liquid. Freshly boiled water may also be used. If using the *raw pack* method, pack raw food in the jars and cover with boiling water.

The hot pack method has several advantages. Heated vegetables are easier to pack because they are softer. As a result, more can usually be put into each jar and fewer jars are needed. Food is further cleansed since the water used to heat the vegetables can be discarded when it is gritty or dark. Be careful, however, to follow packing directions in the chart exactly, as heat may not reach food in the center of jars that have been packed too tightly.

Pack food in liquid leaving a 1 inch headspace in all jars. Headspace is the distance between the food and/or liquid and the top of the jar. If jars are too full, some of the contents may bubble out during heat processing. Food may then become trapped on the sealing compound so that jars do not seal. Too much headspace may prevent a seal if the processing time is not long enough to exhaust excess air. After packing, run a plastic spatula around the inside of the jar to remove air bubbles.

Adding Salt

Add salt to vegetables for flavor; it is not necessary for preservation. Therefore, it may be omitted. If you use salt, try 1/2 teaspoon for each pint jar and 1 teaspoon per quart jar.

Closing Jars

Wipe jar rims and threads with a clean, damp paper towel to remove any

bits of food that might prevent a seal. Then cover with pretreated flat lids, putting the circle of sealing compound against the glass. Screw on the metal band. Follow the manufacturer's directions for preheating lids and tightening screw bands.

Processing in a Pressure Canner

1. Read the manufacturer's directions for use, particularly to check the canner before and during processing and the functions that involve audible hissing, jiggling, or rocking of the weighted gauge.
2. Have 2–3 inches of hot water in the canner. For hot-packed foods, water should be 180°F; for raw-packed food, 140°F.
3. Arrange jars on a rack so steam can flow freely around each one. Keep jars upright at all times. If a double layer of jars is necessary, use an additional rack to separate the layers. Stagger the placement of the jars over the first group.
4. Fasten the canner lid securely so no steam escapes around the rim. Leave the weight off the ventport or open petcock.
5. Turn the heat setting on the range to its highest position. Heat until steam flows freely from the ventport or petcock. While maintaining high heat, let steam exhaust continuously for 10 minutes.
6. After venting your canner, place the weight on the ventport or close the petcock. The canner will pressurize during the next 3–10 minutes.
7. Start timing the process when the pressure reading on the dial gauge indicates the recommended pressure has been reached in a dial gauge canner, or when the weighted gauge begins to jiggle as the manufacturer describes.
8. Regulate the heat under the canner to maintain a steady pressure at or slightly above the recommended pressure. Be sure to adjust pressure for altitudes over 1,000 feet if using a weighted gauge canner or 2,000 feet with a dial gauge canner. (See p. 11.)

If at any time the pressure goes below the recommended level, bring the canner back to pressure by increasing the heat and begin timing the process over, from the beginning, using the original processing time.

9. When the timed process is complete, turn off the heat and remove the canner from heat. Let the canner cool naturally; do not force cooling with water or cold towels.
10. After the canner is completely depressurized, remove the weight from the ventport or open petcock. Wait 10 minutes to help jar lid sealing. Then unfasten the lid and remove it with the underside away from you so that steam does not burn your face.
11. Using a jar lifter, remove jars from the canner without tilting them.

Cooling Jars

Carefully place the jars on clean towels or a cooling rack, leaving one inch space between each. Avoid placing jars on a cold surface or in a cold draft.

Let jars sit undisturbed for 12–24 hours. Do not touch the ring bands or lids until the jars are completely cooled.

Testing for Seal

When the jars are cool to the touch (about 12 hours), test each for a seal. Jars with flat, metal lids are sealed if:

1. The lid has popped down in the center.
2. The lid does not move when pressed down.
3. Tapping the center of lid with a spoon gives a clear, ringing sound.

Reprocessing

If a jar is not sealed, refrigerate or freeze the contents or reprocess within 24 hours of the initial processing. To reprocess, use a new lid and process for the full raw pack time. Foods that were under-processed or improperly processed and held over 24 hours should be destroyed.

Storing

Remove lid rings. Wipe jars. Label with the date, contents of the jar, and processing information.

Store jars in a cool, dark, dry place. For best eating quality and nutritive value, use within one year. Exposure to heat, freezing temperatures, or light decreases the quality and shelf life of canned food.

Before Using

As an extra measure of safety, boil home-canned vegetables for 10 minutes before eating at altitudes below 1,000 feet. Add another minute of boiling time for each additional 1,000 feet of elevation.

As you select each jar for use, examine it for signs of spoilage. With the jar at eye level, look for streaks of dried food on the outside of the jar. Inside of the jar look for cloudy canning liquid, rising air bubbles, or any unnatural color. While opening the jar, watch for spurting liquid or cotton-like mold growth on food surface or under the lid. Smell for unnatural or off odors. *Never taste food from a jar with an unsealed lid or food that shows signs of spoilage.*

Disposal

Carefully discard any jar of spoiled food to prevent possible illness to you, your family, or your pets. Spoiled low-acid foods should be treated as having produced botulinum toxin and handled in one of two ways:

- If the suspect jars are still sealed, write on the jar **“Poison: Danger. Do Not Eat.”** Place the jars in a heavyweight garbage bag. Close and place the bag in a regular trash container or dispose in a nearby landfill.
- If the suspect jars are unsealed, open, or leaking, they should be detoxified before disposal.

Detoxification Process

Wear rubber or heavy plastic gloves when handling suspect foods and cleaning up. Remove the jar lids and carefully place the suspect jars on their sides without splashing (along with the lids) in a stock pot, pan, or boiling water canner (8-quart volume or larger). Wash your gloved hands well. Carefully add water until the level is 1 inch above the jars. Put a lid on the pot and heat the water to boiling. Boil for 30 minutes to detoxify the food. Cool and discard the food and lids. Wash the jars and pot.

Spray or wet contaminated surfaces (such as counters and cutting boards) with a household chlorine bleach solution (1 part unscented 5–6% sodium hypochlorite bleach to 5 parts clean room temperature water) and let stand for 30 minutes. Wipe up treated spills with paper

towels and put them in a plastic bag before discarding in the trash. Rinse surfaces.

Soak metal utensils in a mild chlorine solution (1 teaspoon bleach to 1 quart room temperature water) for 30 minutes. Rinse.

SAFETY CHECKLIST

Due to the risk of botulism, it is extremely important that vegetables be canned according to the USDA-endorsed recommendations in this publication.

Did you...

- Can only vegetables with research-based processing times ?
- Can only vegetables that were firm and ripe? Overripe produce can allow bacteria to grow, causing spoilage.
- Follow the directions for filling jars exactly? Jars packed too tightly do not heat the same as those packed for research studies.
- Use a pressure canner in good working order? Boiling water and steam canners do not produce high enough temperatures to kill botulism-causing bacteria and other illness-causing organisms in low-acid foods.
- Check the accuracy of your canner's dial gauge in the current year?
- Vent your canner 10 minutes before it built pressure? Cold air trapped in a canner will cause inadequate heating of the jars and under-processing of the food.
- Use processing times no shorter than those listed on pp. 11–14?
- Adjust the pressure for altitudes above 1,000 feet for weighted gauge canners or 2,000 feet for dial gauge canners?
- Remove the jars from the canner at the completion of the canning process? Delaying removal can increase spoilage.
- Allow the jars to cool at room temperature?
- Seal the jars within 24 hours?
- Boil all home-canned vegetables for 10 minutes at altitudes below 1,000 feet? Add another minute of boiling time for each additional 1,000 feet of elevation?

CANNING LOW-ACID VEGETABLES

Canning Method. Vegetables must be processed at 240°F or higher in a pressure canner to prevent botulism poisoning and other spoilage and waste. Operate a weighted-gauge pressure canner at 10 pounds pressure (at sea level) to reach 240°F and a dial-gauge pressure canner at 11 pounds pressure (at sea level) to reach 240°F.

Adjustments for Altitude.

Weighted-gauge pressure canner:

- Sea level to 1,000 feet—use 10-pound weight.
- Above 1,000 feet—use 15-pound weight.

Dial-gauge pressure canner:

- Sea level to 2,000 feet—11 pounds pressure on dial.
- 2,001–4,000 feet—12 pounds pressure on dial.
- 4,001–6,000 feet—13 pounds pressure on dial.
- 6,001–8,000 feet—14 pounds pressure on dial.

Canning Time. The processing time for each food and each jar size is based on the preparation methods described in this bulletin. Processing times are accurate only when all directions are followed exactly.

Headspace. Leave 1 inch headspace in all jars, except as directed for fresh lima beans.

Venting. Air trapped in a pressure canner lowers the temperature in the canner. To be sure foods are safely processed, vent all types of pressure canners (including those labeled “self-venting”) 10 minutes before the pressure is allowed to rise. To vent a pressure canner, allow steam to escape steadily from the petcock for 10 minutes, then close the petcock or put the weighted gauge on the canner.

VEGETABLE	PREPARATION	Process Time (minutes) at 240°F (10 pounds pressure for weighted gauge; 11 pounds pressure for dial gauge. Increase pressure according to guidelines for higher altitudes.	
		PINTS	QUARTS
Asparagus	Wash. Trim off scales, tough ends. Wash again. Cut into 1 inch pieces or leave whole. <i>Hot pack.</i> Cover with boiling water; boil 2–3 minutes. Loosely pack into hot jars, leaving 1 inch headspace. Add salt, if desired. Cover with boiling cooking liquid. If liquid is gritty, use freshly boiled water. <i>Raw pack.</i> Pack tightly into hot jars without crushing, leaving 1 inch headspace. Add salt, if desired. Cover with boiling water.	30	40
Beans, green, wax, snap	Wash, trim ends, leave whole, or cut into 1 inch pieces. <i>Hot pack.</i> Cover with boiling water; boil 5 minutes. Pack loosely, leaving 1 inch headspace; add salt, if desired. Cover with boiling cooking liquid. <i>Raw pack.</i> Pack tightly into hot jars, leaving 1 inch headspace; add salt, if desired. Cover with boiling water.	20 20	25 25
Beans, fresh lima	Select young, tender beans. Shell and wash. <i>Hot pack.</i> Cover with boiling water; return to boil. Loosely pack, leaving 1 inch headspace. Add salt, if desired. Cover with boiling water. <i>Raw pack.</i> Loosely pack to these headspaces: Small beans: 1 inch for pints; 1½ inches for quarts Large beans: 1 inch for pints; 1¼ inches for quarts Do not press down or shake jar. Add salt, if desired. Cover with boiling water	40 40	50 50
Beans or peas, dried	Hydrate beans or peas by soaking 12 to 18 hours in a large pot covered with water. Drain water. To quickly hydrate beans, cover beans with boiling water in a saucepan. Boil 2 minutes, remove from heat, soak 1 hour and drain. <i>Hot pack.</i> Cover soaked beans with fresh water and boil 30 minutes. Add ½ teaspoon of salt per pint or 1 teaspoon per quart to the jar, if desired. Fill hot jars with beans or peas and cooking water, leaving 1 inch headspace.	75	90

VEGETABLE	PREPARATION	Process Time (minutes) at 240°F (10 pounds pressure for weighted gauge; 11 pounds pressure for dial gauge. Increase pressure according to guidelines for higher altitudes.		
		PINTS	QUARTS	
Beets	Sort for size; cut off tops, leaving 1 inch stem and root. Wash <i>Hot pack.</i> Cover with boiling water; boil 15–25 minutes until skins slip. Skin, trim. Leave baby beets whole. Cut medium or large beets into ½ inch-cubes or slices. Halve or quarter very large slices. Pack into hot jars leaving 1 inch headspace; add salt, if desired. Cover with boiling water.	30	35	
Carrots	Wash, peel, and slice or dice. <i>Hot pack.</i> Cover with boiling water, bring to boil and simmer for 5 minutes. Pack into hot jars leaving 1 inch headspace; add salt, if desired. Cover with boiling cooking liquid <i>Raw pack.</i> Pack tightly into hot jars with raw carrots, leaving 1 inch headspace. Pack tightly. Add salt, if desired, and boiling water.	25 25	30 30	
Chili peppers	Wash, remove cores and seeds. Slash two or four slits in each pepper. <i>Hot pack.</i> Either blanch in boiling water or blister outer skin with heat*. Peel peppers. Pack loosely; add salt, if desired. Cover with boiling water. Pack in half-pint or pint jars only. Process time for half-pints is the same as pints. <i>*Green chili may be blistered in a hot oven or broiler (400°F) for 6–8 minutes, over a gas or electric burner covered with a heavy wire mesh, or on an outdoor charcoal grill (place chilies 5–6 inches above coals). Be sure heat source is very hot. Turn chilies often to prevent scorching and allow even blistering. Cool before peeling. For easier peeling, place in a pan and cover with a damp towel for a few minutes. Handling chili can burn hands. Wear rubber gloves and keep hands away from eyes.</i>	35	Not recommended	

VEGETABLE	PREPARATION	Process Time (minutes) at 240°F (10 pounds pressure for weighted gauge; 11 pounds pressure for dial gauge. Increase pressure according to guidelines for higher altitudes.	
		PINTS	QUARTS
Corn, cream-style	Husk, remove silk, and wash ears. Blanch ears 4 minutes in boiling water. Cut corn from cob at half-kernel depth, then scrape remaining corn from cob with table knife. <i>Hot pack.</i> Add 1 pint boiling water for each quart of corn; heat to boiling. Pack in hot pint jars only (larger jars cannot be used because heat penetrates this thick food very slowly) leaving 1 inch headspace. Add salt, if desired.	85	Not recommended
Corn, whole kernel	Husk, remove silk, and wash ears. Blanch 3 minutes in boiling water. Cut kernels from cob at three-fourths kernel depth. <i>Hot pack.</i> Add 1 cup hot water for each quart of corn; heat to boiling and simmer 5 minutes. Pack into hot jars, cover with boiling cooking liquid leaving 1 inch headspace. Add salt, if desired. <i>Raw pack.</i> Pack into hot jars without shaking or pressing down leaving 1 inch headspace. Add salt, if desired, and boiling water.	55 55	85 85
Mushrooms	Trim stems, discolored spots. Soak in cold water 10 minutes to remove clinging soil, then wash in clear water. Leave small mushrooms whole; cut large ones into halves or quarters. <i>Hot pack.</i> Cover with water in saucepan and boil 5 minutes. Pack hot into hot jars, leaving 1 inch headspace; add salt, if desired. For better color, add 1/8 teaspoon crystalline ascorbic acid per pint. Cover mushrooms with fresh boiling water. Pack in pint or half-pint jars only. The process time for half pints is the same as for pints.	45	Not recommended

Caution: Do not can wild mushrooms.

VEGETABLE		PREPARATION	PINTS		QUARTS	
Process Time (minutes) at 240°F (10 pounds pressure for weighted gauge; 11 pounds pressure for dial gauge. Increase pressure according to guidelines for higher altitudes.						
Peas, green	Shell and wash.					
	<i>Hot pack.</i> Cover with boiling water; boil 2 minutes. Pack loosely into hot jars leaving 1 inch headspace. Add salt, if desired. Cover with boiling liquid.		40		40	
	<i>Raw pack.</i> Pack into hot jars without shaking or pressing down, leaving 1 inch headspace. Add salt, if desired. Cover with boiling water.		40		40	
Peas, snow, sugar, snap, pod	Not recommended for canning because of poor quality results.		Not recommended		Not recommended	
Potatoes, white	Wash, peel. To prevent darkening, place in ascorbic acid solution (1 teaspoon ascorbic acid per gallon of water). Drain					
	<i>Cubed.</i> Cut into ½-inch cubes. Cook 2 minutes in boiling water. Drain. Pack into hot jars leaving 1 inch headspace; add salt if desired. Cover with fresh hot water.		35		40	
	<i>Whole.</i> Use mature potatoes, small to medium size. Boil 10 minutes and drain. Pack into hot jars, leaving 1 inch headspace; add salt, if desired. Cover with fresh hot water.		35		40	
Pumpkin and winter squash, cubed	Wash, remove seeds, peel. Cut into 1 inch cubes.					
	<i>Hot pack.</i> Add just enough water to cover; boil 2 minutes. Pack into hot jars leaving 1 inch headspace; add salt, if desired. Cover with boiling liquid. <i>Caution:</i> Do not mash or puree before canning.		55		90	
Spinach, other greens	Use fresh, tender greens. Wash; remove tough stems, midribs.					
	<i>Hot pack.</i> Place about 1 pound in blancher basket or cheesecloth bag; steam 3–5 minutes or until well wilted. Pack loosely into hot jars leaving 1 inch headspace. Add salt, if desired (¼ teaspoon to pints, ½ teaspoon to quarts). Cover with fresh boiling water.		70		90	

Mixed Vegetables

6 cups sliced carrots
6 cups cut, whole kernel sweet corn
6 cups cut green beans
6 cups shelled lima beans
4 cups whole or crushed tomatoes
4 cups diced zucchini

Optional mix—You may change the suggested proportions or substitute other vegetables except leafy greens, dried beans, cream-style corn, winter squash, or sweet potatoes.

Except for zucchini, wash and prepare vegetables as described in section for each vegetable. Wash, trim, and slice or cube zucchini. Combine all vegetables; add enough water to cover. Boil 5 minutes. Fill jars with hot vegetables and liquid, leaving 1 inch headspace. Add salt if desired. Process at 10 pounds pressure (weighted gauge) or 11 pounds pressure (dial gauge) for 75 minutes for pints and 90 minutes for quarts. Adjust for altitude if necessary.

Vegetable Soup

Vegetable, dried bean or pea, meat, poultry, or seafood* soups can be canned.

Select, wash, and prepare vegetables as described for the specific foods. Cook vegetables. If dried beans or peas are used, they *must* be rehydrated first. For each cup of dried beans or peas, add 3 cups of water, boil 2 minutes, remove from heat, soak 1 hour, and heat to boil; drain. If meat is to be added, cover meat with water and cook until tender. Cool meat and remove bones.

Combine solid ingredients with meat or vegetable broth, tomatoes, or water to cover. Boil 5 minutes. Fill jars halfway with solid mixture. *It is unsafe to fill jars beyond halfway with solids.* Fill remaining space with liquid, leaving 1 inch headspace. Salt to taste, if desired.

Process at 10 pounds pressure (weighted gauge) or 11 pounds pressure (dial gauge) for 60 minutes for pints and 75 minutes per quarts. Adjust pressure for altitude if necessary.

*Process 100 minutes if soup contains seafood.

Caution: It is not safe to thicken or add noodles or other pasta, rice, flour, cream, or milk before canning. These ingredients can be added after jars are opened and being prepared for serving.

Frequently Asked Questions

- Q. Why isn't there a processing time for cabbage, broccoli, or summer squash?
- A. There are some vegetables which do not have a research-based processing time. The decision that a processing time would not be developed for these vegetables was based on either quality or safety problems. The vegetables listed above are very poor quality when canned.
- Q. Why shouldn't I can wild mushrooms?
- A. There are no research-based processing times for wild mushrooms. Since wild mushrooms have a different texture from commercially-grown mushrooms, the processing time for purchased mushrooms does not apply to wild mushrooms.
- Q. Why does it say that cream-style corn should only be canned in pint jars?
- A. Heat penetrates slowly into cream-style corn, mushrooms, and chili peppers. If these foods were canned in quart jars, the food next to the jar would be badly overcooked before the center portion of the food was heated to the necessary temperature.

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