Boiling Water Canning Project Manual

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Healthy Lifestyles
Home Food
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4-H Home Food Preservation Series

The home food preservation series contains four manuals:

Freezing for ages 8–18

Drying for ages 8–18

Boiling water canning for ages 8–18

Pressure canning for ages 14–18

The manuals may be used by anyone in these age groups regardless of their prior knowledge of home food preservation.

Each manual lists the objectives for the project, and each activity includes a short lesson followed by hands-on activities and questions for further learning. In addition, each manual includes an achievement program to help youth identify their goals and keep track of their accomplishments.

These manuals were written using USDA food preservation guidelines. When preserving food at home, be sure to always follow current USDA canning recipes and guidelines. Contact your local Extension office for a list of these resources.

Acknowledgments

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United States Department of Agriculture. 2009. *Complete Guide to Home Canning.* Agriculture Information Bulletin No. 539. Washington D.C.: National Institute of Food and Agriculture.

Washington State University
Powers-Hammond, Lizann, and Val Hillers. 2012. *Canning Fruits*. PNW 199. Pullman, WA: Washington State University Extension Service.

Resources

So Easy to Preserve, University of Georgia
http://www.soeasytopreserve.com

Ball Blue Book Guide to Preserving, 2011 or most current edition

Canning Fruits, PNW 199
http://cru.cahe.wsu.edu/CEPublications/pnw199/pnw199.pdf

Canning Tomatoes and Tomato Products, PNW 300
http://extension.oregonstate.edu/catalog/

Complete Guide To Home Canning, USDA Bulletin 539
http://nchfp.uga.edu/publications/publications_usda.htmlunivers

Pickling Vegetables, PNW 355
http://extension.oregonstate.edu/catalog/pdf/pnw/pnw355.pd

Ball website
http://www.freshpreserving.com

National Center for Home Food Preservation website
http://www.uga.edu/nchfp

Abbreviations

tsp, TSP = teaspoon

tbsp, TBSP = tablespoon

lb = pound

ft = feet

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Contents

Notes to project helper

This manual is for youth who want to learn about home food preservation. They can't do it without your help. You play a key role in helping them learn the basic information, skills, and safety practices behind food preservation. With your help they will set goals, find resources, and evaluate their own progress as they complete this manual.

Your responsibilities

- Become familiar with the material in this book.
- Assist youth in selecting and completing food preservation activities appropriate for their skills.
- Guide youth through thinking about why something happens or why it doesn't.
- Encourage youth to complete difficult tasks to expand their skills.
- Help youth learn about their strengths and weaknesses.
- Help youth evaluate the quality of their completed activities. Questions at the end of each activity will help youth think through the steps in the project and how to apply their new skills in their everyday lives.
- Be an example with kitchen and food safety rules.

Using experiential learning

Experiential learning is the process of "do, reflect, apply." It is an inquiry-based approach to learning. Rather than being provided with information, learners experience, share, process, generalize, and apply what they are learning.

Do. Experience the activity, perform, do it. This could be a group activity or experience. It involves doing, it may be unfamiliar, and it pushes the learner to a new level.

Reflect. Share reactions and observations. Learners talk about their experiences while doing the activity. They share their reactions and observations and freely discuss their feelings.

Apply. Generalize to connect the experience to real-world examples. Learners identify general trends and real-life examples of when they could use what they have learned.

Developing life skills

The Iowa State Life Skills Model helps identify the life skills that youth attain through the experiential learning process. The life skills targeted in this manual include:

Head

- Wise use of resources
- Planning/organizing
- Goal setting
- Critical thinking

Heart

- Communication

Hands

- Marketable skills
- Self-motivation

Health

- Healthy lifestyle choices
- Disease prevention

Boiling water canning basics

Project objectives

- Learn how to safely preserve fruits, tomatoes, fruit spreads, and pickles.
- Learn how to use home-canned foods you prepared in healthy recipes.
- Show others how to preserve foods by boiling water canning.

Why can foods?

Food preservation can be a safe and economical way to preserve quality food at home. We preserve foods to prevent food spoilage and to have an abundant supply of a variety of foods when fresh produce isn't available. You can control the quality of the food you preserve. Canning is one way to preserve the foods from your garden or those that are grown locally. In this manual, we will review safe canning procedures using a boiling water canner.

The following methods are NOT recommended for any type of food:

- Open-kettle canning
- Oven canning
- Microwave oven canning
- Dishwasher canning
- Steam canning

Canning low-acid vs. high-acid foods

Foods are processed either in a pressure canner or boiling water canner to control molds, yeasts, and bacteria. Whether food should be processed in a pressure canner or boiling water canner depends on the acidity (pH) of the food. The term "pH" is a measure of acidity; the lower the pH, the more acid is the food.

High-acid foods have a pH of 4.6 or lower. They contain enough acid to block bacteria growth or to destroy bacteria rapidly when heated. All high-acid foods must be canned at a temperature of 190°F to destroy bacteria. These temperatures are attainable in any container that is large enough to have 1–2 inches of boiling water above the jars. The exact time needed in the boiling water canner depends on the type of food being canned, the way it is packed into the jars, the size of the jars, and your altitude. Use only USDA-approved recipes for canning.

High-acid foods include:

- Fruits
- Pickles
- Sauerkraut
- Jams
- Jellies
- Marmalades
- Fruit butters
- Salsas
- Tomatoes (after acid is added)

In low-acid canned foods, there is not enough acid to prevent the growth of dangerous bacteria such as botulism. Low-acid foods have a pH higher than 4.6. These foods must be processed in a pressure canner. They include:

- Meats (bear, beef, lamb, pork, veal, and venison)
- Seafood
- Poultry
- Milk
- All fresh vegetables

Making altitude adjustments

Using processing times recommended for canning food at sea level can result in food spoilage if you live at altitudes of 1,000 feet or higher. Water boils at lower temperatures as you go higher in altitude. Lower boiling temperatures are less effective in killing bacteria; therefore, you must increase the processing time to compensate for the lower temperature.

To adjust for altitudes above 1,000 feet, you need to increase the processing time. Foods may spoil if you fail to add time for elevations above 1,000 feet, process for fewer minutes than specified, or cool jars in cold water.

The table below indicates the amount of processing time to add when processing jars at different altitudes. Processing times for ½-pint and pint jars are the same, and processing times for 1½-pint and quart jars are the same.

Boiling water canner altitude adjustments

Altitude (ft)	Increase in processing time (minutes)
1,001–3,000	5
3,001–6,000	10
6,001–8,000	15
8,001–10,000	20

Hot packing vs. raw (cold) packing

Hot packing is the practice of heating prepared food to boiling, simmering for 2–5 minutes, and promptly filling jars loosely with the hot food. It is the best way to remove air from food. Also, the color and flavor of hot-packed foods will last longer than that of raw-packed foods.

Raw (cold) packing is the practice of filling jars tightly with freshly prepared, but unheated, food. Some foods processed this way may float. The air that was not released before processing can cause food to discolor within 2–3 months. Raw packing is more suitable for vegetables processed in a pressure canner or soft fruits that may be bruised by handling.

With both practices, the food is covered with boiling juice, syrup, or water. This practice will help to remove air, thereby shrinking the food, keeping food from floating, increasing the vacuum seal, and improving shelf life.

Getting ready to boiling water can

Selecting produce

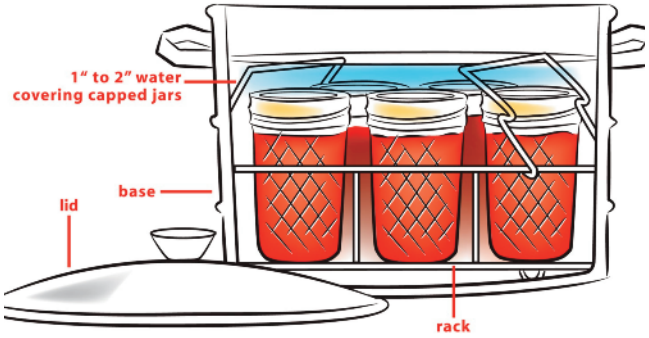
Produce needs to be canned at its peak quality—within hours of harvest. Examine produce carefully for freshness. Discard small pieces that are damaged or moldy. Trim small diseased spots from large produce. Apricots, nectarines, peaches, pears, and plums will have more flavor if they have been ripened for 1 or more days between harvest and canning. If you delay canning, store produce in a shady, cool place.

Washing and peeling

Rinse produce in cold water; don't soak it. For dirty garden produce, first rinse it with an outside hose, and then rinse it one to three times in the kitchen sink.

Selecting jars

Use regular or wide-mouth Mason-type, threaded, home canning jars with self-sealing lids. Do not use other commercial jars with mouths that cannot be sealed with two-piece canning lids. Use only ½-pint, pint, 1½-pint, or quart jars. Half-gallon size jars may be used only for canning very acid juices. With careful use and handling, Mason jars can be reused



Boiling water canning equipment

Equipment	Use
Dry measuring cups	Used to measure dry and solid ingredients. They usually come in a nesting set of 1 cup, ½ cup, ⅓ cup, and ¼ cup.
Liquid measuring cups	Clear measuring cups used to measure liquids. You can see through the cup to measure, and there is headspace.
Measuring spoons	Used to measure dry and liquid ingredients. They usually come in a nesting set of 1 tbsp, ½ tbsp, 1 tsp ½ tsp, and ¼ tsp. When you measure liquid ingredients, measure carefully to avoid spills.
Sharp knives and cutting boards	Used to cut food to desired size. Wash knives and cutting boards after each use in warm, soapy water.
Potholders	Used to protect hands when working with hot pans.
Rubber spatula	Used to scrape the sides of bowls or pans. You can use the flat side to level dry or solid ingredients when measuring.
Large pans	Heavy-duty pans are best for cooking. Don't use aluminum pans.
Long-handled spoons	Choose spoons that are tall enough that they will not fall down into the ingredients.
Mixing bowls	Made of pottery, glass, metal, or plastic, they come in different sizes.
Funnel	Used to pour liquids into jars.
Colander	Used to drain foods after washing.
Timer	For timing food preparation and processing.
Food chopper, blender, or processor	Equipment that will chop, blend, and puree items for food preservation. These optional items can cut back on preparation time. Handle them under the supervision of an adult.
Labels, permanent markers	Used to identify the type of food, pretreatment step, and date.
Double boiler	Used to extract juice.
Boiling water canner	Made of stainless steel, enamel on steel, or aluminum. They need to have a wire rack and tight-fitting lid and be deep enough to have 1–2 inches of boiling water above jars. Flat bottoms are best on electric ranges. To ensure uniform processing of all jars, the canner should be no more than 4 inches wider in diameter than the element on which it is heated.
Jars and lids	Mason-type, threaded, home canning jars with 2-part lids. Recommended sizes: ½ pint, 1½ pint, quart, and ½ gallon (only for juice).
Jar lifter	Used to safely lift hot jars from canners. These large, sure-grip tongs work with regular and wide-mouth canning jars.
Bubble remover and headspace measurer	Has graduations on one end to accurately measure headspace and a tapered tip on the other end to remove bubbles from the jar. Only use plastic versions.
Lid wand	Plastic utensil with a magnetic tip for removing lids from simmering water.
Peeler	Used to remove the skin from vegetables.
Cheesecloth/Jelly bag	Very thin cloth or bag used to hold spices for some canned products.
Scale	Used to weigh vegetables and meat.
Crock	5-gallon stone crock or food-grade plastic container. Used for fermenting foods.
Scale	Used to weigh fruit and vegetables.

Activities

1. Let's Can Fruit: Making Syrup

Adding syrup to a canned fruit helps retain its flavor, color, and shape. Using the chart below, prepare each type of syrup and taste test each sample.

Many fruits that are typically packed in heavy syrup are excellent and tasteful products when packed in lighter syrups. Try using lighter syrups, since they contain fewer calories from added sugar.

Journaling

Which syrup did your prefer and why?

_____

_____

_____

What challenges did you have with this activity?

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_____

What will you do differently next time? Why?

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Preparing and using syrups

Syrup type	Approximate % sugar	for 9-pint or 4-quart load		for 7-quart load		Comments
		Water (cups)	Sugar (cups)	Water (cups)	Sugar (cups)	
Very light	10	6½	¾	10½	1¼	Approximates the natural sugar level in most fruits and adds the fewest calories.
Light	20	5¾	1½	9	2¼	Use with very sweet fruit. Try a small amount the first time to see if your family likes it.
Medium	30	5¼	2¼	8¼	3¾	Use with sweet apples, sweet cherries, berries, and grapes.
Heavy	40	5	3¼	7¾	5¼	Good for tart apples, apricots, sour cherries, gooseberries, nectarines, peaches, pears, and plums.
Very heavy	50	4¼	4¼	6½	6¾	Best with sour fruit. Try a small amount the first time to see if your family likes it.

2. Let's Can Fruit: Raw Pack vs. Hot Pack

Select a fruit from the chart on the following page. Prepare the fruit by washing, draining, coring, and peeling if necessary. Cut into uniform pieces. Process this fruit both as a raw pack and a hot pack according to chart instructions, remembering to adjust for altitude.

Canning method: Fruits are acid enough to be safely processed in a boiling water canner.

Headspace: Leave ½ inch headspace for both the fruit and liquid, unless stated otherwise in the chart.

Several types of anti-darkening and ascorbic acid treatments are available:

- Pure powdered form. Seasonally available among canners' supplies in supermarkets or health food stores. One level teaspoon of pure powder weighs about 3 grams. Use 1 teaspoon per gallon of water as a treatment solution.
- Vitamin C tablets. Economical and available year-round in many stores. Buy 500-milligram tablets; crush and dissolve six tablets per gallon of water as a treatment solution.
- Commercially prepared mixes of ascorbic and citric acid. Seasonally available among canners' supplies in supermarkets. Sometimes citric acid powder is also sold in supermarkets, but it is less effective in controlling discoloration. Follow manufacturer's directions for amounts to use.

Journaling

What fruit did you choose to can?

_____

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_____

What challenges did you have with this activity?

_____

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What will you do differently next time? Why?

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_____

Hot packing and raw packing fruit

Fruit	Preparation	Jar size	Minimum processing time (minutes)			
			0–1,000 ft	1,001–3,000 ft	3,001-6,000 ft	Over 6,000 ft
Apricots, nectarines, peaches, pears	Wash. Peel if desired. (Peaches peel best when first dipped in boiling water, then in cold water.) Halve fruits, remove pits or cores. Slice if desired. To prevent darkening, place fruit into ascorbic acid solution. Drain. **Hot pack.** Heat fruit through in hot syrup. Pack fruit and cover with boiling syrup.	Pints Quarts	20 25	25 30	30 35	35 40
	Raw pack. Pack fruit and cover with boiling syrup.	Pints Quarts	25 30	30 35	35 40	40 45
Berries	Choose firm berries with no mold. Wash and drain. **Hot pack.** Bring berries and sugar (½ cup per quart) to a boil in a covered saucepan. Shake the pan to prevent sticking. Pack hot berries and extracted juice.	Pints and Quarts	15	20	20	25
	Raw pack. Pack berries. Shake the jar gently to obtain a full pack. Cover with boiling syrup Note: The quality of canned strawberries is poor.	Pints Quarts	15 20	20 25	20 30	25 35
Cherries (sweet or pie)	Wash cherries. Remove pits, if desired. **Hot pack**. Add ½ cup water, juice, or syrup per quart of cherries. Bring to a boil in a covered saucepan. Pack hot cherries and cover with cooking liquid.	Pints Quarts	15 20	20 25	20 30	25 35
	Raw pack. Pack cherries. Shake jar to obtain a full pack. Add ½ cup hot liquid to each jar. Add more liquid if necessary.	Pints and Quarts	25	30	35	40
Plums	Remove stems and wash. To can whole, prick skins on two sides of plums with a fork to prevent splitting. Freestone varieties may be halved and pitted. **Hot pack.** Add plums to hot syrup and boil 2 minutes. Cover saucepan and let stand 20–30 minutes. Fill jars with hot plums and cover with cooking syrup.	Pints Quarts	20 25	25 30	30 35	35 40
	Raw pack. Fill jars with raw plums, packing firmly. Cover with hot syrup.	Pints Quarts	20 25	25 30	30 35	35 40

Source: Powers-Hammond, Lizann, and Val Hillers. 2012. *Canning Fruits*. PNW 199. Pullman, WA: Washington State University Extension.