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FACT SHEET

Family and Consumer Sciences

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Basics for Canning Vegetables

Preserving food yourself means having an abundant supply of a variety of foods when the fresh products are not readily available. It also allows you to save the bounty of fresh produce of summer to enjoy all year. Proper canning of fresh vegetables is an excellent way to preserve vegetables for later use. Vegetables that are not canned using current research-based canning methods can pose serious health risks.

Understanding *Clostridium botulinum*

Pressure canning is the only safe method for home canning vegetables. Vegetables are low-acid foods and must be canned in a pressure canner at the appropriate pressure to guarantee their safety. Deadly food borne illness can occur when low-acid vegetables are not properly preserved. *Clostridium botulinum* is the bacterium that causes botulism food poisoning in low-acid foods, such as vegetables. The bacteria produces spores in vegetables and meat that can only be destroyed by temperatures that reach 240 degrees Fahrenheit (F) for the correct amount of time in a pressure canner.

The *Clostridium botulinum* bacterium is harmless until it finds itself in a moist, low-acid, oxygen-free environment or a partial vacuum. These are the conditions found inside a jar of canned vegetables.

Under these conditions, the bacterium can grow and produce toxins dangerous to people and animals.

DO NOT process low-acid vegetables using the boiling water bath because botulinum spores can survive that method.

Caution: All home-canned foods should be canned according to the procedures in this fact sheet. Low-acid and tomato foods not canned according to the recommendations in this publication or according to other USDA-endorsed recommendations present a risk of botulism. If it is possible that any deviation from the USDA-endorsed methods occurred, to prevent the risk of botulism, low-acid and tomato foods should be boiled in a saucepan before consuming even if you detect no signs of spoilage. At altitudes below 1,000 feet, boil foods for 10 minutes. Add an additional minute of boiling time for each additional 1,000 feet elevation. However, this is not intended to serve as a recommendation for consuming foods known to be significantly underprocessed according to current standards and recommended methods. It is not a guarantee that all possible defects and hazards with non-recommended methods can be overcome by this boiling process. The recommendation is to only can low-acid and tomato foods according to the procedures in this fact sheet.

Equipment

Pressure canner

The pressure canner is a heavy pot that has a tight-fitting lid, clean exhaust vent or petcock and safety valve, and an accurate pressure gauge or a weighted gauge. The pressure canning gauge needs to be checked for accuracy every year to guarantee proper pressure processing. Check with your local Extension office for information on this service.

Every pressure canner should come with a metal rack in the bottom to help keep jars elevated and prevent breakage.

USDA does not have recommended processing instructions for canning in a small pressure cooker. Small pressure cookers that hold less than 4 quart jars should not be used for canning. The research for USDA pressure processing for vegetable and meat products was conducted in pressure canners that are most similar to today's 16-quart or larger pressure canners. Processing times on this fact sheet are not adequate for smaller cookers.

Canning jars and lids

Use standard canning jars. Commercial food jars, such as mayonnaise and coffee jars, are not recommended because the failure rate will be greater. These jars may break in the canner or not accept a tight seal during canning. Check jars, ring bands, and lids for defects. Each lid is meant to be used only once and then discarded. Look for chips, cracks, dents, rust, and anything else that will prevent airtight seals. Wash jars in hot soapy water and rinse well. Jars do not have to be sterilized before pressure canning. The recommendation is to use two-piece metal lids and prepare them according to manufacturer's directions. Ring bands may be reused if they are not rusted, dented, or damaged.

Preparing the Produce

For best results, select only fresh, young, tender vegetables, and can them within three hours of harvesting. If canning takes place later, place the

produce in the refrigerator to keep it fresh. Rinse all produce thoroughly. Soaking vegetables will cause loss of flavor and nutrients. Handle gently to avoid bruising.

Small equipment

These kitchen utensils are not mandatory but make the canning more efficient and less frustrating. These would include funnels to fit jar openings, spatulas, bubble freer, a lid wand that has a magnet that helps remove lids from hot water, and jar lifter for easy removal of jars from canners. Knives, cutting boards, timer or clock, clean cloths and towels, hot pads, and cutting boards make the job easier.

Filling Jars

Hot pack method

Vegetables that are hot packed have come to a boil for a period of time and then hot food and hot liquid are placed in jars. Hot packed vegetables should be packed fairly loosely in the jar because the cooking has already caused the shrinkage to take place. A food funnel that fits the top of the jar is helpful when canning small vegetables. Make certain to leave headspace between the jar rim and the liquid according to the chart included in this fact sheet.

Raw pack method

When vegetables are raw packed, they are cleaned, not heated, just put into the jar, and the jar is filled with boiling water. Freshly prepared, unheated vegetables should fill the jar, making certain to pack the jar tightly because the vegetables will shrink during the canning process. Add boiling water to the jars, leaving recommended headspace between the jar rim and liquid. Corn, lima beans, potatoes, and peas would be packed loosely because they expand during processing.

Salt is for flavor only and is optional in home canned vegetables. It does not serve as a preservative. If using salt, the recommended amount is ½ teaspoon per pint and 1 teaspoon per quart for most vegetables.

Closing Jars

Remove trapped air bubbles before closing jars. Insert a long non-metallic spatula or bubble freer along the inside edge of the jar to allow the excess air to escape from the jars. Move the spatula up and down along the inside wall in several places around the jar. Add more boiling liquid if needed. Wipe the jar rim with a clean damp paper towel to remove any food particles.

Place a prepared lid on the jar and adjust the metal ring band according to manufacturer's directions.

Using a Pressure Canner

If available, use the manufacturer's directions for a pressure canner. Otherwise, put 2 to 3 inches of hot water in the canner. Place filled, closed jars on the rack using a jar lifter. Fasten canner lid securely and leave vents and petcocks open. Heat at the highest setting until steam flows freely from the vents. Maintain the high heat and exhaust steam for 10 minutes. Then close the petcock or place the weight on the vent port.

Begin timing the process when the dial gauge or weighted gauge indicates the recommended pressure has been reached. When the timed process is completed, turn off heat and remove canner from the heat source. Allow the canner to depressurize. Do not force the cooling of the canner. This could result in liquid boiling out of the jars and seal failure.

When pressure is at zero, open the petcock, or remove the weight. Allow canner to set for 10 minutes before unfastening and removing the lid. As you remove the lid, direct the remaining trapped steam away from you. Use a jar lifter to remove the jars from the canner, being careful to not tilt the jars, and place on rack, dry towel, or newspapers. DO NOT retighten ring bands; this could break the seal. Also, do not push down on the center of the lid until the jar is completely cooled. Let jars cool 12 to 24 hours before testing seals.

Checking Seals and Storing

Listen for the familiar “ping” as the jars cool. Look for the slight depression in the lid's center. When completely cooled, test for proper seal by

Preparation and processing directions for canning vegetables in a pressure canner at 240 degrees F

Pressure is required to reach 240 degrees F for all vegetables. Use this chart for all processing times listed below.

Elevation	Pounds pressure	
	Dial gauge	Weighted gauge
0–1,000 ft.	11 lb.	10 lb.
1,000–2,000	11	15

pushing down on center of lid; lid should not pop up and down. Allow the canned foods to cool on the counter top before removing the ring bands. Jars should not be stored with the ring bands on. After removing the ring bands, wipe jars with a clean damp cloth to remove any residue or stickiness. Add labels with date, batch, food product, and any other special information. Store jars in a cool, dry, dark place.

Signs of Spoilage

If a jar does not seem completely normal before or after opening, do not use. This includes leaking jars, bulging lids, and jars that spurt when opened. If the food looks spoiled, foams, or has an off odor during preparation, discard it.

Boil all spoiled low-acid canned foods for 30 minutes before disposing of them. This destroys any toxin present and prevents its spread. Sanitize all containers and equipment that may have touched the food. Discard any sponges that may have been used in the cleanup. Place them in a plastic bag and discard in the trash.

References

- Andress, E., & Harrison, J. (2006). *So Easy to Preserve*, (5th ed.). Cooperative Extension/University of Georgia/Athens.
- Complete Guide to Home Canning*, United States Department of Agriculture, Agriculture Information Bulletin No. 539.
- Making Pickles and Relishes*, Ohio Cooperative Extension Service, form 576A.

Vegetables	Pre-preparation	Pack	Processing time	
			Pints	Quarts
Asparagus (spears or pieces)	Use tender, tight-tipped spears, 4 to 6 inches long. Wash and remove tough scales. Break off stems and wash again. Cut in pieces or leave whole.	Raw pack —Fill jars with raw asparagus, pack tightly (but avoid crushing), then cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	30 min.	40 min.
		Hot pack —Cover asparagus with boiling water. Boil 2 or 3 minutes. Loosely fill jars with hot asparagus and cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	30	40
Beans or peas, dry (all varieties)	Sort and wash dry seeds. Cover with cold water and let stand 12 to 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. Remove air bubbles. Wipe jar rims. Adjust lids.	75	90
Beans (fresh lima, butter, pintos, soy, or shelled 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 1½ inches for quarts. For large beans, fill 1 inch from top for pints and 1¼ inches for quarts. Do not press or shake down. Fill jars with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	40	50
		Hot pack —Cover with boiling water, bring to a boil and boil 3 minutes. Pack hot beans loosely in jars and cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	40	50
Beans (green, snap, wax, Italian)	Wash, trim ends. Cut or snap into 1-inch pieces or leave whole.	Raw pack —Fill jars tightly with raw beans, leaving 1-inch headspace. Add boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids. Hot pack —Cover with boiling water; boil 5 minutes. Fill jars loosely, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	20	25
Beets (whole, cubed or sliced)	Sort for size. Cut off tops, leaving tap root and 1 inch of stem to reduce color loss. Wash.	Hot pack only —Boil beets until skins slip off easily (15 to 25 minutes, depending on size). Cool, remove skins, stems, 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 cover with fresh boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	30	35
Carrots (sliced or diced)	Wash, peel, and re-wash. Can baby carrots whole. Slice or dice larger ones.	Raw pack —Pack carrots tightly into jars to 1 inch of jar tops and cover with boiling water; leave 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	25	30
		Hot pack —Cover carrots with boiling water; simmer 5 minutes. Fill jars loosely and cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	25	30

Vegetables	Pre-preparation	Pack	Processing time	
			Pints	Quarts
Corn, cream-style	Husk corn, remove silk, and wash. Blanch ears 4 minutes in boiling water. Cut corn from cob at about the center of kernel. Scrape cob.	Hot pack —To each quart of corn and scrapings in saucepan, add 2 cups boiling water. Heat to boiling. Fill pint jars with hot corn mixture, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	85	Not recommended
Corn, whole-kernel	Husk corn, remove silk, and wash. Blanch 3 minutes in boiling water. Cut from cob at about 3/4 depth of kernel. Do not scrape cob.	Raw pack —Pack corn in jars, leaving 1-inch headspace. Do not shake or press down. Add fresh boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	55	85
		Hot pack —To each quart of kernels in saucepan, add 1 cup hot water. Heat to boiling and simmer 5 minutes. Fill jars with corn and cover with cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	55	85
Mushrooms (whole or sliced)	Use only high quality, small to medium-sized domestic mushrooms with short stems. DO NOT CAN WILD MUSHROOMS. Trim stems and discolored parts and soak in cold water for 10 minutes to remove dirt. Rinse 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. 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. Remove air bubbles. Wipe jar rims. Adjust lids.	45	Not recommended
Greens (including spinach) <i>Greens may be canned; however, freezing results in a better product.</i>	Sort and wash thoroughly. Cut and remove tough stems and midribs. Remove any discolored or damaged portions.	Hot pack only —Steam greens, 1 pound at a time, for 3 to 5 minutes or until wilted. Fill jars loosely with greens; add fresh boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	70	90
Peas (green or English-shelled)	Select filled pods containing young, tender, sweet seeds. Shell and wash peas.	Raw pack —Pack peas into hot jars, leaving 1-inch headspace. Do not shake or press down; add boiling water; leave 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	40	40
		Hot pack —Cover peas with boiling water; boil 2 minutes. Fill jars loosely with hot peas and add cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	40	40

Vegetables	Pre-preparation	Pack	Processing time	
			Pints	Quarts
Peppers (hot or sweet, including chilies, jalapeño, and pimento)	Select firm yellow, green, or red peppers. Wash and drain. Caution: Wear plastic gloves while handling hot peppers or wash hands thoroughly with soap and water before touching face. Small peppers may be left whole. Large peppers may be quartered. Remove cores and seeds.	Hot pack only —Slash 2 or 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 to 8 minutes. Place blistered peppers in pan and cover with damp cloth. Let cool several minutes, then peel. Flatten whole peppers. Fill jars loosely with peppers and add boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	35	Not recommended
Potatoes, white	Wash, pare. Leave whole if 1 to 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 cover with fresh hot water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	35	40
Pumpkin and winter squash (cubed) <i>Do not puree or mash</i>	Wash; remove seeds and pare. Cut into 1-inch cubes.	Hot pack only —Place in saucepan and cover with boiling water. Boil 2 minutes. Fill jars with cubes and cover with cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	55	90
Sweet Potatoes (pieces or whole) <i>Do not puree or mash</i>	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, if needed, to make pieces uniform in size. Fill jars and cover with fresh boiling water or boiling syrup (1 cup sugar and 4¾ cup water for light syrup), leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids.	65	90

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