

Canning Low-Acid Vegetables

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Canning is a practical and economical way to preserve most vegetables. By canning when they are plentiful, we can make the supply last throughout the year.

Methods of Canning

Processing canned food – that is, heating it after it is in the jar – is very important. The heat destroys spoilage organisms in the food. The temperatures required to sterilize different foods vary. For safety, each food should be processed by the method and the time recommended.

For canning, foods are classified into two groups – acid and low-acid.

Acid foods like fruit, tomatoes, sauerkraut and pickled vegetables can be safely processed at the boiling point. The types of organisms that cause spoilage in these foods are usually killed at boiling temperatures. For more information on water bath canning, see publication FSHE77, *Water Bath Canning of Fruits and Tomatoes*.

Low-acid foods include all vegetables except tomatoes, meats, poultry and seafood. Most mixtures of low acid foods and acid foods also are low in acid unless their recipes include lemon juice, citric acid or vinegar to make them more acid. *Clostridium botulinum*, the bacteria that causes botulism, cannot grow in acid foods but can grow in low-acid ones. These organisms have spores that are very hard to destroy at boiling water temperatures. The higher the canner temperature, the more easily they are destroyed. Therefore, the canner temperature recommended for processing

low-acid foods is 240°F to 250°F, the temperature in a pressure canner at 10 to 15 pounds pressure. At these temperatures, the time needed to destroy bacteria in low-acid food ranges from 20 to 100 minutes. The exact time depends on the kind of food being canned, the way it is packed and the size of the jars.

Equipment

Pressure Canner

Most pressure canners are designed to hold seven quart jars or eight to nine pint jars. Small pressure canners hold four quart jars; some large ones hold 18 pints in two layers, but only seven quarts. Pressure saucepans with smaller capacities are not recommended for use in canning. Carefully read the manufacturer's directions for your canner as different brands differ somewhat in details of handling.

Air trapped in a canner lowers the temperature obtained and results in underprocessing. To be safe, all types of pressure canners must be vented 10 minutes before they are pressurized.



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To vent a canner, leave the vent port uncovered on newer models or manually open petcocks on some older models. Heating the filled canner with its lid locked into place boils water and generates steam that escapes through the petcock or vent port. When steam first begins to escape, set a timer for 10 minutes. After venting 10 minutes, close the petcock or place the counterweight or weighted gauge over the vent port to cause pressure to build up in the canner.

Weighted-gauge models exhaust tiny amounts of air and steam each time their gauge rocks or jiggles during processing. They control pressure precisely and need neither watching during processing nor checking for accuracy. The sound of the weight rocking or jiggling indicates that the canner is maintaining the recommended pressure and needs no further attention until the load has processed for the set time.

Check dial gauges for accuracy before use each year, and replace if they read high by more than 1 pound of pressure. Low readings cause over-processing and may indicate that the accuracy of the gauge is unpredictable. Gauges may be checked at most county Cooperative Extension offices.

Handle canner lid gaskets carefully, and clean them according to the manufacturer's directions. Nicked or dried gaskets will allow stem leaks during pressure operation of the canner. Keep gaskets clean between uses. Gaskets of older canner models may need to be lightly coated with vegetable oil once per year. Newer models are prelubricated and do not benefit from oiling. Check your canner's instructions if there is doubt that the gasket on the particular canner lid you use has been prelubricated.

Lid safety fuses are thin metal inserts or rubber plugs designed to relieve excessive pressure from the canner. Do not pick at or scratch fuses while cleaning lids. Use only canners that have the Underwriter's Laboratory (UL) approval to ensure their safety.

Glass Jars and Closures

Only standard glass canning jars should be used for home canning. With careful handling you can use these jars for several years. Jars are made in different shapes and sizes and are tempered (strengthened) for heat and cold. You can usually find jars in the following sizes: half-pint, pint, pint and one-half, and quart.

The size of the jar you choose should be determined by the vegetable being canned and the needs of the family. Examine the sealing edge of the jars to see that there are no nicks, cracks or sharp edges that would prevent a seal. Discard any jars showing these imperfections because they will not seal.

Since pressure processing is recommended for all vegetables, sterilizing jars is not necessary. They will be sterilized at the time the food is processed.

Self-sealing lids consisting of a flat metal lid held in place by a screw band are recommended. Buy only the quantity of lids that will be used in a year. Although gaskets in unused lids work well for at least five years after manufacture, older gasket compound may fail to form a seal.

Carefully follow the manufacturer's directions in preparing lids for use. Examine all lids carefully. Do not use old, dented or deformed lids or lids with gaps or other defects in the sealing gasket.

To close jars, wipe the jar rim clean. Put on lid, gasket side down. Fit the metal screw band over the flat lid. Follow the manufacturer's instructions for tightening the bands properly.

Do not retighten lids after processing jars. Retightening can cause the lids to twist, breaking the seal.

When the jars are cool (12 to 24 hours after processing), check the seals. If the lid is depressed or concave and will not move when pressed, it is sealed.

Screw bands are not needed on stored jars. They can be easily removed after the jars are cooled. Screw bands can be used many times if removed, washed, dried and stored in a dry place. Bands may become difficult to remove, often rust, and may not work properly again when left on stored jars.

Useful Small Equipment

In addition to a pressure canner, jars and closures (lids), there are a number of small utensils which will help you speed up the canning operation. Small vegetable brushes, large pans or colanders (for holding/washing food) and wide-mouth funnels to fill the jars are a convenience. Long-handled forks and spatulas can be used to lift and pack the fruit. Air bubbles that develop in the packed food can be worked out using a slender spatula or plastic knife. You will also need a jar lifter to lift hot jars in and out of the canner.

Canning Vegetables

Select only fresh, young, tender vegetables of a variety suitable for canning. Gather or purchase only as much as can be handled in two to three hours. Work quickly throughout the preparation and canning. If food is allowed to stand, quality is lowered and spoilage is more likely to occur.

Sort the vegetables 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.

Packing Jars

Correct packing allows heat penetration to be uniform and helps food retain better texture. Too much solid in the jar will reduce the amount of liquid and retard heating to the center of the jar. The manner of packing will vary with the nature of the food. Corn, peas and lima beans should be packed loosely because they expand during processing. For other vegetables, make a firm but not tight pack.

Food may be packed into jars while it is hot or cold. Regardless of how the food is packed, any air bubbles must be removed. This can be done by inserting a flat plastic spatula between the food and the jar and slowly turning the jar as the spatula is moved up and down. This allows air bubbles to escape. Do not use a metal spatula or knife. Metal may nick the jars and lead to breakage.



4. Add salt, if desired.*
5. Fill with boiling water to 1 inch from top.
6. Run narrow spatula between food and jar to remove air bubbles. Add more liquid if needed to cover food. Wipe threads and sealing edge of jar. Seal.
7. Process in pressure canner at 10 to 11 pounds pressure (240°F) for recommended time.

*Salt is added to home-canned vegetables strictly for flavor. It can be omitted in any recipe. If salt is used, add 1/2 teaspoon to each pint jar and 1 teaspoon to each quart.

Processing in a Pressure Canner

Follow these steps for successful pressure canning:

1. 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.
2. Leave weight off vent port or open petcock. Heat at the highest setting until steam flows from the petcock or vent port.
3. Maintain high heat setting, exhaust steam 10 minutes and then place weight on vent port or close petcock. The canner will pressurize during the next 3 to 5 minutes.
4. Start timing the process when the pressure reading on the dial gauge indicates that the recommended pressure has been reached, or when the weighted gauge begins to jiggle or rock.
5. 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 rock at a fairly uniform rate throughout the process.
6. When the timed process is completed, turn off the heat, remove the canner from heat if possible and let the canner depressurize. **Do not force-cool the canner.** If you cool it with cold running water in a sink or open the vent port before the canner depressurizes by itself, liquid will spurt from jars, causing low liquid levels and jar seal failures. Force-cooling may also warp the canner lid of older model canners, causing steam leaks. Depressurization of older models should be timed. Standard-size, heavy walled canners require about 30 minutes when loaded with pints and 45 minutes with quarts. Newer thin-walled canners cool more rapidly and are equipped with vent locks. These canners are depressurized when their vent lock piston drops to a normal position.

How to Hot Pack

1. Wash, prepare and cover vegetables with boiling water. Boil for the time listed in directions.
2. Precook only enough vegetables to fill the number of jars which can be processed at one time.
3. Pack hot vegetables into clean jars to within 1 inch of top of jar (1 1/4 inches for starchy vegetables). Add salt, if desired.*
4. Add the hot liquid in which you precooked the vegetable. It contains some of the water-soluble vitamins and minerals which dissolved out of the food. If it is dark, gritty or strong flavored or there isn't enough cooking liquid, use boiling water. Fill to within 1 inch of the top of the jar (1 1/4 inches for starchy vegetables).
5. Run a narrow spatula between food and jar to remove air bubbles. Clean top of the jar with a clean damp cloth. Seal.
6. Process in a pressure canner at 10 to 11 pounds pressure (240°F) for recommended time.

How to Raw (Cold) Pack

1. Wash, sort and prepare vegetables.
2. Cut into appropriately sized pieces.
3. Pack raw vegetables into clean jars as directed in instructions for that vegetable. Leave 1 inch at top of jar.

7. When pressure has returned to normal, remove vent weight or open petcock. After the vent port or petcock has been open for 2 minutes, unfasten the lid and remove it carefully. Lift the lid away from you so that the steam does not burn your face.
8. Remove jars with a lifter, and place on towel or cooling rack.
9. Cool the jars at room temperature for 12 to 24 hours. **Do not** retighten loose lid screw bands.
10. After cooling jars for 12 to 24 hours, remove the screw bands and test seals in one of the following ways:
 - a. Press the middle of the lid with a finger or thumb. If the lid springs up when you release your finger, the lid is unsealed.
 - b. Tap the lid with the bottom of a teaspoon. If it makes a dull sound, the lid is not sealed. If food is in contact with the underside of the lid, it will also cause a dull sound. If the jar is sealed correctly, it will make a ringing, high-pitched sound.
 - c. Hold the jar at eye level and look across the lid. The lid should be concave (curved down slightly in the center). If center of the lid is either flat or bulging, it may not be sealed.

Reprocessing Unsealed Jars

If a lid fails to seal on a jar, remove the lid and check the jar-sealing surface for tiny nicks. If necessary, change the jar. Using a new properly prepared lid, reprocess within 24 hours of first processing procedure using the same processing time. As an alternative to reprocessing, headspace in unsealed jars may be adjusted to 1 1/2 inches and jars of food could be frozen. Foods in single unsealed jars could be stored in the refrigerator and consumed within several days.

Storing Canned Foods

If lids are tightly vacuum sealed on cooled jar, wash the lid and jar to remove food residue; then rinse and dry jars. Label and date the jars and store them in a clean, cool, dark, dry place. Do not store jars above 95°F or near hot pipes, a range, a furnace, in an uninsulated attic or in direct sunlight. Under these conditions, food will lose quality in a few weeks or months and may spoil. Dampness may corrode metal lids, break seals and allow recontamination and spoilage.

Using Canned Vegetables

All low-acid foods canned according to approved recommendations may be eaten without boiling them when you are sure of all the following:

- Food was processed in a pressure canner.
- Gauge of the pressure canner was accurate.
- Up-to-date researched process times and pressures were used for the size of jar, style of pack and kind of food being canned.
- The process time and pressure recommended for sterilizing the food was followed.
- Jar lid is firmly sealed and concave.
- Nothing has leaked from jar.
- No liquid spurts out when jar is opened.
- No unnatural or “off” odors can be detected.

If there is a reason to question the gauge accuracy, process time or pressure for a product, the product should be boiled for 10 minutes prior to tasting.

If you are unsure about the last four items in the list above, this may be a sign of possible spoilage. **Do not taste the food.** All suspect containers of spoiled low-acid foods should be treated as having produced botulinum toxin, a deadly poison, and handled carefully in one of two ways:

- If the suspect jars are still sealed, place them in a heavy garbage bag. Close and place the bag in a regular trash container or bury it in a nearby landfill.
- If the suspect jars are unsealed, open or leaking, they should be detoxified before disposal.

Detoxification process: Carefully place the suspect containers and lids on their sides in an 8-quart volume or larger stock pot, pan or boiling-water canner. Wash your hands thoroughly. Carefully add water to the pot. The water should completely cover the containers with a minimum of a 1-inch level above the containers. Avoid splashing the water. Place a lid on the pot and heat the water to boiling. Boil 30 minutes to ensure detoxifying the food and all container components. Cool and discard the jars, their lids and food in the trash or bury in soil.

Thoroughly scrub all counters, containers and equipment including can opener, clothing and hands that may have contacted the food or containers. Discard any sponges or wash cloths that may have been used in the cleanup. Place them in a plastic bag and discard in the trash.

Canning Timetable for Low-Acid Vegetables

1. Use a pressure canner for processing all vegetables except tomatoes and pickled vegetables.
2. Operate weighted gauge canners at 10 pounds pressure; dial gauge canners at 11 pounds.
3. Salt listed in the procedure is for flavor and may be omitted if you prefer. If salt is used, recommended amount is 1/2 teaspoon per pint or 1 teaspoon per quart.

Vegetables	Method of Preparation	Min. to Process (See note 2 above)	
		Pints	Quarts
(Glass Jars)			
BEANS (Fresh Lima) – Shell, wash. Hot Pack – Cover with boiling water, bring to a boil. Loosely pack hot into jars. Add salt. Pack to within 1 inch of top. Cover with boiling water. Adjust lids. Process.		40	50
	Raw Pack – Pack raw beans into clean jars. For small beans, fill to 1 inch of top for pints and 1 1/2 inches for quarts. For large beans, fill to 1 inch of top for pints and 1 1/4 inches for quarts. Do not press or shake down. Add salt. Fill to top of beans with boiling water. Adjust lids. Process.		40
BEANS (Snap) – Wash, cut or break into 1 inch lengths. Hot Pack – Cover with boiling water. Boil 5 minutes. Loosely pack hot to 1 inch of top. Add salt. Cover with hot cooking liquid. Adjust lids. Process.		20	25
	Raw Pack – Pack beans tightly to 1 inch of top, add salt. Cover with boiling water, leaving 1 inch space in top of jar. Adjust lids. Process.		20
BEETS – Cut off tops. Leave 1 inch of stem and the root. Wash, cover with boiling water. Boil 15 to 25 minutes until skin slips. Skin and trim. Can baby beets whole. Cut large beets into uniform pieces. Pack hot to within 1 inch of top. Add salt. Cover with clean boiling water. Adjust lids. Process.		30	35
CARROTS – Wash and scrape carrots. Slice or dice. Hot Pack – Cover with boiling water and bring to a boil. Simmer 5 minutes. Pack hot to 1 inch of top. Add salt. Cover with boiling hot cooking liquid, leaving 1 inch space at top. Seal and process.		25	30
	Cold Pack – Pack raw carrots tightly into clean jars to 1 inch of top. Add salt. Fill jars to 1 inch of top with boiling water. Seal and process.		25
CORN (Cream Style) – Can in pints only. Husk, remove silks and wash ears. Blanch ears 4 minutes in boiling water. Cut corn from cob at about the center of the kernel. Scrape cob. Hot Pack – To each quart of corn add 2 cups of boiling water. Heat to boiling. Pack hot corn to 1 inch of top. Add salt. Adjust lids. Process.		85	
CORN (Whole Kernel) – Husk, remove silks and wash ears. Blanch 3 minutes in boiling water. Cut corn from cob at about three-fourths the depth of kernel. Hot Pack – To each quart of kernels, add 1 cup hot water. Heat to boiling and simmer 5 minutes. Add salt. Fill jars with hot corn and cooking liquid leaving 1 inch at top. Adjust lids. Process.		55	85
	Raw Pack – Fill jars with raw kernels, leaving 1 inch at top. Do not shake or press down. Add salt. Add fresh boiling water to 1 inch of top. Adjust lids. Process.		55
OKRA – Wash and trim. Leave whole or cut into 1 inch pieces. Cover with boiling water and boil for 2 minutes. Pack hot to 1 inch of top. Cover with boiling cooking liquid. Add salt. Adjust lids. Process.		25	40
PEAS (Dried) – Select mature, dry seeds. Place in pot. Cover with water. Soak 12 to 18 hours in a cool place. (Or to hydrate quickly, cover with boiling water. Boil 2 minutes, remove from heat and soak 1 hour.) Drain. Regardless of soaking method, cover beans with fresh water. Boil 30 minutes. Add salt. Fill jars to 1 inch of top. Adjust lids. Process.		75	90
PEAS (Green) – Shell, wash. Hot Pack – Cover with boiling water, bring to a boil. Boil 2 minutes. Pack hot to 1 inch of top. Cover with cooking liquid. Seal. Process.		40	40
	Raw Pack – Pack raw peas to 1 inch of top. Do not press or shake down. Cover with boiling water, leaving 1 inch space at top of jar. Seal. Process.		40

Vegetables	Method of Preparation	Min. to Process (See note 2 above)	
		Pints	Quarts
		(Glass Jars)	
PEPPERS (Hot or sweet including chile, jalapeno and pimento)	– Caution: If using hot peppers, wear plastic gloves while handling them or wash hands thoroughly with soap and water before touching face. Wash and leave whole. Large peppers may be quartered. Remove cores and seeds. Cut two to four slits in each. If need to remove skin, (1) Cover a hot gas or electric burner with heavy wire mesh. Place peppers on burner for several minutes until skins blister, or (2) bake in a hot oven (400°F) for 6 to 8 minutes. Allow peppers to cool. Place in a pan and cover with a damp cloth. After several minutes, peel each pepper. Flatten whole peppers. Add salt to each pint jar. Fill jars loosely with peppers and add fresh boiled water, leaving 1 inch at top. Adjust lids. Process.	35	
POTATOES (White)	– Wash, peel and cube, if desired. Place in solution containing 1 teaspoon powdered ascorbic acid per gallon (six 500 milligram tablets per gallon). Drain. Cook in boiling water for 2 minutes for cubes, 10 minutes for whole potatoes. Drain. Pack to within 1 inch of top of jar. Add salt. Cover with fresh boiling water, leaving 1 inch at top. Adjust lids. Process.	35	40
PUMPKIN (Cubed)	– Wash, peel, remove seeds and cut in 1-inch cubes. Add just enough water to cover. Bring to boil. Boil 2 minutes. Pack cubes in jars. Note: Do not mash. Add salt, if desired. Cover with hot cooking liquid to 1 inch of top. Adjust lids. Process.	55	90
SPINACH AND OTHER GREENS	– Wash thoroughly. Cut out tough stems and midribs. Steam 3 to 5 minutes or until well wilted. Pack hot spinach loosely to 1 inch of top. Add salt (1/2 teaspoon per quart). Cover with fresh boiling water, leaving 1 inch at top. Adjust lids. Process.	70	90
SQUASH (Summer)	– Wash. Do not peel. Trim ends. Cut in 1/2-inch slices of uniform size. Hot Pack – Add just enough water to cover. Bring to boil. Pack hot to 1 inch of top. Add salt. Cover with hot cooking liquid, leaving 1 inch space. Adjust lids. Process.	35	40
	Raw Pack – Pack tightly in jars to 1 inch of top. Add salt. Fill to top with boiling water. Adjust lids. Process.	35	40
SQUASH (Winter)	– Prepare, pack and process like pumpkin.	55	90
SWEET POTATOES (Wet Pack)	– Wash, stem or boil until skin slips. Cut into uniform size pieces. (Do not mash.) Pack hot to 1 inch of top. Add salt. Cover with boiling water or medium syrup (2 cups sugar in 4 cups water), leaving 1 inch space. Adjust lids. Process.	65	90
VEGETABLE SOUP MIXTURE	– Carrots, green beans, lima beans, celery or any other mixture of vegetables may be canned. Prepare each vegetable according to directions. Combine in a large pot. Boil 5 minutes. Do not thicken. Fill jars halfway with solid mixture. Add salt. Cover with hot cooking liquid, leaving 1 inch space at top of jar. Adjust lids. Process.	60	75

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