

## Preserving Food: Canning Vegetables

Organisms that cause food spoilage—molds, yeasts and bacteria—are present everywhere in the air, soil and water. Enzymes that may cause undesirable changes in flavor, color and texture are present in raw vegetables.

When vegetables are canned, they are heated hot enough and long enough to destroy spoilage organisms. This heating (or processing) also stops the action of enzymes.

Pressure canning is the only safe method of canning all vegetables (except tomatoes). Jars of food are placed in a pressure canner which is heated to a temperature of at least 240°F. This temperature can be reached only in a pressure canner.

The *Clostridium botulinum* microorganism is the main reason pressure canning is necessary. Though the bacterial cells are killed at boiling temperatures, the spores they form can withstand these temperatures. The spores grow well in low acid foods in the absence of air, such as in canned low acid foods (vegetables and meats). When the spores begin to grow, they produce the deadly botulinum toxins (poisons). This growth can occur without any noticeable signs of spoilage in the sealed jar.

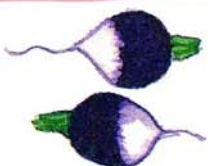
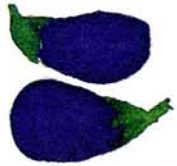
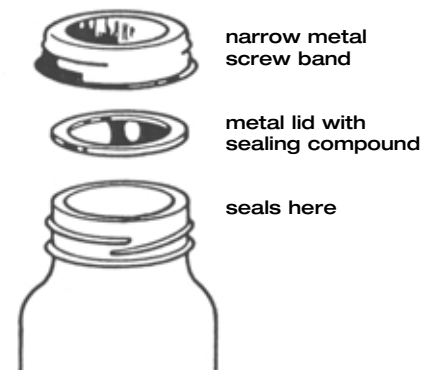
Luckily, these spores can be destroyed by canning the food at a temperature of at least 240°F. This temperature is above the 212°F boiling point of water, so it can only be reached in a pressure canner at the appropriate pressure (10 pounds at sea level). Because most people do not can at sea level, use the pressure given with the directions for canning vegetables. The pressures are different for dial and weighted gauge canners, because the weighted gauge canners have extra weight built in. Also the pressures are different for different altitudes.

### Equipment

A *pressure canner* is necessary for home canning. It must have a rack in the bottom, a tight-fitting cover, exhaust vent (or petcock), safety valve and an accurate pressure gauge. The pressure gauge may be a weighted gauge that fits over the vent or a dial gauge on which a needle indicates the pressure inside the canner. Newer canners may also have an extra cover lock as an added safety feature. *Canning jars* should be checked closely for cracks or chips. Use jars specifically designed for home canning. Commercial food jars such as mayonnaise or coffee jars break easily, especially in pressure canners, and may not seal. Use only one half-pint, pint and quart sizes.

Before using the jars, wash them in hot soapy water and rinse well. Keep the jars hot until they are filled and placed in the canner. This will help prevent jar breakage.

*Two-piece metal canning lids* need to be prepared for use. The lids can be used only one, but the screw bands can be reused as long as they are in good condition. Read the manufacturer's instructions for treating the lids. Some need to be covered with hot water, while others need to be boiled for a minute or more. Do not reuse lids from commercially canned foods for home canning.



## ***Preparing the Vegetables***

Select only fresh, young, tender vegetables for canning. The sooner you can get them from the garden to the jar, the better. If you buy vegetables to can, try to get them from a nearby garden or orchard.

For ease of packing and even cooking, sort the vegetables for size and ripeness. Wash all vegetables thoroughly, whether or not they will be pared. Dirt contains some of the bacteria hardest to kill. Do not let vegetables soak; they may lose flavor and nutrients. Handle them gently to avoid bruising.

## ***Filling the Jars***

Vegetables may be packed raw into jars or pre-heated and packed hot. Read the directions for each vegetable to determine which method may be used. If given a choice, the hot pack produces a higher quality product. Remember, have the jars hot to prevent breakage as they are filled.

**To raw pack** - Put raw vegetables into jars and cover with boiling water. Most raw vegetables (except for starchy ones) should be packed firmly into the jars. Starchy vegetables such as corn, peas and lima beans should be packed loosely, because they expand during processing.

**To hot pack** - Heat vegetables in water or steam before packing. Then cover with the boiling cooking liquid. Pack the hot food loosely.

For either pack, use enough liquid to fill around the solid food in the jar and to cover the food. See directions for each vegetable for the correct amount of head space to leave between the top of the food and the top of the jar. This head space is important for obtaining a good seal.

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

## ***Closing the Jars***

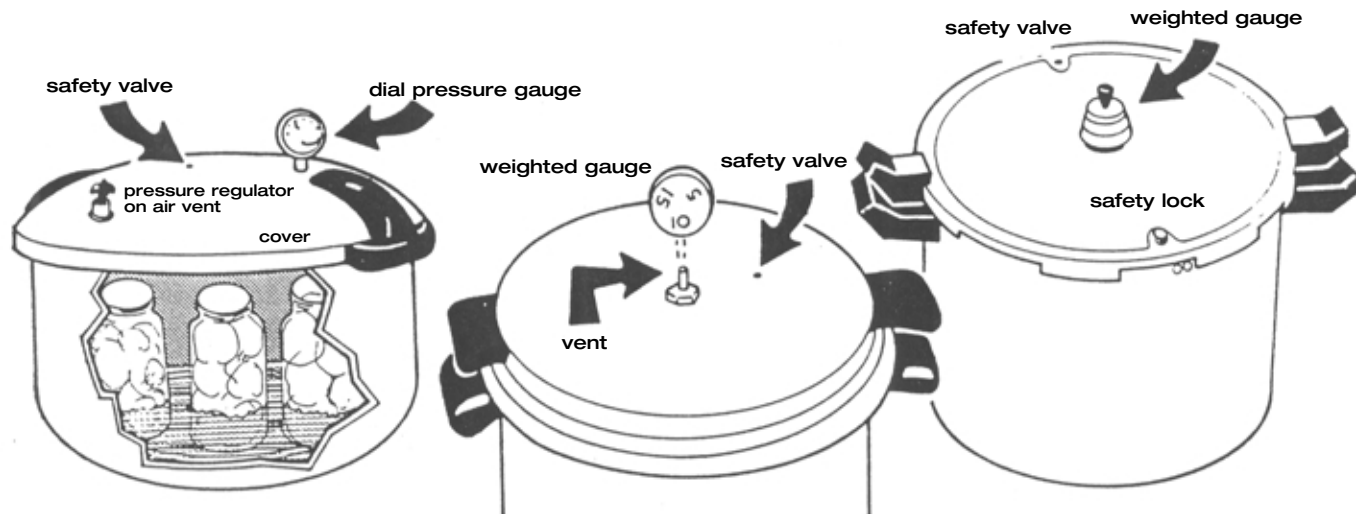
To remove any trapped air bubbles, slide a non-metallic spatula between the food and the sides of the jar. Add more liquid if necessary to obtain the proper head space. Wipe the jar rim with a clean damp cloth to remove any food particles.

Place the treated lid on the jar. Screw the screw band fingertip tight.

## ***Processing Vegetables***

Read the manufacturer's instructions on the use of your pressure canner. The following are general instructions:

- \* Have the two to three inches of water in your canner hot but not boiling if you are canning raw pack foods. For hot pack foods, the water can be hot or simmering.
- \* Place the jars of food on the rack in the canner so steam can flow around each jar.
- \* Fasten the canner lid so no steam can escape except through the vent.
- \* Turn heat to high and watch until steam begins to escape from the vent. Let the steam escape steadily for 10 minutes.



**Pressure Canners**

- \* Close the vent, using a weight, valve or screw, depending on the type of canner. If you have a weighted gauge canner that has a weight of varying pressures, be sure you are using the correct pressure.
- \* For a dial gauge canner, let the pressure rise quickly to eight pounds of pressure. Adjust the burner temperature down slightly and let the pressure continue to rise to the correct pressure. (If the burner were left on high, the pressure would be hard to regulate when the correct pressure is reached.) Start counting the processing time as soon as the pressure is reached. For weighted gauge canners, let the canner heat quickly at first and then reduce the heat slightly until the weight begins to rock gently or “jiggle” two or three times per minute, depending upon the type of canner you have. Start counting the processing time as soon as the weight does either of these.
- \* Keep the pressure constant by regulating the heat under the canner. **Do not lower the pressure by opening the vent or lifting the weight.** Keep drafts from blowing on the canner.
- \* When processing time is completed, carefully remove the canner from the heat. If the canner is too heavy, simply turn off the heat.
- \* Let the pressure in the canner drop to zero. This will take 30 to 45 minutes in a 16-quart canner and nearly an hour for a 22-quart canner. Do not rush cooling by setting the canner in water or by running cold water over the canner. Never lift the weight or open the vent to hasten the reduction of pressure.
- \* When the gauge on a dial gauge canner registers zero or when a gentle nudge to the weight on a weighted gauge canner does not produce steam or resistance, wait two minutes, and then open the vent or remove the weight. Wait two more minutes and then open the canner.
- \* Unfasten the lid, and tilt the far side up, so the steam escapes away from you. Do not leave the canner unopened, or the food inside could begin to spoil.
- \* Carefully remove the jars from the canner. To prevent the jars from breaking on contact with a cold surface, place the hot jars on a rack, dry towels, boards or newspaper, right side up.
- \* Allow the jars to cool untouched, away from drafts. Do not be alarmed at popping sounds as the jars cool and seal.

### ***Day-After Canning Jobs***

Test the seal on the jar lids. Press flat metal lids at the center of the lid. They should be slightly concave and

should not move. Screw bands may be removed from thoroughly cooked jars. Label sealed jars with contents and date.

Store the canned food in a cool, dry place. Stored properly, canned vegetables should retain their high quality for about one year.

Unsealed jars of foods need to be treated as fresh. The food can be eaten immediately, refrigerated, frozen or reprocessed. If you reprocess the food, the whole processing time must be repeated.

### ***On Guard Against Spoilage***

Do not taste or use canned vegetables that show any signs of spoilage! Look closely at all jars before opening them. A bulging lid or leaking jar are signs of spoilage. When you open the jar, look for other signs such as spurting liquid, an off odor or mold.

All spoiled canned foods should be discarded in a place where they will not be eaten by humans or pets. Spoiled low acid vegetables should be detoxified to destroy any poisons that might be present, before being discarded. To detoxify canned vegetables that have spoiled, carefully remove the lid from jar. Place the jar(s) of food and its lid(s) in a saucepot. Add enough hot water to cover the jar(s). Boil for 30 minutes and then cool. Drain water and dispose of food and lid. The jar may be reused.

Improperly canned vegetables can contain botulism toxin without showing signs of spoilage. Vegetables are considered IMPROPERLY canned if any of the following are true:

- \* The food was NOT processed in a pressure canner.
- \* The gauge of the canner was INACCURATE.
- \* Up-to-date researched processing times and pressures were NOT used for the size of jar, style of pack and kind of food being processed.
- \* Ingredients were added that were NOT in an approved recipe or the proportions of ingredients were CHANGED.
- \* The processing time and pressure were NOT correct for the altitude at which the food was canned.

Because improperly canned vegetables may contain botulism toxin without showing signs of spoilage, they should also be detoxified as directed above and then discarded. Surfaces that come in contact with spoiled or questionable food should be cleaned with a solution of 1 part chlorine bleach to 5 parts water. Wet the surface with this solution and let stand 5 minutes before rinsing.

## Directions for Canning Vegetables

**Caution! Altitude Adjustments:** The processing times and pressures given here 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 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.

### 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.

Vegetable	Pack	Preparation	Processing Time (minutes)	
<b>Beans: Green Snap, Wax, Italian</b>	Hot	Wash; trim ends. Leave whole or break or cut into 1 inch pieces. Cover beans with boiling water and boil 5 minutes. Pack hot beans into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints	20
			Quarts	25
	Raw	Wash; trim ends. Leave whole or break or cut into 1 inch pieces. Pack beans tightly into hot jars, leaving 1 inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling water.	Pints	20
			Quarts	25
<b>Beans: Lima, Butter, Soy</b>	Hot	Shell and wash young tender beans. Cover beans with boiling water; bring to a boil and boil 3 minutes. Pack hot beans loosely in hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints	40
			Quarts	50
	Raw	Shell and wash young tender beans. Pack beans loosely in hot jars, leaving 1-inch headspace for pints. For quarts, leave 1 1/2 inches if beans are small; 1 1/4 if large. If desired, add 1/2 teaspoon salt per pint. Fill jar with boiling water, again leaving 1-inch headspace. water.	Pints	40
			Quarts	50
<b>Beets</b>	Hot	Cut off tops leaving 1 inch of stem and tap root. Wash. Cover with boiling water; boil until skins slip easily - 15 to 25 minutes, according to size. Skin, trim tap root and stem. Can baby beets whole; cut medium and large beets in 1/2 inch cubes or slices. Halve or quarter large slices. Pack hot beets 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.	Pints	30
			Quarts	35
<b>Carrots</b>	Hot	Wash, peel and re-wash carrots. Baby carrots can be left whole; slice or dice larger ones. Cover with boiling water, bring to a boil, boil 5 minutes. Pack hot carrots into jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill to 1 inch from top with boiling cooking liquid.	Pints	25
			Quarts	30
	Raw	Wash, peel and re-wash carrots. Baby carrots can be left whole; slice or dice larger ones. Pack carrots tightly 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.	Pints	25
			Quarts	30

<b>Vegetable</b>	<b>Pack</b>	<b>Preparation</b>	<b>Processing Time (minutes)</b>	
<b>Corn: Cream-Style</b> (use pint jars only)	Hot	Shuck, silk and wash corn. Blanch ears 4 minutes in boiling water. Cut from cob at about center of kernel; scrape cobs. Add 1 cup boiling water to each 2 cups of corn. Boil 3 minutes. Pack hot corn into jars, leaving 1-inch headspace. If desired add 1 teaspoon salt per pint.	Pints	85
	Raw	Shuck, silk and wash corn. Blanch 3 minutes in boiling water. Cut from cob at about 2/3's depth of kernel. Do not scrape cobs. Pack corn 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.	Pints Quarts	55 85
<b>Corn: Whole Kernel</b>	Hot	Shuck, silk and wash corn. Blanch 3 minutes in boiling water. Cut from cob at about 2/3's depth of kernel. Do not scrape cobs. Add 1 cup boiling water to each 4 cups of corn and bring to a boil. Simmer 5 minutes. Pack hot corn into jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints Quarts	55 85
	Raw	Shuck, silk and wash corn. Blanch 3 minutes in boiling water. Cut from cob at about 2/3's depth of kernel. Do not scrape cobs. Pack corn 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.	Pints Quarts	55 85
<b>Greens: Spinach, Turnip, Mustard</b>	Hot	Wash thoroughly and cut out tough stems. Blanch 1 pound of greens at a time, until well wilted (about 3 to 5 minutes). Pack hot greens loosely into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints Quarts	70 90
	Raw	Wash thoroughly and cut out tough stems. Blanch 1 pound of greens at a time, until well wilted (about 3 to 5 minutes). Pack hot greens loosely into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints Quarts	70 90
<b>Mixed Vegetables</b>	Hot	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 the 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.	Pints Quarts	75 90
	Raw	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 the 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.	Pints Quarts	75 90
<b>Okra</b>	Hot	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.	Pints Quarts	25 40
	Raw	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.	Pints Quarts	25 40
<b>Peas: Blackeye, Crowder, Field</b>	Hot	Shell and wash peas. Cover peas with boiling water; boil 3 minutes. Pack hot into jars, leaving 1-inch headspace for pints, 1 1/2 inch for quarts. If desired, add 1/2 teaspoon salt per pint. Fill jar with boiling cooking liquid, leaving 1-inch headspace.	Pints Quarts	40 50
	Raw	Shell and wash peas. Pack loosely in hot jars, leaving 1-inch headspace for pints, 1 1/2 inches for quarts. Do not shake or press down. If desired, add 1/2 teaspoon of salt per pint. Fill jar with boiling water, leaving 1-inch headspace.	Pints Quarts	40 50
<b>Peas: Green or English</b>	Hot	Shell and wash peas. Cover with water and bring to a boil. Boil 2 minutes. Pack hot into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints Quarts	40 40
	Raw	Shell and wash peas. Pack into hot jars, leaving 1-inch headspace. Do not shake or press down. If desired, add 1/2 teaspoon salt per pint. Fill to 1 inch from top with boiling water.	Pints Quarts	40 40

Vegetable	Pack	Preparation	Processing Time (minutes)	
<b>Potatoes: White</b>	Hot	Select small or medium-size mature potatoes. For packing whole, choose potatoes 1 to 2 inches in diameter. Wash, pare, cut potatoes into 1/2 inch cubes, if desired. Place cubes in solution of 1 teaspoon (3000 mg) ascorbic acid and 1 gallon of water to prevent darkening. Drain. Cook whole potatoes for 10 minutes, cubes for 2 minutes in boiling water. Drain. Pack hot into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling water.	Pints	35
			Quarts	40
<b>Pumpkin: Cubed</b> (It is not safe to can strained or mashed pumpkin)	Hot	Wash pumpkin, remove seeds and pare. Cut into 1 inch cubes. Add to a saucepot of boiling water, boil 2 minutes. Pack hot cubes into hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling cooking liquid.	Pints	55
			Quarts	90
<b>Squash: Winter (Acorn, Butternut, Golden Delicious, Hubbard, etc.)</b>		Follow preparation procedures and processing times for cubed pumpkin. DO NOT CAN spaghetti squash. Its flesh does not stay cubed during processing. Spaghetti squash can be frozen.		
<b>Sweet Potatoes</b>	Hot	Wash small or medium potatoes; boil or steam until partially soft (15 to 20 minutes). Cool slightly and remove skins. Cut medium potatoes, if needed, so that pieces are uniform in size. Pack hot potatoes in hot jars, leaving 1-inch headspace. If desired, add 1/2 teaspoon salt per pint. Fill jar to 1 inch from top with boiling water or syrup made from 1 to 1 3/4 cups sugar and 4 cups water.	Pints	65
			Quarts	90
<b>Tomatoes</b>		See Extension Publication FDNS-E-43-2, Preserving Foods: Canning Tomatoes and Tomato Products.		
<b>Vegetable Soup</b>	Hot	Choose your favorite soup 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, tomato juice or broth. CAUTION: DO NOT THICKEN OR ADD MILK. Add salt to taste, if desired. Fill hot jars halfway with solid mixture. Continue filling with hot liquid, leaving 1-inch headspace.	Pints	60
			Quarts	75
			NOTE: <b>Cooked</b> seafood can also be added. If it is, additional processing time will be needed.	Pints
			Quarts	100

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Issued in furtherance of Cooperative Extension work, Acts of May 18 and June 30, 1914, The University of Georgia College of Agricultural and Environmental Sciences and the U.S. Department of Agriculture cooperating.

Gale A. Buchanan, Dean and Director

FDNS-E-43-3

07-00