

Canning Vegetables

Fact Sheet No. 9.348

Food and Nutrition Series | Preservation

by P. Kendall and E. Shackelton*

Canning can be an economical method of preserving vegetables to enjoy throughout the year, and the nutrient value is often as good or better than fresh produce. National movements promoting both the environmental and health benefits of consuming more locally-grown foods has spurred a renewed interest in home gardens, farmers' markets and home food preservation, but if not done safely, your canned foods can become contaminated with the bacteria, *Clostridium botulinum*, that could make you very sick—or kill you.

In order to supply sufficient heat to destroy the botulism-causing bacteria, vegetables must be processed in a pressure canner at the number of pounds needed to achieve 240° F. Do not take short cuts in recommended preparation or processing procedures. Failure to properly process low-acid foods in a pressure canner can allow the survival of the bacteria that cause botulism. Protect yourself and your family by knowing and following safe canning methods.

See Table 1
pages 3-4

Prepare Equipment and Jars

Pressure canner. Make sure your pressure canner has a tight-fitting cover, clean exhaust vent (or petcock) and safety valve, and an accurate pressure gauge. There are two types of pressure gauges: weighted and dial gauges. Dial gauges need to be checked for accuracy before

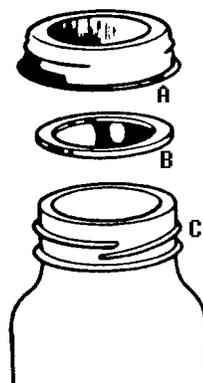
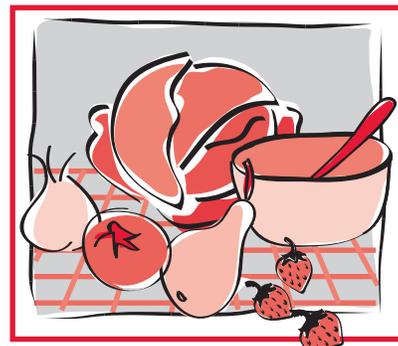


Figure 1: Canning jars and lids.
A. Narrow metal screw band.
B. Metal lid with sealing compound.
C. Canning jar seal area.

using but weighted gauges need only to be cleaned before using. Check gauges each season before use, more frequently if used often. Contact your Colorado State University Extension county office for more information about having your gauge checked.

Use a pressure canner that holds at least 4 quart jars. Smaller pressure canner-saucepans are not recommended for home canning as they heat up and cool down too quickly to ensure adequate heat penetration using the processing schedules specified in this fact sheet.

Canning jars and lids. Discard any jars and closures with cracks, chips, dents or rust, since defects can prevent an airtight seal. Use jars designed specifically for home canning. Use only the half-pint, pint and quart sizes. Wash jars in hot, soapy water and rinse well before using. Keep the jars hot until they are filled and placed in the canner. This will help prevent jar breakage. Prepare new metal lids as manufacturer directs (See Figure 1). Do not use commercial food jars (mayonnaise, pasta sauce, etc.) as they break easily in pressure canners and may not seal.



Quick Facts

- Most recipes for home canned foods will require high altitude adjustments to time and/or the processing method.
- Can vegetables only in a pressure canner and at the pressure required to reach 240° F for your altitude. At varying altitudes, the processing time stays the same, but adjustment to the pounds pressure is required.
- Vent all pressure canners 10 minutes before starting the actual canning processing time.
- Before tasting or serving, boil all home-canned, low-acid vegetables 10 minutes plus one minute for 1,000 feet.

© Colorado State University Extension. 10/99. Revised 9/13.
www.ext.colostate.edu



*P. Kendall, Ph.D., R.D., Colorado State University Extension food safety specialist and professor emeritus; and E. Shackelton, Extension assistant, department of food science and human nutrition. 9/2013

Prepare Vegetables

Select only fresh, young, tender vegetables for canning. The sooner you can get them from the garden to the jar, the better. For ease of packing and even cooking, sort the vegetables for size and ripeness. Wash all vegetables thoroughly. Soil often contains bacterial spores, the form of bacteria which is hardest to destroy. Don't let vegetables soak; they may lose flavor and nutrients. Handle them gently to avoid bruising.

Fill and Close Jars

The hot-pack method is recommended for all low-acid foods, including vegetables. Some vegetables may also be packed raw. (See individual directions in Table 1 to determine which method to use.)

Raw pack. Put cold, raw vegetables into jars and cover with boiling water. Pack most raw vegetables (except starchy ones) firmly into the jars. Loosely pack starchy vegetables such as corn, peas and lima beans, because they expand during processing.

Hot pack. Heat vegetables in water or steam before packing. Then cover with the boiling cooking liquid or water. Loosely pack the hot food.

For both hot and raw pack, use enough liquid to fill around and cover the food. Read the directions for each vegetable for the amount of space to leave between the top of the food and the top of the jar. This headspace is important to obtain a good seal.

Salt may be added to each jar, if desired. Salt is added only for seasoning and does not help preserve the food. If salt is used, canning salt is recommended to prevent the liquid from turning cloudy. Use 1/2 teaspoon salt per pint.

To remove any trapped air bubbles, insert a nonmetallic spatula between the food and the jar. Slowly turn the jar and move the spatula up and down to allow air bubbles to escape. Add more liquid if necessary to obtain the proper headspace. Wipe the jar rim with a clean damp paper towel to

remove any food particles. Place pre-treated lid on the jar. Screw on the band fingertip tight.

Process in Pressure Canner

Read the manufacturer's instructions for your pressure canner. General directions for using pressure canners are as follows:

- Put 2 to 3 inches of hot water in the canner. Place filled jars on the rack, using a jar lifter. Fasten canner lid securely. Leave weight off vent port or open petcock.
- Maintaining a high heat setting, exhaust steam 10 minutes.
- Place weight on vent port or close petcock. The canner will pressurize in the next three to five minutes.
- Start timing the canning process when the pressure reading on the dial gauge indicates that the recommended pressure for your altitude has been reached, or when the weighted gauge begins to jiggle or rock. Regulate heat under the canner to maintain a steady pressure at or slightly above the correct gauge pressure. Quick and large pressure variations during processing may cause unnecessary liquid losses from jars. Weighted gauges should jiggle or rock slowly throughout the process.
- When the timed process is completed, turn off the heat, remove the canner from the heat if possible, and let the canner depressurize. Do not force-cool the canner by pouring cold water over it. When the pressure registers zero, wait a minute or two, then slowly open the petcock or remove weighted gauge. Unfasten the cover and tilt the far side up so steam can escape away from you.
- Carefully remove jars from canner and place on rack, dry towels or newspapers. Allow jars to cool untouched, away from drafts, for 12 to 24 hours before testing seals.

Post-Canning

Test the seals on the jar lids. Press flat metal lids at the center of the lid. Lids should be slightly concave and not move when pressed. Remove screw bands and wipe jars with a clean, damp cloth. Label sealed jars with contents, canning method and date. Store in a clean, cool, dry, dark place.

Treat any unsealed jars of food as fresh. The food should either be eaten immediately, refrigerated, frozen or reprocessed. The food can safely be reprocessed if the unsealed jar is discovered within 24 hours. To re-can, check the jar sealing surface for tiny nicks and change the jar, if necessary. Repeat the entire canning process, using a new lid.

On Guard Against Spoilage

Bulging lids or leaking jars are signs of spoilage. When you open the jar, look for other signs, such as spurting liquid, an off odor, or mold.

Low-acid canned vegetables and meats can contain botulism toxin without showing signs of spoilage. Given the challenges of high altitude food preservation and as an additional safety precaution, boil all home-canned, low-acid vegetables and meats before tasting or serving in a saucepan for 10 minutes, plus 1 minute for each 1,000 feet above sea level (15 minutes at 5,000 feet). If food looks spoiled, foams, or has an off odor during heating, discard it.

Dispose of all spoiled home-canned food where it will not be eaten by people or pets. If possible, boil all spoiled, low-acid canned food for 30 minutes before disposing of it to destroy any toxin present and prevent its spread.

References and Resources

USDA Complete Guide to Home Canning. U.S. Department of Agriculture. Information Bulletin No. 539, 2009.

So Easy To Preserve, 5th Edition, 2006. University of Georgia Cooperative Extension.

Table 1. Directions for canning vegetables at 240 degrees F.

Caution! Altitude Adjustments: The processing times and pressures given are those recommended by the U.S. Department of Agriculture. **DO NOT DECREASE the processing times or pressures given.** At varying altitudes, the PROCESSING TIMES STAY THE SAME, but you must make the following pressure adjustments:

In a Dial Gauge Pressure Canner

- At altitudes of 0-2000 feet, process at 11 pounds pressure
- At altitudes of 2001-4000 feet, process at 12 pounds pressure
- At altitudes of 4001-6000 feet, process at 13 pounds pressure
- At altitudes of 6001-8000 feet, process at 14 pounds pressure
- At altitudes of 8001-10000 feet, process at 15 pounds pressure

In a Weighted Gauge Pressure Canner

- At altitudes of 0-1000 feet, process at 10 pounds pressure
- At altitudes above 1000 feet, process at 15 pounds pressure

There are NO safe boiling water processing times for any of the vegetables listed in this fact sheet.

Vegetable	Preparation and Pack	Processing Time (min.)	
		Pints	Quarts
Asparagus, spears or pieces	Use tender, tight-tipped spears, 4-6 inches long. Wash and trim off tough scales. Break off tough stems and wash again. Cut in 1-inch pieces or can whole.		
	Raw Pack – Fill jars with raw asparagus. Pack as tightly as possible, without crushing, to 1 inch of jar tops. Add boiling water, leaving 1-inch headspace.	30	40
Beans or peas, dry (all varieties)	Sort and wash dry seeds. Cover with cold water and let stand 12-18 hours in cool place. Drain.		
	Hot Pack Only – Cover soaked beans with fresh water and boil 30 minutes. Fill jars with beans or peas and cooking water, leaving 1-inch headspace.	75	90
Beans, fresh lima, butter or shell beans	Can only young, tender beans. Shell beans and wash thoroughly.		
	Raw Pack – Pack raw beans loosely into jars. For small beans, fill 1 inch from top for pints and 1 1/2 inches for quarts. For large beans, fill 1 inch from top for pints and 1 1/4 inches for quarts. Do not press or shake down. Fill jars with boiling water, leaving 1-inch headspace.	40	50
Beans, green, snap, wax, Italian; pieces	Wash; trim ends. Leave whole or cut or snap into 1-inch pieces.		
	Hot Pack – Cover with boiling water, bring to a boil. Pack hot beans loosely in jars to 1 inch of jar tops. Cover with boiling water, leaving 1-inch headspace.	40	50
Beans, green, snap, wax, Italian; pieces	Raw Pack – Pack beans tightly into jars to 1 inch of jar tops. Add boiling water, leaving 1-inch headspace.	20	25
	Hot Pack – Cover beans with boiling water; boil 5 minutes. Fill jars loosely to 1 inch of jar tops. Add boiling water, leaving 1-inch headspace.	20	25
Beets, whole, cubed or sliced	Sort for size. Cut off tops, leaving tap root and 1 inch of stem. Wash.		
	Hot Pack Only – Cover with boiling water. Boil until skins slip easily - 15-25 minutes, depending on size. Cool, remove skins, trim off stems and and roots. Can baby beets whole. Cut medium and large beets in 1/2-inch slices or cubes, or halve or quarter. Fill jars with hot beets and fresh hot water, leaving 1-inch headspace.	30	35
Carrots, sliced or diced	Wash, peel and rewash. Baby carrots can be left whole. Slice or dice larger ones.		
	Raw Pack – Pack carrots tightly into jars to 1 inch of jar tops. Add boiling water, leaving 1-inch headspace.	25	30
Corn, cream-style	Hot Pack – Cover carrots with boiling water. Simmer 5 minutes. Fill jars to 1 inch of jar tops. Add hot cooking liquid, leaving 1-inch headspace.	25	30
	Husk corn, remove silk and wash. Blanch ears 4 minutes in boiling water. Cool in ice water. Cut corn from cob at about the center of kernel. Scrape cob.		
Corn, whole-kernel	Hot Pack Only - To each quart of corn and scrapings in saucepan, add 2 cups boiling water. Boil. Fill pint jars with hot corn mixture, leaving 1-inch headspace.	85	not recommended
	Husk corn, remove silk and wash. Blanch 3 minutes in boiling water. Cool in ice water. Cut from cob at about 3/4 depth of kernel. Do not scrape cob.		
Greens, including spinach	Raw Pack – Pack corn in jars, leaving 1-inch headspace. Do not shake or press down. Add fresh boiling water, leaving 1-inch headspace.	55	85
	Hot Pack – To each quart of kernels in saucepan, add 1 cup hot water. Heat to boil and simmer 5 minutes. Fill jars with corn and cooking liquid, leaving 1-inch headspace.	55	85
Greens, including spinach	Sort and wash thoroughly. Cut tough stems and midribs.		
	Hot Pack Only – Steam greens, 1 lb. at a time, for 3-5 minutes or until wilted. Fill jars loosely with greens. Add fresh boiling water, leaving 1-inch headspace.	70	90

Table 1, continued. Directions for canning vegetables at 240 degrees F.

Vegetable	Preparation and Pack	Processing Time (min.)	
		Pints	Quarts
Mixed vegetables	Hot Pack Only – Select your favorite mixture of vegetables, except leafy greens, dried beans, cream-style corn, winter squash or sweet potatoes. (Equal portions of carrots, whole kernel sweet corn, green beans, lima beans, tomatoes and diced zucchini make a good mix.) Prepare each vegetable as for canning and cut into desired sizes. Mix together, cover with boiling water and bring back to a boil. Boil 5 minutes. Pack hot vegetables into jars, leaving 1-inch headspace. Add 1/2 teaspoon salt to each pint jar, if desired. Fill jar to 1 inch from top with boiling liquid.	75	90
Mushrooms, whole or sliced	Select only high quality, small to medium-size domestic mushrooms with short stems. Do not can wild mushrooms. Trim stems and discolored parts. Soak in cold water for 10 minutes to remove dirt. Wash in clean water. Leave small mushrooms whole; cut large ones. Hot Pack Only – Cover mushrooms with water in a saucepan and boil 5 minutes. Fill jars with hot mushrooms, leaving 1-inch headspace. Add 1/8 teaspoon of ascorbic acid powder or a 500-milligram tablet of vitamin C to each jar to prevent discoloration. Add fresh hot water, leaving 1-inch headspace.	45	not recommended
Okra	Hot Pack Only – Wash and trim pods. Cut in 1 inch pieces or leave whole. Pre-cook okra for 2 minutes in boiling water. Drain. Pack into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill to 1 inch from top with boiling water.	25	40
Peas, green or English; shelled	Select filled pods containing young, tender sweet seeds. Shell and wash peas. Raw Pack – Fill jars with raw peas. Add boiling water, leaving 1-inch headspace. Hot Pack – Cover peas with boiling water, boil 2 minutes. Fill jars loosely with hot peas. Add cooking liquid, leaving 1-inch headspace.	40 40	40 40
Peppers, hot or sweet	Select firm yellow, green or red peppers. Wash and drain. Small peppers may be left whole. Large peppers may be quartered. Remove cores and seeds. Caution! Wear plastic gloves while handling hot peppers or wash hands thoroughly with soap and water before touching face. Hot Pack Only – Make 2 to 4 slits in each pepper. Blanch in boiling water or blister skins by placing peppers in hot oven (400 degrees F) or broiler for 6-8 minutes. Place blistered peppers in pan, cover with damp cloth. Let cool several minutes, then peel. Flatten whole peppers. Fill jars loosely with peppers to 1 inch of jar tops. Add boiling water, leaving 1-inch headspace.	35	not recommended
Potatoes, white; cubed or whole	Wash, pare. Leave whole if 1-2 inches in diameter or cut into 1/2-inch cubes. Dip potatoes into solution of 1/2 teaspoon ascorbic acid per quart of water to prevent darkening. Drain. Hot Pack Only – Place potatoes in saucepan and cover with boiling water. Boil cut potatoes for 2 minutes, whole for 10 minutes. Drain. Fill jars with hot potatoes and fresh hot water, leaving 1-inch headspace.	35	40
Pumpkin and winter squash, cubed	Wash; remove seeds and pare. Cut into 1-inch cubes. Hot Pack Only – Place in saucepan, cover with boiling water. Boil 2 minutes. Do not mash or puree. Fill jars with cubes and cooking liquid, leaving 1-inch headspace.	55	90
Sweet potatoes, pieces or whole	Choose small to medium-sized potatoes. Wash well. Hot Pack Only – Boil or steam until partially soft (15 to 20 minutes). Remove skins. Cut medium potatoes to uniform pieces. Do not mash or puree. Fill jars, leaving 1-inch headspace. Cover with fresh boiling water or syrup, leaving 1-inch headspace.	65	90
Tomatoes	See CSU Extension Fact Sheet 9.341 Canning Tomatoes and Tomato Products.		
Vegetable Soup	Hot Pack Only – Choose your favorite vegetable ingredients. Prepare each as you would for a hot pack in canning. Cooked meat or poultry can also be added, if desired. Combine ingredients with hot water, broth, or tomatoes and juice to cover. Boil 5 minutes. If dried beans or peas are used, they MUST be rehydrated first. CAUTION: DO NOT THICKEN OR ADD MILK, CREAM, FLOUR, RICE, BARLEY OR OTHER GRAINS, NOODLES OR OTHER PASTA. These ingredients can slow down the rate of heating and these process times have not been tested for use with soups containing these ingredients. Add salt to taste, if desired. Fill jars halfway with solid mixture. Continue filling with hot liquid, leaving 1-inch headspace.	60	75
	Note: Cooked seafood can also be added. If it is, additional processing time will be needed.	100	100