

# Vegetables



This publication includes freezing and canning procedures for vegetables popular in Kansas. Related publications are referenced in the text.

## Freezing

Speed in getting vegetables from the garden to the freezer is a must for top-quality frozen vegetables. During hot weather, harvest vegetables in the early morning before they absorb much heat. Select vegetables at optimum maturity, when they reach their best flavor and texture.

Process and freeze all garden products with as little delay as possible.

If you must store vegetables for a short time after harvesting, spread them out loosely in a cool well-ventilated place or pack them loosely in the refrigerator. Prompt cooling in ice water followed by refrigerator storage helps retain flavor, quality, and vitamin C in many freshly picked vegetables such as asparagus and unshelled peas. For longer storage periods, pack in crushed ice.

Never store vegetables after shelling or cutting. Souring may result from the delay between preparation and freezing, improper cooling after blanching or stacking the packages too close when freezing.

## Blanching is necessary

To prevent a loss of quality and to preserve the vitamin content of vegetables for freezing, blanch them in boiling water or steam. Nutritive values are best retained when:

- Water is brought to a boil quickly.
- The blanching period is as short as possible.
- The vegetable is chilled quickly and removed from cold water promptly.

The blanching process is necessary to inactivate enzymes. If these enzymes are left in their active state, the frozen vegetable loses quality after one to two months or less. "Off" flavors develop and the vegetable tends to lose its garden-fresh color, vitamin

content, and texture. When enzymes are inactivated by heat, the storage life is nine to twelve months.

*To blanch in boiling water:* Use 1 gallon of water for each pound of vegetable except for leafy greens which need 2 gallons per pound.

- Bring the water to a rolling boil.
- Immerse the wire basket, blanching basket or mesh bag containing the vegetables.
- Cover the kettle and boil at top heat the required length of time. Begin counting the time as soon as the water returns to a boil. You may use the same blanching water two or three times. Keep it at the required level. Change the water if it becomes cloudy.
- Cool immediately in pans of ice water for the same time used for blanching. Keep the chilling water ice cold.
- Drain the vegetables thoroughly. Extra water will form too many ice crystals.
- Pack using the dry- or tray-pack method.

*To blanch in steam:* Use a pot with a tight lid and a basket that holds the food at least three inches above the bottom of the pot. Fill pot with an inch or two of water and bring to a boil.

Put vegetables in basket in a single layer for even steaming. Cover with lid and keep heat high. Start counting time as soon as the lid is on.

This works best for broccoli, pumpkin, sweet potatoes and winter squash.

*Microwave blanching:* This is not recommended due to uneven heating. This may cause some enzymes to remain active. This method does not save time or energy.

## Methods of packing vegetables

There are two basic methods for packing vegetables for freezing, the tray-pack and the dry-pack methods.

*Dry pack:* Blanch, cool, and drain vegetables. Pack tightly into containers or freezer bags to reduce the amount of air in the container. Press freezer bags to

squeeze air out of the unfilled part of the bag. When packing broccoli, alternate the heads and stems.

*Tray pack:* Freeze individual pieces of blanched and drained vegetables on a tray or shallow pan, then pack the frozen pieces into a freezer bag or container. This method produces a product similar to commercially frozen plastic bags of individual vegetable pieces and is particularly good for peas, corn, and beans.

Pack the frozen pieces into a bag or container as soon as they are frozen.

## Canning

Low-acid foods such as vegetables require pressure-canner processing. Pressure does not destroy microorganisms, but high temperatures applied for a certain period of time do kill microorganisms. The success of destroying all microorganisms capable of growing in canned food is based on the temperature obtained in pure steam, free of air, at sea level. At sea level, a canner operated at a gauge pressure of 10.5 pounds provides an internal temperature of 240°F.

## Processing instructions

Two serious errors in the temperatures obtained in pressure canners occur because:

1. Internal canner temperatures are lower at higher altitudes. To correct this error, canners must be operated at the increased pressures specified in this publication for appropriate altitude ranges.
2. Air trapped in a canner lowers the temperature obtained at 5, 10 or 15 pounds of pressure and results in underprocessing. The highest volume of air trapped in a canner occurs in processing raw-packed foods in dial-gauge canners. These canners do not vent air during processing. To be safe, all types of pressure canners must be vented 10 minutes before they are pressurized.

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

Weighted-gauge models exhaust tiny amounts of air and steam each time the 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 been processed for the set time.

The single disadvantage of weighted-gauge canners is that they cannot correct precisely for higher altitudes. At altitudes above 1,000 feet, they must be operated at canner pressures of 10 instead of 5, or 15 instead of 10 pounds of pressure. Check dial gauges for accuracy before use each year and replace if they read high by more than 1 pound at 5, 10 or 15 pounds of pressure. Low readings cause overprocessing and may indicate that the accuracy of the gauge is unpredictable. Gauges may be checked at most local K-State Research and Extension offices.

Handle canner lid gaskets carefully and clean them according to the manufacturer's directions. Nicked or dried gaskets will allow steam leaks during pressurization of the canners. Keep the gaskets clean between uses. Gaskets on older canner models may need to be lightly coated with vegetable oil once a year. Those on newer models are prelubricated and do not benefit from oiling. Check your canner's instructions if there is doubt that the particular gasket 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 the fuses while cleaning the lids. Use only canners that have the Underwriter's Laboratory (UL) approval to ensure their safety.

Replacement gauges and other parts for canners are often available at stores offering canning equipment or from canner manufacturers. When ordering parts, give your canner model number and describe the parts needed.

## Using pressure canners

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 the canner lid securely.
2. Leave the weight off the vent port or open the petcock. Heat at the highest setting until the steam flows from the petcock or vent port.

3. Maintain a high heat setting, exhaust the steam for 10 minutes, and then place the weight on the vent port or close the 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 the 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 the jars. Weighted gauges on Mirro canners should jiggle about 2 or 3 times per minute. On Presto canners, they should rock slowly 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. Forced cooling may result in food spoilage. Cooling the canner with cold running water or opening the vent port before the canner fully depressurizes will cause a loss of liquid from the jars and seal failures. Force-cooling may also warp the canner lid of older model canners, causing steam leaks.

Depressurization of older model canners 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.

7. After the canner is depressurized, remove the weight from the vent port or open the petcock. Wait 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 the jars with a lifter and place on a towel or cooling rack.

### Cooling jars

When you remove hot jars from a canner, do not retighten their jar lids. Retightening the hot lids may cut through the gasket and cause seal failures. Cool the jars at room temperature for 12 to 24 hours. The jars may be cooled on racks or towels to minimize heat damage to the counter.

The food level and liquid volume of raw-packed jars will be noticeably lower after cooling. Air is exhausted during processing; do not open the jar to add more liquid. Check for sealed lids as described below.

### Testing jar seals

After cooling the jars for 12 to 24 hours, remove the screw bands and test seals with one of the following options:

*Option 1:* 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.

*Option 2:* Tap the lid with the bottom of a teaspoon. If it makes a dull sound, the lid is not sealed. If the food is in contact with the underside of the lid, it will also cause a dull sound. If the jar lid is sealed correctly, it will make a ringing, high-pitched sound.

*Option 3:* 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, remove the lid and check the jar-sealing surface for tiny nicks. If necessary, change the jar, add a new properly prepared lid and reprocess within 24 hours using the same processing time. Head space in unsealed jars may be adjusted to 1½ inches, and the jars could be frozen instead of reprocessed. Foods in single unsealed jars could be stored in the refrigerator and consumed within several days.

In addition to the vegetables listed below, information on preserving green and Italian beans, sweet corn, peppers and tomatoes can be found in the following publications:

*Preserving Green Beans*, MF-1179

*Preserving Tomatoes*, MF-1185

*Preserving Corn*, MF-1183

*Preserving Peppers*, MF-1186

Nutrition information is on page 9.

### Asparagus — Spears or Pieces

#### Quality

Use tender, tight-tipped spears, 4 to 6 inches long.

#### Quantity

An average of 24½ pounds is needed per canner load of 7 quarts; an average of 16 pounds is needed per

canner load of 9 pints. A crate weighs 31 pounds and yields 7 to 12 quarts — an average of 3½ pounds per quart. One crate (12 2-pound bunches) of fresh asparagus yields 15 to 22 frozen pints. One to 1½ pounds yield 1 frozen pint.

### **Preparation**

Wash the asparagus and trim off the tough scales. Break off the tough stems and wash again. Leave the asparagus whole or cut into 1-inch pieces.

### **Freezing**

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Separate stalks into medium and large (½- to ¾-inch diameter). Blanch (see page 1) the medium stalks for 3 minutes, large stalks for 4 minutes. Chill in ice water.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

### **Canning**

Wash the jars. Prepare the lids according to the manufacturer's instructions.

*Hot pack:* Cover the asparagus with boiling water. Boil for 2 or 3 minutes. Loosely fill the jars with hot asparagus, leaving 1-inch head space.

*Raw pack:* Fill the jars with raw asparagus, packing as tightly as possible without crushing, leaving 1-inch head space.

Add 1 teaspoon of salt per quart to the jar, if desired. Add boiling water, leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times.

## **Beans, Snap and Italian – Pieces (Green and Wax)**

Information on canning and freezing this vegetable can be found in the separate publication *Preserving Green Beans*, MF-1179.

## **Beets — Whole, Cubed, or Sliced**

### **Quality**

Beets with a diameter of 1 to 2 inches are preferred for whole packs. Beets larger than 3 inches in diameter are often fibrous.

### **Quantity**

An average of 21 pounds (without tops) is needed per canner load of 7 quarts; an average of 13½ pounds

is needed per canner load of 9 pints. A bushel (without tops) weighs 52 pounds and yields 15 to 20 quarts — an average of 3 pounds per quart. One bushel (30 pounds) of beets without tops yields 30 to 45 frozen pints. One and one-fourth to 1½ pounds yield 1 frozen pint.

### **Preparation**

Trim off the beet tops, leaving an inch of the stems and roots to reduce bleeding of the color. Scrub well.

### **Freezing**

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Sort beets according to size. Cook in boiling water until tender: small beets for 25 to 30 minutes, medium beets for 45 to 50 minutes. Cool promptly in cold water. Peel, remove the stem and tap root, and cut into slices, julienne strips, or cubes.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

### **Canning**

Wash the jars. Prepare the lids according to the manufacturer's instructions. Cover the beets with boiling water. Boil until the skins slip off easily, about 15 to 25 minutes depending on the size. Cool, remove the skins and trim the stems and roots. Leave baby beets whole. Cut the medium or large beets into ½-inch cubes or slices. Halve or quarter very large slices. Add 1 teaspoon of salt per quart to the jar, if desired. Fill the jars with hot beets and fresh hot water, leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times.

## **Broccoli**

Canning is not recommended; the product will not be desirable.

### **Quality**

Select firm, young, tender stalks with bright green compact heads. Discard off-color heads or any that have begun to blossom.

### **Quantity**

One crate (25 pounds) yields 24 frozen pints. One pound yields 1 frozen pint.



## Preparation

Remove the leaves and woody portions. Separate the heads into convenient-size sections and immerse in brine (4 teaspoons of salt to 1 gallon of water) for 30 minutes to remove the insects. Drain and split lengthwise so the florets are no more than 1½ inches across. Broccoli may be cut into chunks or chopped.

## Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Blanch for 3 minutes in boiling water (see page 1). Cool promptly. Pack the heads and stalks alternately.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

## Carrots — Sliced or Diced

### Quality

Select small carrots, preferably 1 to 1¼ inches in diameter. Larger carrots are often too fibrous.

### Quantity

An average of 17½ pounds (without tops) is needed per canner load of 7 quarts; an average of 11 pounds is needed per canner load of 9 pints. A bushel (without tops) weighs 50 pounds and yields 17 to 25 quarts — an average of 2½ pounds per quart. One bushel (50 pounds) yields 32 to 40 frozen pints. One and one-fourth to 1½ pounds yield 1 frozen pint.

### Preparation

Remove the tops, and wash, peel and rewash the carrots.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Leave small carrots whole. Cut others into thin slices, ¼-inch cubes, or lengthwise strips.

Blanch (see page 1) small whole carrots for 5 minutes, and diced, sliced and lengthwise strips for 2 minutes. Cool promptly.

Fill pint- or quart-size freezer bags 3 to 4 inches from the top. Squeeze out the air, label and freeze.

### Canning

Wash the jars. Prepare the lids according to the manufacturer's instructions. Wash, peel and rewash the carrots. Slice or dice.

*Hot pack:* Cover with boiling water; bring to a boil and simmer for 5 minutes. Fill the jars, leaving 1-inch head space.

*Raw pack:* Fill the jars tightly with raw carrots, leaving 1-inch head space. Add 1 teaspoon of salt per quart to the jar, if desired. Add hot cooking liquid or water, leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times.

## Cauliflower

Canning is not recommended; the product will not be desirable.

### Quality

Choose compact, snow-white heads with fresh leaves.

### Quantity

Two medium heads yield 3 frozen pints. One and one-third pounds of cauliflower yield 1 frozen pint.

### Preparation

Trim off the leaves, cut the head into pieces about 1 inch across, and immerse in brine (4 teaspoons of salt to 1 gallon of water) for 30 minutes to remove the insects. Drain.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Blanch (see page 1) for 3 minutes in water containing 4 teaspoons of salt per 1 gallon of water. To prevent darkening, add 2 to 3 tablespoons of lemon juice per gallon of blanching water. Cool promptly.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

## Eggplant

### Quality

Use garden varieties of good color and quality. Canning is not recommended.

### Quantity

Two average eggplant yield 2 frozen pints.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day.

If eggplant is to be fried, cut it in ½-inch slices. For casseroles or mixed vegetables, dice or cut it in strips.

Work quickly, preparing only enough eggplant for one blanching.

Water blanch (see page 1) diced pieces or strips for 2 minutes in 1 gallon of boiling water containing 4½ teaspoons of citric acid or ½ cup of lemon juice. One-third inch slices should be blanched for 4 minutes. Cool and drain.

*Note:* Slices to be fried should be packed between sheets of freezer wrap for easy removal.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out air, label and freeze.

## Peas

Freeze sugar snap and Chinese edible pods for best quality. Green and English peas can be frozen or canned.

## Quality

*Green or English:* Select filled pods containing young, tender, sweet seeds. Discard the diseased pods.

*Snow peas (also called Chinese peas):* Should be harvested when peas are just barely visible in the pods.

*Sugar snap peas:* Should be picked when the pods are round and fully mature, 2 to 3 inches long.

## Quantity

*Green or English:* An average of 31½ pounds (in pods) is needed per canner load of 7 quarts; an average of 20 pounds is needed per canner load of 9 pints. A bushel weighs 30 pounds and yields 5 to 10 quarts — an average of 4½ pounds per quart. Two to 2½ pounds yield 1 frozen pint.

*Sugar snap and Chinese:* One bushel (30 lbs.) yields 12 to 15 frozen pints. Two to 2½ pounds yield 1 frozen pint.

## Preparation

*Green or English:* Shell and wash the peas.

*Sugar snap and Chinese:* Wash. Remove the stems, blossom ends and any strings. Leave whole.

## Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day.

*Green or English:* Blanch (see page 1) for 2½ minutes. Cool and drain.

*Sugar snap and Chinese:* Blanch (see page 1) small pods for 2 minutes, large pods for 3 minutes. Cool and drain.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

## Canning

*Green or English:* Wash the jars. Prepare the lids according to the manufacturer's instructions. Add 1 teaspoon of salt per quart to the jar, if desired.

*Hot pack* — Cover with boiling water. Bring to a boil in a saucepan, and boil for 2 minutes. Fill the jars loosely with hot peas and add cooking liquid, leaving 1-inch head space.

*Raw pack* — Fill the jars with raw peas and add boiling water, leaving 1-inch head space. Do not shake or press down the peas. Adjust the lids and process. See page 9 for processing times.

## Peppers

Information on canning and freezing this vegetable can be found in the separate publication *Preserving Peppers*, MF-1186.

## Potatoes, Sweet — Pieces or Whole

### Quality

Choose small to medium-sized potatoes. They should be mature and not too fibrous. Preserve them within one to two months after harvest.

### Quantity

An average of 17½ pounds is needed per canner load of 7 quarts; an average of 11 pounds is needed per canner load of 9 pints. A bushel weighs 50 pounds and yields 17 to 25 quarts — an average of 2½ pounds per quart. Two-thirds of a pound of sweet potatoes yields 1 frozen pint.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day.

*Preparation:* Choose medium to large sweet potatoes that have been cured for at least one week. Sort according to size and wash.

Cook the potatoes until almost tender in water, steam, a pressure cooker or oven. Let them stand at room temperature until cool. Peel the sweet potatoes; cut them in halves, slice, or mash.

If desired, to prevent darkening, dip the whole sweet potatoes or slices for 5 seconds in a solution of ½ cup of lemon juice to 1 quart of water.

To keep mashed sweet potatoes from darkening, mix 2 tablespoons of orange or lemon juice with each quart of mashed sweet potatoes.

Fill pint- or quart-size freezer containers leaving ½-inch headspace.

*Baked:* Wash, trim, (don't peel) and heat the potatoes in the oven at 350°F until they are slightly soft. Cool, remove the peel and wrap them individually in aluminum foil. Place them in polyethylene bags and freeze. Complete the baking in an oven at 350°F immediately before serving, leaving the potatoes wrapped in foil.

### Canning

It is not recommended to dry-pack sweet potatoes. Wash the potatoes and boil or steam them until partially soft (15 to 20 minutes). Remove the skins. Cut medium potatoes, if needed, so the pieces are uniform in size. **Caution: Do not mash or puree pieces.**

Fill the jars, leaving 1-inch head space. Add 1 teaspoon of salt per quart to the jar if desired. Cover with your choice of fresh boiling water or syrup (see below), leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times.

#### Measures of water and sugar for a medium syrup

| For a 9-pint load |               | For a 7-quart load |               |
|-------------------|---------------|--------------------|---------------|
| Cups of water     | Cups of sugar | Cups of water      | Cups of sugar |
| 5¼                | 2¼            | 8¼                 | 3¾            |

Heat the water and sugar together. Bring to a boil and pour over the sweet potatoes in the jars.

### Potatoes, White

#### Quality

Select small to medium-size potatoes of ideal quality for cooking. Tubers stored below 45°F may discolor when canned. Choose potatoes 1 to 2 inches in diameter if they are to be packed whole.

#### Quantity

An average of 35 pounds is needed per canner load of 7 quarts; an average of 22½ pounds is needed per canner load of 9 pints. A bag weighs 50 pounds and yields 8 to 12 quarts — an average of 5 pounds per quart. Two-thirds of a pound yields 1 frozen pint.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day.

Because fresh potatoes are available year-round, most people do not find it practical to freeze potatoes at home. However, if potatoes are to be home frozen, it is best to freeze cooked mashed potato patties, baked stuffed potatoes or french fries.

*Baked stuffed potatoes or mashed potato patties:* Prepare according to your favorite recipe, cool quickly in the refrigerator, then wrap in moisture/vapor-proof packing. Seal and freeze. The recommended maximum storage time is one month at 0°F. To serve, unwrap and reheat in a 350°F oven.

*French-fried potatoes:* Pare and cut the potatoes lengthwise into strips about ¼-inch thick. Rinse them quickly in cold water and dry well on paper towels.

Oven method — Arrange the potato strips in a shallow baking pan, brush with melted butter or margarine, and bake at 450°F just until they begin to brown, turning occasionally. Cool them quickly in the refrigerator.

Oil method — Blanch the potato strips in vegetable oil heated to 370°F until tender but not brown. Drain and cool them quickly in refrigerator.

Place the prepared strips in moisture/vapor-proof containers or bags. Seal and freeze. The maximum recommended storage time is two months at 0°F.

To serve, return the frozen potatoes to a baking sheet and bake at 450°F until golden brown, turning occasionally. Or, deep-fat fry the frozen potatoes at 390°F until golden and crisp.

### Canning

Wash the jars. Prepare the lids according to the manufacturer's instructions.

Wash and peel the potatoes. Place the potatoes in an ascorbic acid solution to prevent darkening. Place 1 teaspoon (3000 mg.) of ascorbic acid in 1 gallon of water and mix. If using tablets, crush and mix. If desired, cut the potatoes into ½-inch cubes. Drain. Cook for 2 minutes in boiling water and drain again.

For whole potatoes, boil for 10 minutes and drain. Add 1 teaspoon of salt per quart to the jar, if desired. Fill the jars with hot potatoes and fresh hot water, leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times.

## Pumpkin and Winter Squash

### Quality

Pumpkins and squash should have a hard rind and stringless mature pulp of ideal quality for cooking fresh. Small-size pumpkins (sugar or pie varieties) make better products. Spaghetti squash pulp should not be mashed.

### Quantity

An average of 16 pounds is needed per canner load of 7 quarts; an average of 10 pounds is needed per canner load of 9 pints — an average of 2¼ pounds per quart. Three pounds yield 2 frozen pints.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Wash, remove the seeds, cut into 1-inch-wide slices and peel.

Cook until soft in boiling water or steam, or in a pressure cooker, an oven or a microwave oven. To cool, place the pan containing the pumpkin in cold water and stir occasionally. Remove the pulp from the rind and mash.

*Note:* Small pumpkins can be pierced and baked whole on a tray in an oven or a microwave oven until soft. After cooling, peel, remove the strings and seeds, and mash.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

### Canning— Cubed Only

Wash the jars. Prepare the lids according to the manufacturer's instructions. Wash, remove the seeds, cut into 1-inch-wide slices, and peel. Cut the flesh into 1-inch cubes. Boil for 2 minutes in water.

**Caution: Do not mash or puree.**

Fill the jars with the cubes and cooking liquid, leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times. For making pies, drain the jars and strain or sieve the cubes.

## Spinach and Other Greens

### Quality

Preserve only fresh harvested greens. Discard any wilted, discolored, diseased, or insect-damaged leaves. The leaves should be tender and attractive in color.

### Quantity

An average of 28 pounds is needed per canner load of 7 quarts; an average of 18 pounds is needed per canner load of 9 pints. A bushel weighs 18 pounds and yields 3 to 9 quarts — an average of 4 pounds per quart. One to 1½ pounds of fresh greens yield 1 frozen pint.

### Freezing

Freeze only up to 2 pounds of food per cubic foot of freezer capacity per day. Wash the greens thoroughly and cut off the woody stems. Blanch (see page 1) the collards for 3 minutes and all other greens for 2 minutes. Chill and drain.

Fill pint- or quart-size freezer containers leaving ½-inch headspace. Squeeze out the air, label and freeze.

### Canning

Wash the jars. Prepare the lids according to the manufacturer's instructions. Wash only small amounts of the greens at one time. Drain the water and continue rinsing until the water is clear and free of grit. Cut out the tough stems and midribs. Place 1 pound of greens at a time in a cheesecloth bag or blancher basket and steam for 3 to 5 minutes or until they are well wilted. Add ½ teaspoon of salt to each quart jar, if desired. Fill the jars loosely with greens and add fresh boiling water, leaving 1-inch head space. Adjust the lids and process. See page 9 for processing times.

### Sweet Corn

Information on canning and freezing this vegetable can be found in the separate publication, *Preserving Corn*, MF-1183.

### Tomatoes

Information on canning and freezing this vegetable can be found in the separate publication *Preserving Tomatoes*, MF-1185.



## Recommended processing times for vegetables in a pressure canner

| Product                   | Style of pack | Jar size | Process time | Canner gauge pressure needed at different altitudes (in feet) |           |                       |            |
|---------------------------|---------------|----------|--------------|---|-----------|-----------------------|------------|
|                           |               |          |              | Dial gauge (lbs.)   |           | Weighted gauge (lbs.) |            |
|                           |               |          |              | 0- 2000   | 2001-4000 | 0-1000                | Above 1000 |
| Asparagus                 | Hot or raw    | Pints    | 30           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 40           | 11  | 12        | 10                    | 15         |
| Beets                     | Hot           | Pints    | 30           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 35           | 11  | 12        | 10                    | 15         |
| Carrots                   | Hot or raw    | Pints    | 25           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 30           | 11  | 12        | 10                    | 15         |
| Peas                      | Hot or raw    | Pints    | 40           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 40           | 11  | 12        | 10                    | 15         |
| Potatoes, sweet           | Hot           | Pints    | 65           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 90           | 11  | 12        | 10                    | 15         |
| Potatoes, white           | Hot           | Pints    | 35           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 40           | 11  | 12        | 10                    | 15         |
| Pumpkin and winter squash | Hot           | Pints    | 55           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 90           | 11  | 12        | 10                    | 15         |
| Spinach and other greens  | Hot           | Pints    | 70           | 11  | 12        | 10                    | 15         |
|                           |               | Quarts   | 90           | 11  | 12        | 10                    | 15         |

## Nutrition per ½ cup cooked

|                 | Calories | Carbo. | Fat   | Vitamin C | Dietary fiber | Sodium             |                 |
|-----------------|----------|--------|-------|-----------|---------------|--------------------|-----------------|
|                 |          |        |       |           |               | without added salt | with added salt |
| Asparagus       | 22.0     | 3.8 g  | 0.3 g | 9.7 mg    | 1.5 g         | 9.9 mg             | 276.0 mg        |
| Beets           | 37.0     | 8.5 g  | 0.2 g | 3.0 mg    | 2.0 g         | 65.5 mg            | 332.0 mg        |
| Broccoli        | 22.0     | 3.9 g  | 0.3g  | 58.0 mg   | 2.0 g         | 20.0 mg            | 287.0 mg        |
| Carrots         | 35.0     | 8.2 g  | 0.1 g | 1.8 mg    | 2.5 g         | 51.5 mg            | 318.0 mg        |
| Cauliflower     | 17.0     | 3.4 g  | 0.2 g | 28.2 mg   | 1.8 g         | 16.2 mg            | 283.0 mg        |
| Eggplant        | 14.0     | 3.2 g  | 0.1 g | 0.6 mg    | 1.5 g         | 1.4 mg             | 268.0 mg        |
| Peas            | 67.0     | 12.5 g | 0.2 g | 11.4 mg   | 3.8 g         | 2.4 mg             | 269.0 mg        |
| <b>Potatoes</b> |          |        |       |           |               |                    |                 |
| Sweet           | 88.0     | 20.6 g | 0.1 g | 8.0 mg    | 2.2 g         | 7.0 mg             | 273.0 mg        |
| White           | 67.0     | 15.6 g | 0.0 g | 5.7 mg    | 1.1 g         | 4.0 mg             | 270.0 mg        |
| Pumpkin         | 24.5     | 6.0 g  | 0.1 g | 5.8 mg    | 2.1 g         | 1.2 mg             | (no salt)       |
| Winter Squash   | 47.0     | 10.5 g | 0.8 g | 11.5 mg   | 3.3 g         | 4.5 mg             | (no salt)       |
| Spinach         | 21.0     | 3.4 g  | 0.2 g | 8.8 mg    | 2.0 g         | 63.0 mg            | 196.0 mg        |

## Problems and Solutions

### 1. How do I dry vegetables?

Most vegetables can be dried. To learn about drying foods, see [www.rrc.ksu.edu](http://www.rrc.ksu.edu)

### 2. Is it safe to can vegetables without salt?

Yes. Salt is used for flavor only and is not necessary to prevent spoilage.

### 3. Should all vegetables be precooked before canning?

For best quality, yes. However, some vegetables can be packed raw or cold into jars before being processed in the pressure canner.

### 4. What vegetables expand instead of shrink during processing?

Corn, peas and lima beans are starchy, absorb water and expand during processing. They should be packed loosely.

### 5. Can I can mashed or pureed pumpkin?

Home canning is not recommended for pumpkin butter or any mashed or pureed pumpkin or winter squash. There are not sufficient data available to allow establishing safe processing times for any of these types of products. It is true that previous USDA recommendations had directions for canning mashed winter squash, but USDA withdrew those recommendations and any publications preceding the *Complete Guide to Home Canning* (September 1994) are considered out of date. It is best to freeze pumpkin butters or mashed squash.

### 6. What are the recommended canners for canning vegetables?

Pressure canners for use in the home have been extensively redesigned in recent years. Models made before the 1970s were heavy-walled kettles with clamp-on or turn-on lids. They were fitted with a dial gauge, a vent port in the form of a petcock or counterweight, and a safety fuse. Modern pressure canners are lightweight, thin-walled kettles; most have turn-on lids. They have a jar rack, gasket, dial or weighted gauge, an automatic vent/cover lock, a vent port (steam vent) to be closed with a counterweight or weighted gauge, and a safety fuse.

Pressure does not destroy microorganisms, but high temperatures applied for an adequate period of time do kill microorganisms. The success of destroying all

microorganisms capable of growing in canned food is based on the temperature obtained in pure steam, free of air, at sea level. At sea level, a canner operated at a gauge pressure of 10.5 lbs provides an internal temperature of 240°F.

### 7. How long can home canned foods be stored?

If lids are tightly vacuum sealed on cooled jars, remove screw bands, 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. For best quality, store between 50 and 70 °F. Can no more food than you will use within a year.

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.

### 8. What causes the food to float inside a jar of canned food?

Food naturally contains trapped air. When using a raw pack method to fill jars, floating can occur. Use a hot pack to preheat the food and begin removing air from the food. When using the raw pack method, pack the food as close as possible without crushing it.

Be sure to release trapped air bubbles before applying the lid and ring. Add more food or liquid if necessary. Liquid should cover food pieces completely.

### 9. What causes white sediment to form in the bottom of a jar?

It could be from several sources. One is natural starch in the food is released. This cannot be prevented. Second, hard water minerals will settle out of the water. Try using soft water to prevent this. Third, it could be because table salt was used. Table salt contains fillers to keep it from caking. Always used canning and pickling salt in all home canned foods. And finally, it could be spoilage. The liquid looks murky and the food is soft. This could be due to underprocessing for the recommended length of time. Do not use.

### 10. What are the white crystals in canned spinach?

Spinach contains calcium and oxalic acid. They combine and form harmless calcium oxalate. The spinach is safe to consume.



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Adapted from *Preserving Vegetables* by Karen P. Penner, Ph.D., Foods and Nutrition, and Jeanne Dray, Extension Assistant, Foods and Nutrition, April 1995; *Complete Guide to Home Canning*, USDA AIB No. 539, 2009; and *So Easy to Preserve*, 5th ed., The University of Georgia Cooperative Extension Service.

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