

B1159

University of Wisconsin-Extension Cooperative Extension

**Wisconsin Safe Food
Preservation Series**

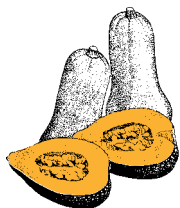
Canning



Vegetables Safely



Barbara H. Ingham



Late autumn finds some pantry shelves stocked with row upon row of home-canned vegetables. High quality home-canned vegetables can add nutrients and enjoyment to family meals all year long. For safe food unlikely to spoil, follow the directions in this publication for canning vegetables.

Acids naturally found in foods can help limit or control the growth of many disease-causing microorganisms. However, most vegetables contain relatively low amounts of acid. You can only prevent spoilage and possible foodborne illness by processing canned vegetables at temperatures to destroy harmful bacteria.

Over the years, botulism from improperly home-canned foods has received a good deal of public attention. **Botulism** is a potentially fatal poisoning resulting from consuming food that contains toxins produced by *Clostridium botulinum*, bacteria widely distributed in soils around the world. In the absence of air and in low-acid foods, the heat-resistant spores of this organism can grow and produce lethal toxins in food. This can happen without any sign of spoilage in the sealed jar. Even a taste of food containing this toxin can be fatal.

Low-acid foods that would support the growth of *C. botulinum* include meats, milk, eggs, and vegetables such as peas, carrots, corn and potatoes. **These low-acid foods must be processed in a pressure canner** to destroy any *C. botulinum* spores that might be present.

Foods with sufficient acid — fruits such as apples, peaches and pears — will not support the growth of *C. botulinum* spores and can be safely processed in a boiling water canner. The **acidity measure** of a food that divides low acid (pressure canning) from high acid (boiling water canning) is a **pH of 4.6** (see the pH chart in the box on page 2).





A pH number measures acidity and alkalinity on a scale from 1 to 14.

A pH of 7 is neutral. As the pH drops below neutral (pH < 7), a food becomes increasingly more acidic. As the pH increases from 7 (pH > 7), a food becomes increasingly more basic or alkaline. In general, the foods we eat have a pH below 7. Very few foods are alkaline; egg whites are the notable exception (pH = 8).

Here are some common foods and their pH values.

For boiling water canning:

pH 3.0 to 4.0—apples, berries, cherries, lemons, oranges, peaches, pears; pickles

For boiling water canning or pressure canning:

pH 4.0 to 5.0—tomatoes with added acid *

For pressure canning:

pH 5.0 to 6.0—carrots, beans, onions, peppers, potatoes, squash; most meats

pH 6.0 to 7.0—corn, mushrooms, peas; chicken

To destroy *C. botulinum* spores, low-acid foods must be processed at temperatures higher than the boiling point of water (212° F at sea level). This can only be achieved by surrounding the jars of food with pure steam under pressure, using a steam pressure canner. Under pressure, water boils at a higher temperature.

Use pressure canners to process low-acid vegetables. Do not use boiling water canners for low-acid foods.

A **pressure canner** is not the same as a **pressure cooker**. Pressure cookers or **pressure saucepans** are used to rapidly cook meats, vegetables and other foods for a family meal. But they may not maintain adequate pressure, and they heat and cool too quickly to ensure safe food. Do not use pressure cookers or pressure saucepans for home canning.

Pressure canners may have dial gauges or weighted gauges. Pressure is measured in **pounds per square inch (psi)**. When pressure is applied, water boils at a temperature above 212°F. Food can be processed in a pressure canner quickly and safely at these high temperatures. For home canning, use pressure canners that maintain pressures up to 15 psi.

* Tested recipes for canning tomatoes can be found in *Tomatoes Tart and Tasty* (B2605), available from your county UW-Extension office or order from Cooperative Extension Publications (learningstore.uwex.edu).

Processing times must be long enough to:

- allow heat to penetrate to the center of food or the coldest spot in the jar, and
- reach temperatures needed to destroy harmful bacteria and bacterial spores.

How quickly heat penetrates depends on the:

- size of the jar, and
- contents of the jar:
 - ratio of solid to liquid, and
 - kind and size of food pieces.

Processing methods in this publication take these factors into account and must be followed precisely to ensure safe home-canned food. Use only the jar sizes and packing styles listed for each vegetable. Process for the full time listed for each vegetable. Follow directions in the Vegetable Canning Guide beginning on page 15.

Select high quality vegetables

For high quality canned products, use fresh vegetables at the peak of eating quality. Ideally, vegetables commonly grown in home gardens should be canned the same day they are harvested. If this is not possible, refrigerate the vegetables until you are ready to can them. Refrigeration will slow the rate of quality loss.

Green beans, peas, sweet corn and green leafy vegetables can lose quality very rapidly. Carrots, beets, potatoes or winter squash can be stored for a relatively long time without much quality change.



For a list of recommended vegetables to plant, request the publication *Vegetable Cultivars and Planting Guide for Wisconsin Gardens* (A1653). Other helpful information can be found in *Harvesting Vegetables from the Home Garden* (A2727). These are available from your county UW-Extension office or order from Cooperative Extension Publishing (learningstore.uwex.edu).

Canning vegetables

Preparing vegetables

Wash all vegetables thoroughly under running water or through several changes of water. Lift the vegetables out of the water to drain so that dirt washed off will not settle back on the food. Trim or peel as needed, depending on the vegetable.

To limit nutrient loss: If directions call for cutting up vegetables for canning, do so just before you are ready to pack them into jars. Cut into

uniform size pieces. Specific suggestions are stated in the Vegetable Canning Guide beginning on page 15.

Optional ingredients

Pickling or canning salt can be added to canned vegetables to enhance flavor. However, you can omit or use less salt without risking spoilage in low-acid vegetables.

Spices or herbs may be added in **small** amounts before processing. Heat treatments in this publication are sufficient to render these additions safe.

The yield of canned product from different vegetables varies greatly. The chart below will help you estimate the amount of canned food you can get from each vegetable. Weights per bushel or crate are approximate.

Yields for canned vegetables			
Vegetable	Pounds for 1 quart jar	Weight & measure	About how many quarts
Asparagus	3 ¹ / ₂	31 lbs./crate	7 to 12
Beans, green, wax or Italian	2	30 lbs./bushel	15 to 20
Beans, lima (in pods)	4	32 lbs./bushel	6 to 10
Beans or peas, dry	3 ¹ / ₄	25 lbs./bushel	6 to 7
Beets (without tops)	2 ¹ / ₂ to 3	52 lbs./bushel	15 to 20
Carrots (without tops)	2 ¹ / ₂ to 3	50 lbs./bushel	17 to 25
Corn, sweet (in husks)	4 to 5	35 lbs./bushel	8 to 9 as kernels
Peas, green (in pods)	4 to 5	30 lbs./bushel	6 to 8
Potatoes, white	3	60 lbs./bushel	15 to 20
Spinach or other greens	4	20 lbs./bushel	5 to 8
Squash, winter or pumpkin	2	40 lbs./bushel	16 to 20

Do not add butter or fat to home-canned products unless specifically allowed in a recipe tested for safety. Adding butter or other fats to home-canned food may slow the rate of heat transfer, and result in an unsafe product.

Do not thicken, add rice, barley or pasta to canned vegetables. These starchy ingredients absorb liquid during processing, and slow the way the vegetables heat. Under-processing and unsafe food could result.



For high quality canned products, use fresh vegetables at the peak of

eating quality. Ideally, vegetables commonly grown in home gardens should be canned the same day they are harvested. If this is not possible, refrigerate the vegetables until you are ready to can. You may add small amounts of salt, spices and herbs to canned vegetables. But do not add butter or fat, or thicken these items with rice, pasta or starch.

Filling jars

Use standard canning jars free of cracks or chips. Do not reuse commercial mayonnaise jars for processing in pressure canners, since the risk of breakage is great. Wash and rinse the jars. You do not need to sterilize jars before filling when pressure canning.

Do not use jars larger than 1 quart because safe process times are not available for larger jars. For some vegetables, even quart jars are not recommended for the same reason.

Check the Vegetable Canning Guide for recommended jar sizes for each product. If you use 1½ pint jars, use the process time for quarts.

Vegetables may be packed raw or preheated and packed hot, as indicated in the guide. A few vegetables should be hot packed only.

Hot packing usually produces a higher quality canned product and improves shelf life because it helps remove trapped air from the food tissues, shrinks food, reduces floating, and increases vacuum in the sealed jars.

Follow instructions for loose- or tight-pack filling. Some vegetables expand during processing, or will not heat evenly if packed too tightly.

Follow these steps for successful home canning of vegetables:

- Loose- or tight-pack vegetables in jars, as instructed.
- Leave the proper amount of headspace, usually 1 inch.
- Add boiling water or cooking liquid to cover food. Cooking liquid is often preferred because of the added vitamins, minerals and flavor imparted.
- Process vegetables for the correct time and at the correct pressure setting.



Leave the amount of **headspace** — between the top surface of the liquid and the top rim of the jar — recommended in the Vegetable Canning Guide. Usually 1-inch headspace is recommended for foods processed in a pressure canner. This space allows food to expand during processing and form a vacuum as the jars cool. Overfilling jars could lead to under-processing or cause sealing problems.

Use enough **liquid** — boiling water or cooking liquid — to cover raw- and hot-packed food. If uncovered, vegetables at the top of the jar may darken.

Use hard water, because the calcium salts in hard water will help vegetables maintain a firm texture. This is particularly important for green beans. However, if your water is high in iron or copper salts, you may prefer to use soft water in canning to keep vegetables from discoloring.

After filling, remove air bubbles from jars by sliding a rubber spatula or bubble freer between the food and the side of the jar in several places. Wipe the jar rim carefully to remove food particles.

Jar lids

Follow the manufacturer's directions for pretreating two-piece vacuum seal lids. Fill hot, clean jars with vegetables. Remove bubbles. Be careful not to leave any food on the jar rims.

Wipe jar rims with a clean, damp paper towel. Put on pretreated lids and screw on metal bands until you begin to feel resistance, then turn the band until it is firmly tight.

Caution: Porcelain-lined zinc caps and rubber rings have not been made for years and are no longer recommended for home canning.

Processing in a pressure canner

Low-acid foods must be processed for the correct number of minutes at temperatures between 240° and 250° F to destroy harmful bacteria and bacterial spores. These temperatures are attained using a pressure canner. At these temperatures, it takes from 20 to 110 minutes to destroy bacteria and bacterial spores in low-acid foods.

Wisconsin elevations range from 580 to 1,953 feet above sea level. Using the process time for sea level may lead to spoilage if you live at higher elevations. Water boils at lower temperatures as elevation increases. Increasing canner pressure compensates for the lower boiling temperatures.

Therefore, when you look up the process time for a particular vegetable, select the canner pressure for your elevation.

If you do not know the elevation where you live, consult the map on page 8, contact your local county Land Information office, or process as recommended for the higher elevation.

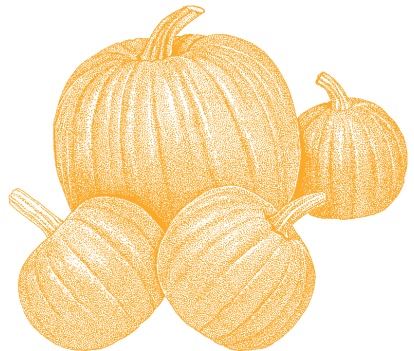
Remember: If you share recipes with friends and relatives, be sure to include adjustments for changes in elevation.



Pressure is measured in pounds per square inch (psi). When canning low-acid vegetables at all Wisconsin elevations, unless otherwise specified, operate:

- *dial gauge canners* at 11 pounds pressure (11 psi).
- *weighted gauge canners* at 10 psi at elevations up to 1,000 feet above sea level, or 15 psi above 1,000 feet elevation.

If you do not know the elevation where you live, consult the map on page 8 in this publication, or process as recommended for the higher elevation.



Check the canner and pressure gauge

Before you start canning, be sure the canner is in good operating condition. Have a dial pressure gauge tested each canning season to be sure it measures pressure accurately. Contact your county UW-Extension office for dial gauge testing.

Canners with weighted pressure regulators do not require testing. But the regulators and vent pipes must be kept clean, and gaskets need to be in good condition. Replace any rubber gaskets that are old or leaking.

See *Using and Caring for a Pressure Canner* (B2593) at learningstore.uwex.edu.

Elevation map

Remember to adjust for elevation above sea level when pressure canning vegetables.

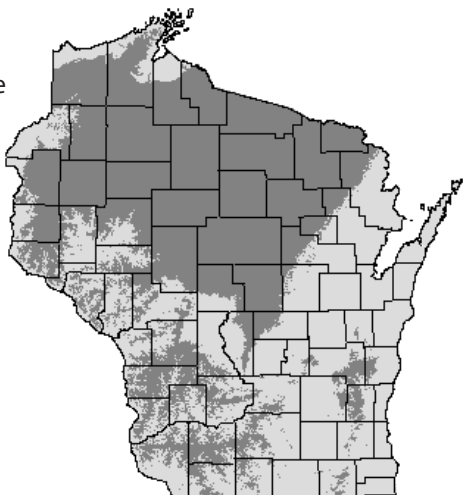
Consult the elevation map, or call your county Land Information office (listed under county government in your phone book). If you share recipes with friends and relatives, be sure to include adjustments for changes in elevation.

■ Elevation above 1,000 feet

■ Elevation below 1,000 feet

Process in a pressure canner

When you are ready to process vegetables, put 2 to 3 inches of boiling water in the bottom of the pressure canner. Set filled jars on a rack in the canner so steam can flow freely around each jar. Fasten the canner lid in place.



Source: *Wisconsin Geological and Natural History Survey*

Vent the canner for 10 minutes to drive air from the canner. If air is trapped in the canner, a lower temperature will result and cause under-processing.



Follow recipes precisely and process all vegetables in a pressure canner.

Open kettle canning, microwave canning and oven canning are very unsafe and *not recommended*. Boiling water canning is also very unsafe and *not recommended* for vegetables.

Vent all pressure canners for 10 minutes before beginning pressure processing. Failure to vent canners can result in under-processing and unsafe food.

Start counting process time when the correct pressure is reached. Maintain the pressure at a steady level by regulating heat under the canner.

Fluctuating pressure can cause jars to lose liquid and damage seals, or lead to under-processing. If at any time during processing the pressure drops below the process level, bring the pressure back up and retime for the entire process period.

To vent the canner: Leave the vent port uncovered, or open the petcock by hand. Heat the canner so the water boils and generates steam. After steam flows from the canner vent for 10 minutes, close the petcock or place the pressure regulator on the vent pipe and let the pressure rise to the desired level.

Start counting process time when the correct pressure is reached. Maintain the pressure at a steady level by regulating heat under the canner. Fluctuating pressure can cause jars to lose liquid and damage seals, or lead to under-processing and unsafe food.

If at any time during processing the pressure drops below the process level, bring the pressure back up and retime for the entire process period.

When the process time is up, turn off the heat and remove the canner from the burner, if possible. Let the pressure drop on its own. Do not force-cool the canner. Force-cooling with cold water will cause the jars to lose liquid and may damage their seals. Forced cooling will also lead to under-processing. The cool-down period is part of the lethal process that destroys harmful bacteria and bacterial spores.

Time for depressurizing will vary, but in most cases will be 30 minutes or less. When the pressure reaches zero, wait a few minutes, then slowly open the petcock or remove the weight control. Unfasten the cover and tilt it away from you as the steam escapes. If you delay opening the canner for several hours, it may be very difficult to remove the lid, and foods will cool more slowly than desired.

Cool jars

Remove jars from the canner and place them upright on a towel or rack away from drafts. Do not retighten the screw band. If some liquid has boiled out during processing, do not open the jar to add more.

- **If only a small amount of liquid boils out (less than half) and the lid seals properly, the food will be safe to eat.** However, food that is not covered with liquid may darken during storage.
- **If more than half the liquid has been lost, either reprocess the vegetables with added liquid, or freeze the contents of these jars.** Liquid is necessary for adequate heat penetration. Losing too much liquid during processing can lead to under-processing and unsafe food.



For best quality, use home-canned food within one year. Properly home-canned food will remain safe for years, but quality will suffer in extended storage. Store jars in a cool, dry place to retain the best eating quality. And remember to rotate jars, using the oldest first, and then those more recently canned.

Check seals

After the jars have cooled completely, check the seals. Press the center of flat metal lids. If the lid is popped down and does not move, the jar is sealed. After 24 hours, you can remove metal bands, wash and store them for re-use.

Storing canned vegetables

Wipe sealed jars clean, label and date. For best quality, use home-canned food within one year. Properly home-canned food will remain safe for years, but quality will suffer from extended storage. Store jars in a cool, dry place to retain the best eating quality and protect the lids from rusting.

In an unheated storage area, protect canned food by wrapping jars in paper and covering them with a blanket. Move them to a heated area when the temperature drops to freezing. Freezing will not cause canned vegetables to spoil unless the seal is damaged when the jar's contents expand. But the food may have a softer texture, and the flavor may change.

Jar seals may fail for several reasons:

- Nicks or chips on the jar rim
- Not enough or too much head-space
- Food particles on the jar rim — Wipe the rim before placing the lid on the jar. Overfilling may force food particles under the lid. Fluctuating pressure or a sudden drop in pressure can also draw food particles under the lid.
- Incorrectly pretreating lids — Follow the manufacturer's directions.
- Reusing single-use lids, or using old lids with dried-out sealing compound
- Defects in the lid itself: flaws in the sealing compound coating, or too little compound on the lid



If jars fail to seal

If properly processed jars fail to seal, you can do one of the following:

- **Refrigerate the jar of vegetables and use it within 2 or 3 days.** Once cooled to room temperature, jars of vegetables that did not seal should be refrigerated until used, or reprocessed within 24 hours.
- **Freeze the contents of jars that did not seal.** Package in a freezer-safe container (glass jar or plastic container), label and date. You may need to transfer the vegetables to a new container if:
 - there is not room for vegetables to expand on freezing in the original canning jar, or
 - you want to use a different (non-breakable) container in your freezer.
- **Reprocess vegetables within 24 hours.** Empty vegetables from jars, heat (if directions called for hot packing), and place into clean, hot jars. Process as if you were canning fresh food. Reprocessed vegetables may be softer, but will be wholesome.
- **If more than 24 hours have elapsed, safely dispose of the jars and their contents.** Follow the directions on pages 12-13.

Dispose of spoiled foods carefully

Do not taste food from a jar with an unsealed lid, or food that shows signs of spoilage. You can more easily detect some types of spoilage in jars stored without screw bands. Growth of bacteria and yeasts produces gas that pressurizes the food, swells lids, and breaks jar seals.

As you select canned food from your cupboard, examine each lid for tightness and vacuum. Lids that are popped down in the center have good seals. Next, hold the jar upright at eye level. Turn the jar and examine all sides for streaks of dried food from the top of the jar. Look at the contents for rising air bubbles and unnatural color.

While opening the jar, smell for unnatural odors and look for spurting liquid and cotton-like mold (white, blue, black or green) on the food and under the lid.



Vegetables that failed to seal may be safely reprocessed within

24 hours. Empty vegetables from jars, heat (if hot packing), and place into clean, hot jars. Reprocess again for the full time. If more than 24 hours have elapsed, safely dispose of the jars and their contents.

If the seal is broken or you detect signs of spoilage, treat canned vegetables carefully — they may contain *C. botulinum* toxin.

Even if the vegetables show no obvious signs of spoilage, dispose of them in one of these 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, **detoxify** the jars and their contents before discarding. Detoxifying the jars and their contents will destroy any poisons that might have formed.

To detoxify food:

Carefully place the filled suspect jars and lids on their sides in an 8-quart or larger stock pot, pan, or boiling water canner. Wash your hands thoroughly. Carefully add to the pot enough water to cover the jars by 2 inches. Avoid splashing the water.

Place a lid on the pot and heat the water to boiling. Boil for 30 minutes to ensure detoxifying the food and jars. Cool. Discard the jars, their lids and food in the trash, or bury in soil.

Wash with soap and water all counters, pots and equipment including can opener, clothing and hands that may have contacted the spoiled food or jars. 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.

Follow directions carefully

When you can mixed vegetables, check the process time for each vegetable and use the longest time. Food quality will be better if you combine vegetables that have similar process times. For example, if you include corn in a mixture, the process time is going to be very long and will greatly overcook vegetables like green beans, carrots or peas that have shorter process times.

Use only research-tested recipes for home canning. Extension bulletins and the *USDA Complete Guide to Home Canning* are sources of tested recipes (see page 23).

Items prepared with untested recipes should not be canned, but most can be frozen. Canning foods at home is not a time to experiment with recipes — the safety of you and your family could be at risk.

Be sure you follow filling instructions, so the amount of solids in each jar is not greater than stated.

The guidelines in this publication assure heat penetration for specific combinations and proportions of foods, so any changes may result in unsafe or under-processed food.



Safely discard vegetables that are spoiled or that became unsealed.

Even if the vegetables show no obvious signs of spoilage, dispose of them in one of these 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, detoxify the jars and their contents before discarding. Place suspect jars in an 8-quart or larger pan. Carefully add water to cover by 2 inches and boil for 30 minutes. Cool and discard in the trash, or bury.*

Do not thicken, or add rice, barley or pasta to mixed vegetables.

These starchy ingredients absorb liquid during processing, and change the heat transfer characteristics of the product. Under-processing and unsafe food could result.

Process vegetables in a pressure canner

- **Dial gauge canners** at 11 pounds pressure (11 psi)
- **Weighted gauge canners** at
 - 10 pounds pressure (10 psi) at elevations up to 1,000 feet above sea level
 - 15 pounds pressure (15 psi) above 1,000 feet elevation

All recommendations in the Vegetable Canning Guide are for the higher elevation — above 1,000 feet. If you are certain that you live below 1,000 feet, you may safely process at 10 pounds pressure (10 psi) with a weighted gauge canner.

The processing time remains the same at any elevation.

(See the Wisconsin elevation map on page 8.)

Use only tested recipes for home canning, such as the following guidelines, other extension bulletins, or the *USDA Complete Guide to Home Canning* available from the National Center for Home Food Preservation: www.uga.edu/nchfp/.

Freeze food if you do not use a tested recipe. If you change tested recipes, the safety of you and your family could be at risk.

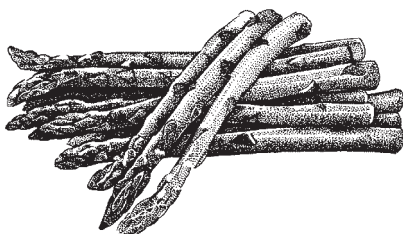
Note: lb. = pound
mg. = milligram
psi = pounds per square inch (pressure)
tbsp. = tablespoon
tsp. = teaspoon
1 quart = 2 pints = 4 cups



VEGETABLE CANNING GUIDE

Canner pressure	Dial gauge	Weighted gauge up to 1,000 ft.	Weighted gauge above 1,000 ft.
	11 lbs. pressure	10 lbs. pressure (10 psi)	15 lbs. pressure (15 psi)
Vegetable	Type of pack, preparation, process time		
Asparagus; raw pack	Wash, trim and cut into 1-inch pieces or can whole. Pack tightly into hot jars without crushing, leaving 1-inch headspace. Add salt.* Cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 30 minutes — Quarts: 40 minutes		
Asparagus; hot pack	Wash, trim and cut into 1-inch pieces or can whole. Boil in water 2 to 3 minutes. Loosely pack in hot jars and cover with hot cooking liquid, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 30 minutes — Quarts: 40 minutes		
Beans or peas, dry; hot pack	Use kidney, navy, soybeans, great northern, or any other dry bean or pea. Sort and wash dry beans and prepare using one of the following methods: <ol style="list-style-type: none"> 1) Place the beans in a large pot, cover with water and let stand in a cool place for 12 to 18 hours. Drain. 2) Cover beans with water, bring to a boil. Boil 2 minutes, remove from heat and soak for 1 hour. Drain. Take drained beans soaked by either method and cover with fresh water. Boil for 30 minutes. Pack hot beans into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 75 minutes — Quarts: 90 minutes		

* Use canning or pickling salt. Unless otherwise stated, add 1/2 tsp. salt to pints and 1 tsp. to quarts. You may use less salt or no salt in canned vegetables.



VEGETABLE CANNING GUIDE

Canner pressure	Dial gauge	Weighted gauge up to 1,000 ft.	Weighted gauge above 1,000 ft.
	11 lbs. pressure	10 lbs. pressure (10 psi)	15 lbs. pressure (15 psi)
Vegetable	Type of pack, preparation, process time		
Beans, dry — with tomato or molasses sauce; hot pack	<p>Add 3 cups water for each cup of dry beans in a large pot. Soak overnight, or cover with water and boil 2 minutes, remove from heat and soak 1 hour. Drain, cover with fresh water, and boil for 30 minutes. Drain and save liquid for sauce. Fill hot jars $\frac{3}{4}$ full of hot beans and cover with boiling sauce (see below), leaving 1-inch headspace. Add a $\frac{3}{4}$-inch cube of pork, ham or bacon to each jar, if desired. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 65 minutes — Quarts: 75 minutes</p>		
	<p>Tomato sauce 3 cups tomato juice 1 cup tomato catsup 3 tbsp. sugar 2 tsp. salt 1 tbsp. chopped onion $\frac{1}{4}$ tsp. ground cloves Heat to boiling.</p>	<p>Molasses sauce 4 cups cooking liquid 3 tbsp. molasses or sorghum 1 tbsp. vinegar 2 tsp. salt $\frac{3}{4}$ tsp. dry mustard Heat to boiling.</p>	
Beans, baked	<p>Soak and boil beans and prepare molasses sauce as directed above. Place seven $\frac{3}{4}$-inch pieces of pork, ham, or bacon in an earthenware crock, large casserole, or pan. Add beans and enough molasses sauce to cover beans. Cover and bake 4 to 5 hours at 350°F, adding water as needed every hour. Fill hot jars, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 65 minutes — Quarts: 75 minutes</p>		
Beans, green, wax or Italian; raw pack	<p>Wash and trim. Leave whole or cut into 1- or 2-inch pieces. Pack tightly into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 20 minutes — Quarts: 25 minutes</p>		
Beans, green, wax or Italian; hot pack	<p>Wash, trim and cut as above. Cover with boiling water, boil 5 minutes. Pack hot beans into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 20 minutes — Quarts: 25 minutes</p>		

VEGETABLE CANNING GUIDE

Vegetable	Type of pack, preparation, process time
Beans, fresh lima (shelled); raw pack	Shell and wash. Fill hot jars loosely with raw beans. Do not shake or pack down. Add salt.* Cover with boiling water, leaving headspace below for small or large beans: Small beans: Leave 1-inch headspace in pints, 1½ inches in quarts. Large beans: Leave 1-inch headspace in pints, 1¼ inches in quarts. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 40 minutes — Quarts: 50 minutes
Beans, fresh lima (shelled); hot pack	Shell and wash. Cover beans with boiling water; bring to a boil, and boil 3 minutes. Loosely pack hot beans into hot jars, leaving 1-inch headspace. Do not shake or pack down. Add salt.* Cover with boiling cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 40 minutes — Quarts: 50 minutes
Beets; hot pack	Small, 1-2 inches: Pack whole. Medium, 2-3 inches: Cube or slice. Beets larger than 3 inches are often too fibrous to can. Remove tops, leaving 1-inch stem and tap root. Scrub well. Cover with boiling water. Boil until skins slip off easily, about 15 to 25 minutes depending on size. Cool, remove skins and trim off root and stem. Can small beets whole; cut larger ones into ½-inch slices or cubes. Fill hot jars with hot beets and cover with fresh boiling water, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 30 minutes — Quarts: 35 minutes
Carrots; raw pack	Wash, peel and rewash. Leave small carrots whole; slice or dice larger carrots. Pack hot jars tightly, leaving 1-inch headspace. Add salt.* Fill jar with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 25 minutes — Quarts: 30 minutes
Carrots; hot pack	Prepare as above. Cover carrots with water, bring to a boil and simmer 5 minutes. Fill hot jars with hot carrots, leaving 1-inch headspace. Add salt.* Cover with boiling cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 25 minutes — Quarts: 30 minutes

* **Use canning or pickling salt.** Unless otherwise stated, add ½ tsp. salt to pints and 1 tsp. to quarts. You may use less salt or no salt in canned vegetables.

VEGETABLE CANNING GUIDE

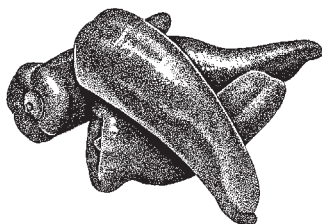
Canner pressure	Dial gauge	Weighted gauge up to 1,000 ft.	Weighted gauge above 1,000 ft.
	11 lbs. pressure	10 lbs. pressure (10 psi)	15 lbs. pressure (15 psi)
Vegetable	Type of pack, preparation, process time		
Corn** — cream-style; hot pack	<p>Note: <i>Hot pack using pint jars only. Canning in quart jars is unsafe.</i> Husk, remove silks, and wash. Blanch ears 4 minutes in boiling water. Cut corn from cob at center of kernel, and scrape cobs. Add 1 cup boiling water to each 2 cups corn in a saucepan. Heat to boiling. Use pint jars only. Fill hot jars with hot corn mixture, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 85 minutes — Quarts: UNSAFE</p>		
Corn** — whole kernel; raw pack	<p>Husk, remove silks, and wash. Blanch 3 minutes in boiling water. Cut kernels from cob ³/₄ the depth of the kernels. Do not scrape cob. Pack corn loosely into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 55 minutes — Quarts: 85 minutes</p>		
Corn** — whole kernel; hot pack	<p>Prepare as above. In a saucepan, combine 1 cup boiling water for each 4 cups of corn. Heat to boiling; simmer 5 minutes. Pack hot corn loosely into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling hot cooking liquid, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 55 minutes — Quarts: 85 minutes</p>		
Mushrooms, domestic; hot pack	<p>Caution: <i>Can only domestic mushrooms. Do not can wild mushrooms, as safe processes have not been developed. See page 22.</i> Hot pack using half-pint or pint jars only. Canning in quart jars is unsafe. Trim stems and discolored parts. Soak in cold water for 10 minutes and wash thoroughly in several changes of water. Leave small mushrooms whole; cut larger ones. Cover with water in a saucepan and boil 5 minutes. For better color, add to each pint jar one 500 mg. tablet of vitamin C (crushed) or ¹/₈ tsp. ascorbic acid powder. Use half-pint or pint jars only. Fill hot jars loosely with hot mushrooms and cover with fresh boiling water, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Half-pints or pints: 45 minutes — Quarts: UNSAFE</p>		

****Note:** Supersweet corn is not recommended for canning. High temperatures cause unacceptable browning of kernels.

VEGETABLE CANNING GUIDE

Vegetable	Type of pack, preparation, process time
Onions; hot pack	Use onions 1 inch in diameter or less. Wash and peel onions. Cover onions with boiling water; bring to a boil. Boil 5 minutes. Pack onions into hot jars, leaving 1-inch headspace. Add salt.* Fill jars with fresh boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 40 minutes — Quarts: 40 minutes
Peas, green; raw pack	Note: Freeze <i>Sugar Snaps</i> or <i>edible pods</i> for best quality. Shell, wash. Pack peas loosely into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints or quarts: 40 minutes
Peas, green; hot pack	Shell, wash. Cover with water in a saucepan. Bring to a boil and boil for 2 minutes. Pack hot peas loosely into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling cooking liquid, leaving 1-in. headspace. Remove air bubbles. Wipe jar rims. Adjust lids, process. Pints or quarts: 40 minutes
Peppers, hot or sweet, green or red; hot pack	Note: <i>Small peppers may be left whole; large peppers may be quartered.</i> Wash, core and remove seeds. Wear rubber gloves if working with hot peppers. Slash 2 to 4 slits in each pepper and remove skins as follows: Heat in 400° F oven or broiler 6 to 8 min. until skins blister. Place in a pan and cover with a damp cloth. Let steam for 5 to 10 minutes. Remove skins with a knife blade. Flatten peppers and pack loosely in layers in hot jars. Add 1/2 tsp. salt to each pint jar, if desired. Cover with boiling water, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Half-pints or pints: 35 minutes — Quarts: UNSAFE

* **Use canning or pickling salt.** Unless otherwise stated, add 1/2 tsp. salt to pints and 1 tsp. to quarts. You may use less salt or no salt in canned vegetables.



VEGETABLE CANNING GUIDE

Canner pressure	Dial gauge	Weighted gauge up to 1,000 ft.	Weighted gauge above 1,000 ft.
	11 lbs. pressure	10 lbs. pressure (10 psi)	15 lbs. pressure (15 psi)
Vegetable	Type of pack, preparation, process time		
Potatoes, white — cubed or whole; hot pack	<p>Small, 1-2 inches: Pack whole. Note: <i>Potatoes must be peeled for process times given to produce a safe product.</i> Wash, peel, and cut into 1/2-inch cubes. Keep in ascorbic acid solution to prevent browning: 3,000 mg. vitamin C (crushed) per gallon of cold water. Drain. Cook cubed potatoes 2 minutes in boiling water, whole potatoes 10 minutes. Drain. Pack hot potatoes into hot jars, leaving 1-in. headspace. Add salt.* Cover with fresh boiling water, leaving 1-in. headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 35 minutes — Quarts: 40 minutes</p>		
Soups	<p>For information on canning meat-based soups or sauces, see <i>Canning Meat, Wild Game, Poultry and Fish Safely</i> (B3345) available from your county UW-Extension office or Cooperative Extension Publishing (learningstore.uwex.edu). Instructions for canning vegetable mixtures can be found on page 13, or consider the mixed vegetable recipe on page 22.</p>		
Spinach or other greens; hot pack	<p>Can freshly picked, tender greens that are thoroughly washed. Cut out tough stems and midribs. Blanch 1 pound at a time in a cheesecloth bag or steamer for 3 to 5 minutes or until well wilted. Pack hot greens loosely into hot jars, leaving 1-inch headspace. Cover with boiling water, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 70 minutes — Quarts: 90 minutes</p>		
Squash, summer — UNSAFE	<p>Caution: <i>Must be frozen.</i> There are no guidelines for safely canning this product. See page 22 and <i>Freezing Fruits and Vegetables</i> (B3278), available from your county UW-Extension office or from Cooperative Extension Publishing (learningstore.uwex.edu).</p>		
Squash, winter or pumpkin — cubed; hot pack	<p>Caution: <i>Do not mash or purée.</i> Wash, remove seeds, peel. Cut into 1-inch cubes. Boil 2 minutes in water. Pack hot cubes into hot jars and cover with hot cooking liquid or boiling water, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process. Pints: 55 minutes — Quarts: 90 minutes</p>		

VEGETABLE CANNING GUIDE

Vegetable	Type of pack, preparation, process time
Succotash; hot pack	<p>15 lbs. unhusked sweet corn or 3 qts. cut whole kernels 14 lbs. mature green podded lima beans or 4 qts. shelled limas 2 qts. crushed or whole tomatoes (optional)</p> <p>Wash and prepare fresh corn/limas/tomatoes. Combine all prepared vegetables in a large kettle with enough water to cover the pieces. Boil gently 5 minutes and fill hot jars with pieces and cooking liquid, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process. Yield: 7 quarts</p> <p>Pints: 60 minutes — Quarts: 85 minutes</p>
Succotash; raw pack	<p>Fill hot jars with equal parts of prepared vegetables (listed above) leaving 1-inch headspace. Do not shake or press down pieces. Add fresh boiling water, adjusting headspace to 1-inch. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 60 minutes — Quarts: 85 minutes</p>
Sweet potatoes; hot pack	<p>Caution: <i>Do not mash or purée.</i> Wash sweet potatoes. Boil or steam 15 to 20 minutes to slip off skins. Cool enough to handle and remove skins. Cut into uniform pieces. Pack hot sweet potatoes into hot jars, leaving 1-inch headspace. Add salt.* Cover with boiling water or medium sugar syrup, leaving 1-inch headspace. Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 65 minutes — Quarts: 90 minutes</p> <p>Medium sugar syrup Dissolve 1³/₄ cups sugar in 1 quart of water. Heat to boiling. Yields 5 cups syrup.</p>
Tomatoes	<p>For instructions on safely canning tomatoes, see <i>Tomatoes Tart & Tasty</i> (B2605), available from your county UW-Extension office or from Cooperative Extension Publishing (learningstore.uwex.edu).</p>

* **Use canning or pickling salt.** Unless otherwise stated, add 1/2 tsp. salt to pints and 1 tsp. to quarts. You may use less salt or no salt in canned vegetables.

VEGETABLE CANNING GUIDE

Canner pressure	Dial gauge	Weighted gauge up to 1,000 ft.	Weighted gauge above 1,000 ft.
	11 lbs. pressure	10 lbs. pressure (10 psi)	15 lbs. pressure (15 psi)
Vegetable	Type of pack, preparation, process time		
Vegetables, mixed; hot pack**	<p>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 favorite vegetables except leafy greens, dried beans, cream-style corn, squash and sweet potatoes. Except for zucchini, wash and prepare vegetables as directed previously for each vegetable. Wash, trim, and slice or cube zucchini; combine all vegetables in a large pot or kettle, and add enough water to cover pieces. Boil 5 minutes and fill hot jars with hot pieces and liquid, leaving 1-inch headspace. Add salt.* Remove air bubbles. Wipe jar rims. Adjust lids and process.</p> <p>Pints: 75 minutes — Quarts: 90 minutes</p>		

** Instructions for canning other vegetable mixtures can be found on page 13. See below for vegetables not suited for canning in mixtures.

Not recommended

The following vegetables are **not recommended** for home canning:

Broccoli, Brussels sprouts, cabbage, cauliflower, kohlrabi, rutabaga, summer squash (such as zucchini, yellow squash, spaghetti squash), turnips, and wild mushrooms.

These vegetables develop strong flavors and usually discolor when canned, or may be unsafe to can. Using them in vegetable mixtures is **not recommended** for the same reasons.



For more information, see *Freezing Fruits and Vegetables*

(B3278), *Tomatoes Tart & Tasty* (B2605), *Canning Salsa Safely* (B3570), and *Using and Caring for a Pressure Canner* (B2593), available from your county UW-Extension office or Cooperative Extension Publishing (see back cover).

Wisconsin Safe Food Preservation Series

Canning Fruits Safely (B0430)

Canning Meat, Wild Game, Poultry and Fish Safely (B3345)

Canning Salsa Safely (B3570)

Canning Vegetables Safely (B1159)

Freezing Fruits and Vegetables (B3278)

Homemade Pickles and Relishes
(B2267)

Making Jams, Jellies and Fruit Preserves (B2909)

Make Your Own Sauerkraut (B2087)

Tomatoes Tart & Tasty (B2605)

Using and Caring for a Pressure Canner
(B2593)

Wisconsin's Wild Game: Enjoying the Harvest (B3573) and
Guidelines for Making Safe Jerky at Home (SUPL3573)

To start with the right ingredients, see also:

Growing Tomatoes, Peppers and Eggplants in Wisconsin (A3687)

Harvesting Vegetables from the Home Garden (A2727)

Vegetable Cultivars and Planting Guide for Wisconsin Gardens (A1653)

These are available from your county UW-Extension office or order from Cooperative Extension Publishing (learningstore.uwex.edu).

Resources

So Easy to Preserve Bulletin 989 4th edition, by Elizabeth L. Andress and Judy A. Harrison (Athens, Ga.:

University of Georgia College of Family and Consumer Sciences), 1999:

www.uga.edu/nchfp/publications/publications_uga.html

USDA Complete Guide to Home Canning (Ag Information Bulletin 539, 1994) is online via the **National Center for Home Food**

Preservation:

www.uga.edu/nchfp/publications/publications_usda.html

You can also find more research-tested recipes on this web site (adjust recipes for Wisconsin elevations, see page 8):

www.uga.edu/nchfp/publications/nchfp/factsheets.html

Web sites: If you do not have a computer, most libraries have one you can use.

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Author: Barbara H. Ingham, professor and food science extension specialist, College of Agricultural and Life Sciences, University of Wisconsin-Madison and UW-Extension.

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