

NDSU

EXTENSION

2023



Upcoming Webinars

- **March 22 - What does Time Temperature Control Mean for Food processors/Entrepreneurs?**

- Byron Chaves-Elizondo, assistant professor and Extension food safety specialist,
University of Nebraska Lincoln

- **March 29 – Food Safety Considerations in Organic Produce**

- Londa Nwadike, associate professor, Kansas State University and University of Missouri



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Presenter

Audio Settings



Chat



Raise Hand

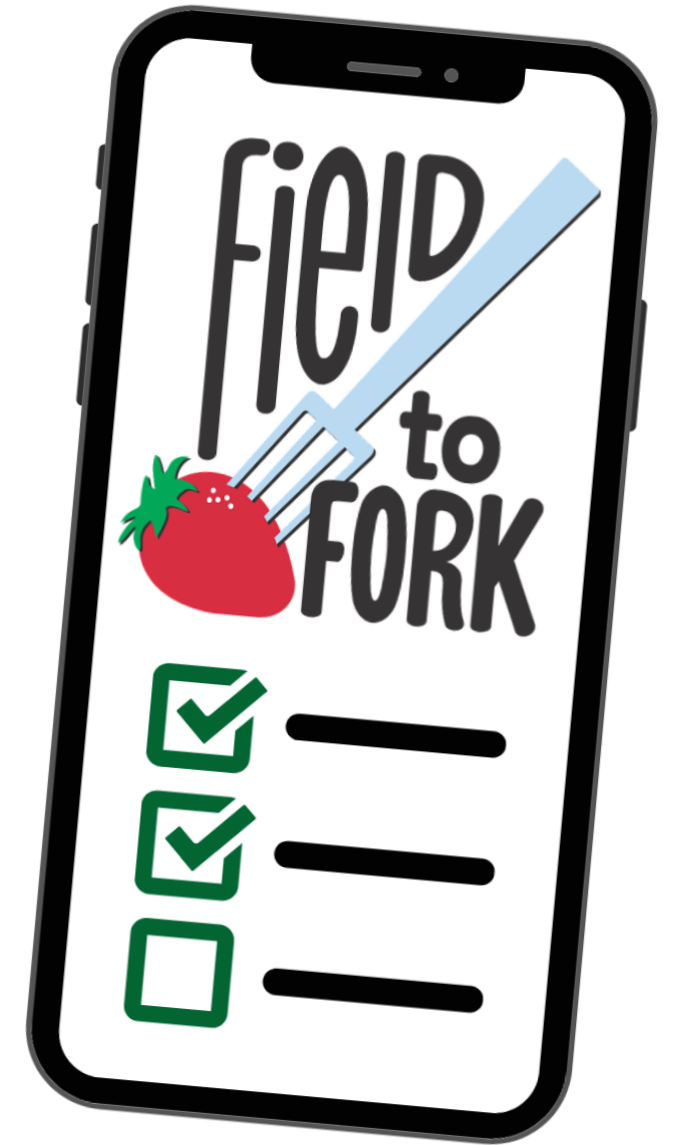


Q&A

Leave

- **Please complete the short online survey** that will be emailed to you after today's webinar. It will take just a couple minutes!
- Be sure to sign up for an opportunity to win a prize in the drawing. After submitting the survey, a form to fill out with your name/address will appear.

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March 15

Safely Using a Steam Canner to Preserve the Bounty of the Harvest

Barbara Ingham, professor of Food Science and Extension food safety specialist, University of Wisconsin-Madison

The Bounty of the Harvest

What acidic food do you most enjoy canning at home?



pH, Heat, and Safe Home-Canned Foods

Acid or Acidified Foods

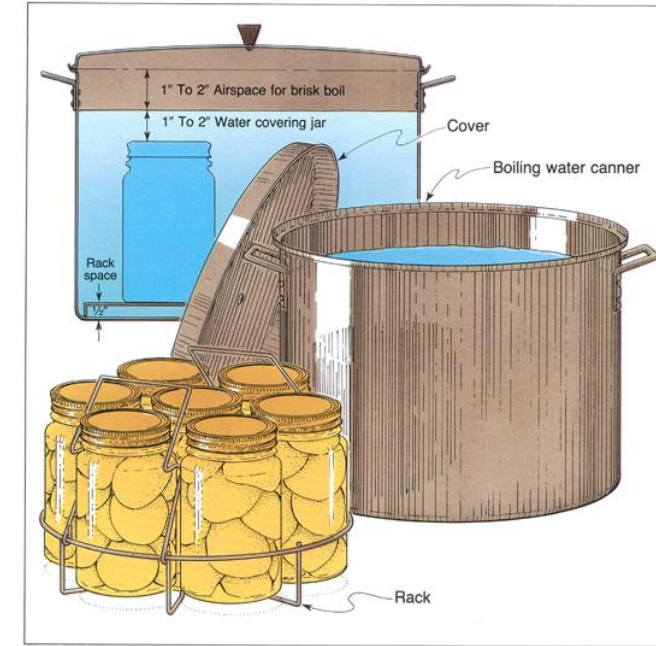
- **High acid** (pH 4.6 or below) will ensure that spores of *Clostridium botulinum* will not germinate
- **Heat** is required to destroy **vegetative cells of pathogens** and **spoilage organisms**

- ✓ Yeasts and mold are destroyed with heat
- ✓ **Heat processing** also removes air entrapped in the product and in the headspace, allowing a **vacuum seal** to form on cooling



Boiling Water Canners

- Used for naturally acid foods (most fruits) or acidified foods (pickles, salsa)
- Jars sit on a rack surrounded by boiling water (1-2" of water covering jars)
- Used with a tight-fitting lid
- Processes food at ~212° F

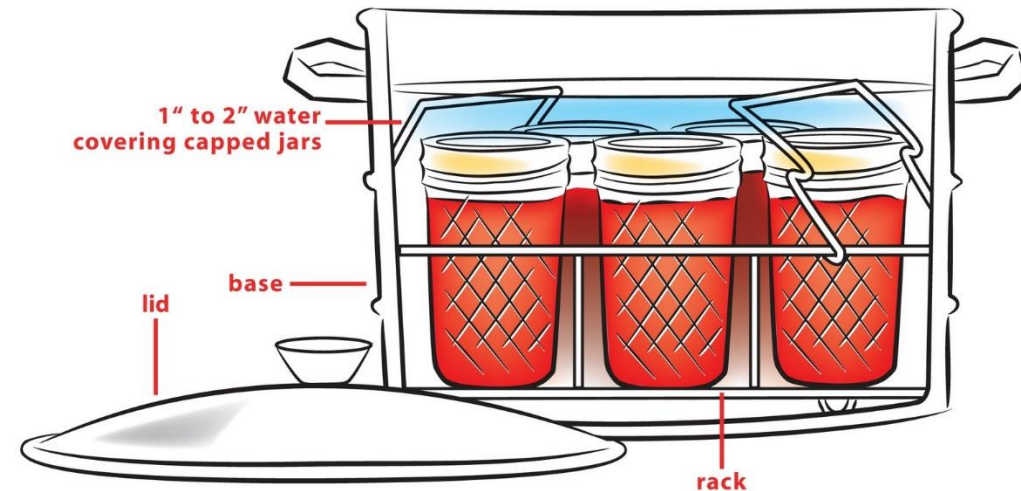


Adjust processing time for elevation.

Use a research-tested recipe.

National Center for Home Food Preservation

<https://nchfp.uga.edu>



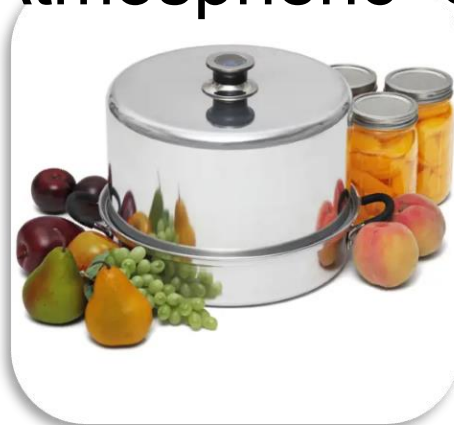
What if.....



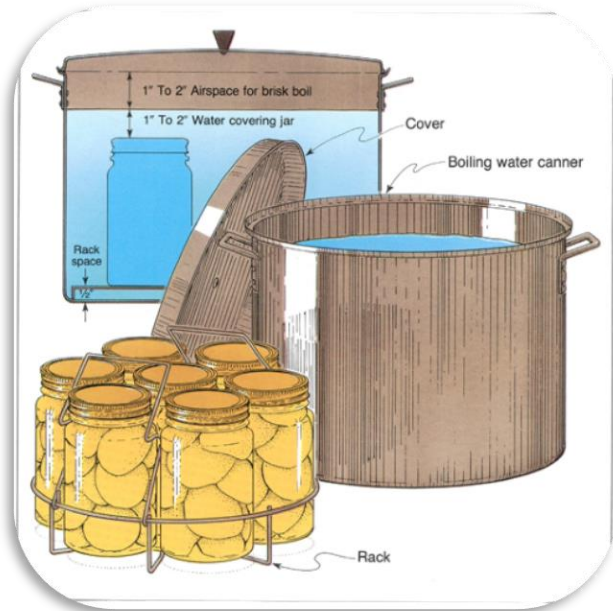
When home canning naturally acid
or acidified foods you didn't have to:

- Wait for all that water to boil?
- Use so much water?

What about.... an Atmospheric Steam Canner



Comparative Research: Boiling Water Canners, Atmospheric Steam Canners

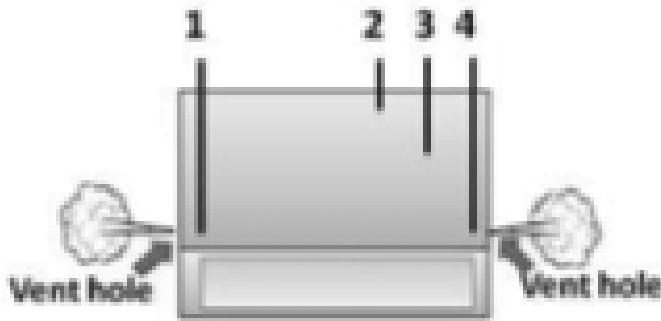
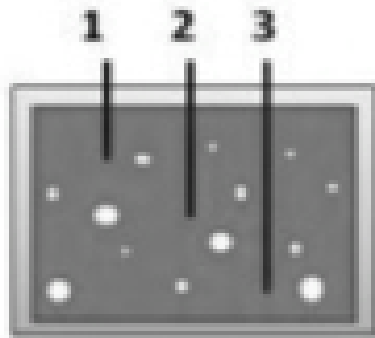


Boiling water canning:

- Jars are immersed in boiling water
- 16 quarts water are heated

Steam canning:

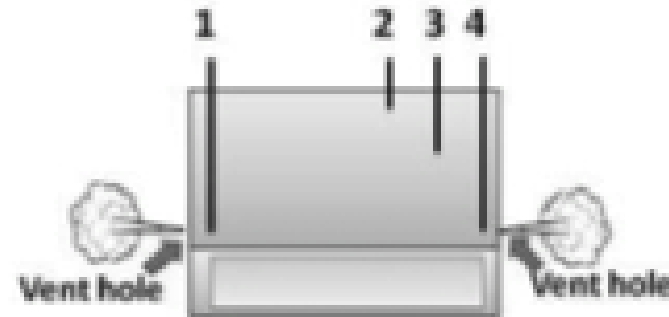
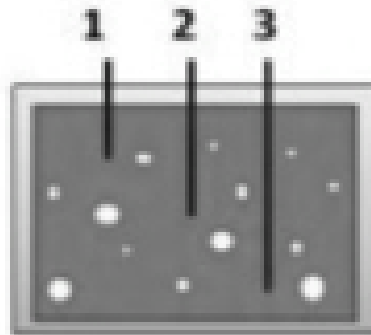
- Jars sit on a rack over boiling water, surrounded by pure steam
- ~2 quarts of water are heated



How do boiling water or steam heat jars in the canner?



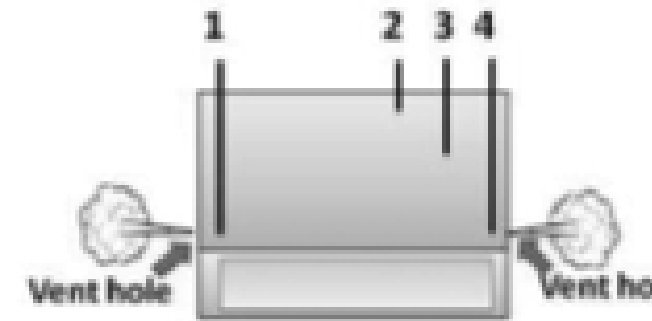
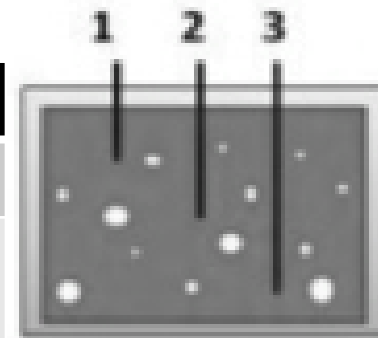
Tomato juice:
Quarts, pints,
half pints



Heat Distribution in a Boiling Water or Steam Canner

- Tomato Juice – filled hot (~180°F) or room temp (~75°F) into warm jars
- Quarts (7), Pints (8), Half Pints (8)
- Probes at varying depths recorded heating patterns in the canner

Time to reach processing temperature - Quart Jars			
Boiling Water Canner		Steam Canner	
Preheat 75 F to 180 F	22 min	75 F to 210 F	12 min*
180 F to 210 F	10 min*		



*BW canner range 6 – 11 minutes (54 trials)

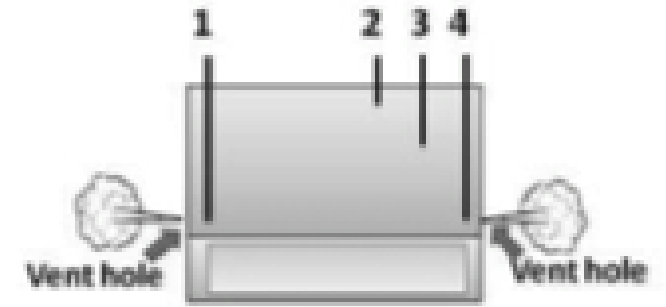
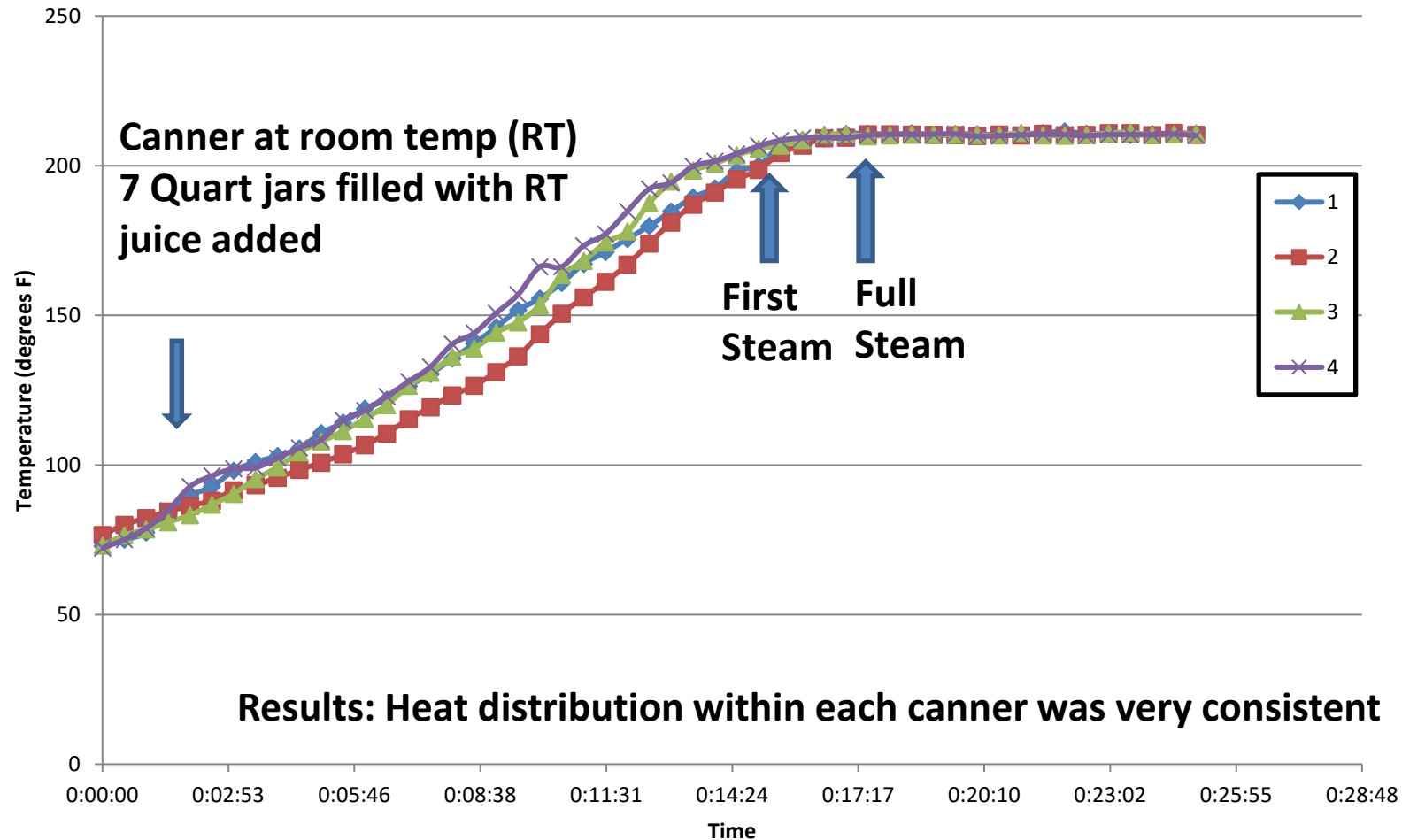
*AS canner range 9 – 12 minutes

Results:

- The time to preheat the water in a BW canner adds significantly to the overall process time.
- The longest total process time was observed when each canner was operated at 'full capacity.' All subsequent trials were conducted with full canners.

Heat Distribution in Canner

7 Quart Jars Room Temp Juice (ASC)



Home Canning in Steam vs Boiling Water

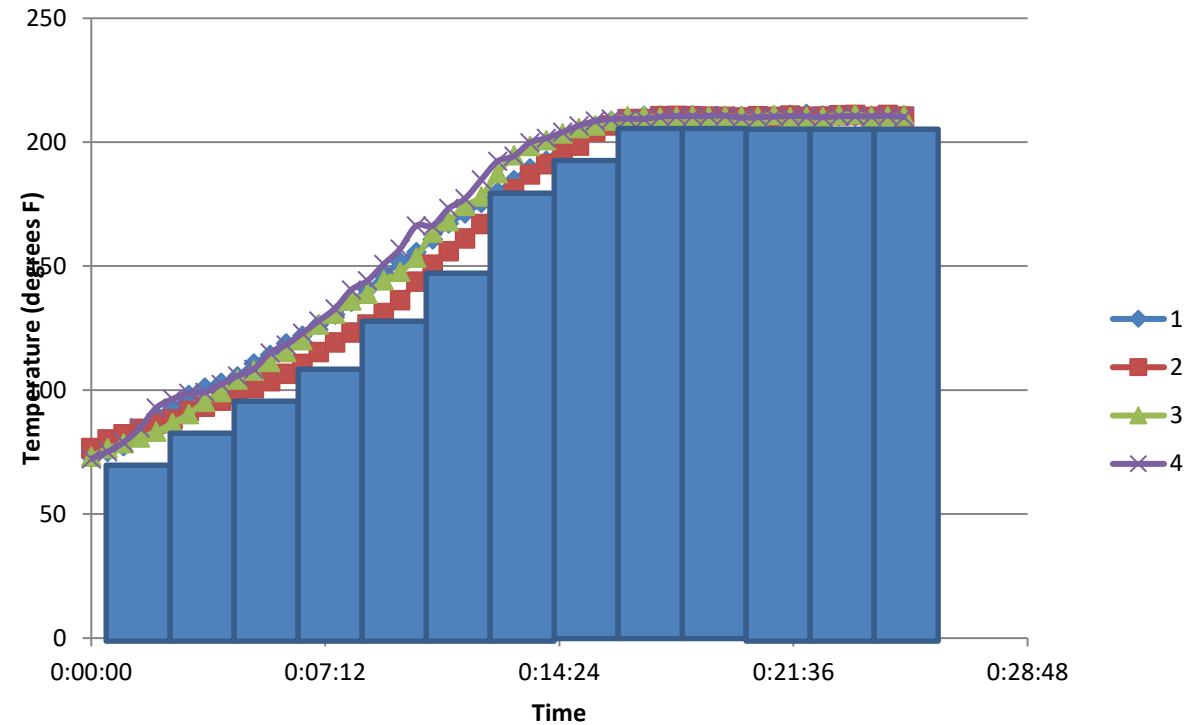
4 Food Products / 2 Canner Types

Tomato juice, cranberries in heavy syrup, applesauce – pint jars
chocolate raspberry dessert sauce – half pint jars

- Use tested recipes approved for Boiling Water canning
 - While heating, measure the temperature of the heating medium in the canner and the temperature inside the jar (cold spot)
 - Test for vacuum seals once cool
- ➔ Is the food safe? Calculate the 'process lethality'.



Calculated Thermal Process Lethality

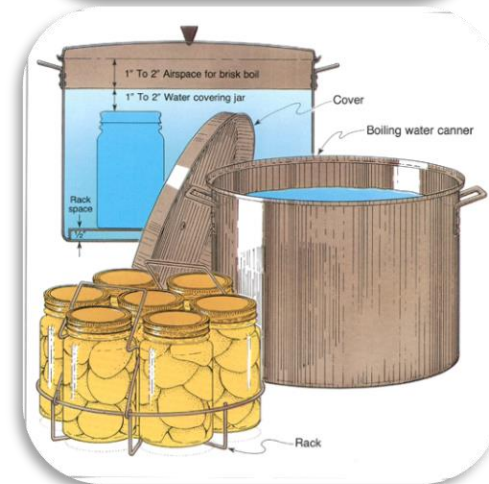


Process lethality can be compared across runs to determine how to adjust tested recipes for use in an Atmospheric Steam Canner.

Research Results

- Canner **temperature** is important to process lethality – boiling water or pure steam (212° F)
- The **rate of food product heating** was not different in a boiling water vs steam canner
- A significant portion of the **process lethality** was during cooling (~50-95%) for each canner type, especially for short process times
- Either process yielded jars with **strong vacuum seals** – 20 to 25 psi (across 87 jars tested).

Reference: P. Willmore, M. Etzel, E. Andress, and B. Ingham. 2015. Home Processing of Acid Foods in Atmospheric Steam and Boiling Water Canners. *Food Protection Trends*. 35:150-160.



Guidelines for Safely Using a Steam Canner for Home Food Preservation



A Steam Canner may be used to safely can high acid foods as long as **all of the following** conditions are met:

- ✓ Choose an **up-to-date, research-tested** recipe.
- ✓ Prepare jars and food according to a tested recipe.
- ✓ Ready the canner – preheating optional for a steam canner.
- ✓ To ensure you are processing at the correct temperature, **vent for 1 full minute before timing the process.**
 - ✓ Adjust process time for elevation as you would for a boiling water canner.
 - ✓ Limit process time to 45 minutes or less.
 - ✓ Mixing jar sizes is OK, stacking jars is not.
- ✓ After processing, allow jars to air-cool undisturbed.

NOTE: Research results apply ONLY to dome-style canners; we did not test other steam canner styles.

Research into Action: Hot-Packed Crushed Tomatoes

1. Select fully ripe tomatoes. YUM!
2. Rinse, trim, and dip into boiling water to remove skins. Core.
3. Quarter or slice tomatoes and place in a kettle to quickly heat to boiling while crushing.
4. Simmer 5 minutes once all tomatoes are added.
5. While tomatoes simmer, wash and rinse canning jars. Keep jars hot and ready for filling. HINT: use a dishwasher or Nesco roaster. Jars do not have to be pre-sterilized.
6. Add required acid to clean, hot canning jars. [Salt and sugar are optional.]

Citric acid:	½ teaspoon per quart	¼ teaspoon per pint
Bottled lemon juice:	2 Tablespoons per quart	1 Tablespoon per pint

7. Fill prepared jars with hot tomatoes, leaving ½ inch headspace.
8. Apply 2-piece lids and place filled jar on rack in canner above simmering water.
9. Once canner is full, place dome lid on canner and turn heat to HIGH.
10. Bring water to boiling. Watch for steam venting. Vent for 1 minute!
11. Once venting is complete, begin timed process. **Heat may be turned down but canner must vent during entire timed process.** [Don't forget to adjust process time for elevation!]

Pint Jars	35 minutes (0 – 1,000 feet)	40 minutes (1,001-3,000 feet)
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12. Remove processed jars and allow to air cool, undisturbed. Check for seals.

https://nchfp.uga.edu/how/can_03/tomato_crushed.html



Research into Action: Strawberry Jam

4 Cups crushed berries 2 Tablespoons bottled lemon juice
4 Cups sugar 1 box powdered pectin (or 1/3 cup bulk)



1. Rinse ripe berries, trim and crush. Measure 4 cups and place in kettle.
2. Add pectin and lemon juice to kettle and stir to combine.
3. Quickly bring fruit/pectin mixture to a full rolling boil, stirring constantly.
4. Add sugar, return to a boil and boil 1 minute.
5. Remove from heat. To prevent fruit from floating, allow to stand – skim foam if desired.
6. Clean jars and 2-piece lids. Keep warm. [Note: lids are clean but not heated prior to use.]
7. Fill warm jars* with hot jam, leaving ¼" headspace. *For best keeping quality, pre-sterilize jars before use.
8. Place filled jars on rack in canner above simmering water.
9. Once canner is full, place dome lid on canner and turn heat to HIGH.
10. Bring water to boiling. Watch for steam venting. Vent for 1 minute!
11. Once venting is complete, begin timed process. **Heat may be turned down but canner must be kept at a boil during entire timed process.** [Adjust process time for elevation!]

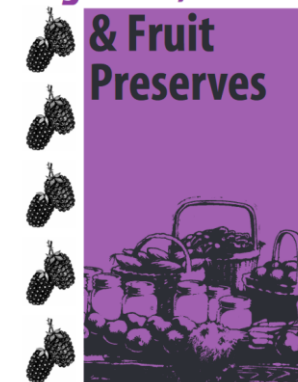
Half Pints or Pints	5 minutes (0 – 1,000 feet)	10 minutes (1,001-3,000 feet)
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12. Remove processed jars and allow to air cool, undisturbed. Check for seals.

<https://fyi.extension.wisc.edu/safefood/recipes/>

University of Wisconsin-Extension Cooperative Extension
Wisconsin Safe Food
Preservation Series

Making Jams, Jellies



Barbara H. Ingham

Canning Tips



- Don't believe everything that you read on the internet
if it seems too good to be true, it probably is
- Seek out trusted sources for information
- Stay up to date
- Enjoy the bounty of the harvest!



Canning a bushel of tomatoes

Try a new gadget and use a steam canner to safely preserve high acid foods such as sauces, fruits, pickles, and jellied fruit products.

Resources

Safe Canning Recipes

- ❑ National Center Home Food Preservation <https://nchfp.uga.edu>
- ❑ North Central food safety network [search NCFSEN](#)
- ❑ Wisconsin Safe Food Preservation series
<https://fyi.extension.wisc.edu/safefood/recipes/>

Steam Can it Right [NCFSEN web page](#) (guidelines for steam canning)

Additional questions? Contact: Barb Ingham, University of Wisconsin-Madison
Email: bingham@wisc.edu



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mail:
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Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410; or

fax:
(833) 256-1665 or (202) 690-7442;
e-mail:
program.intake@usda.gov;

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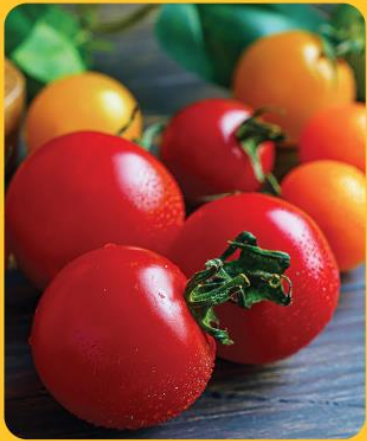
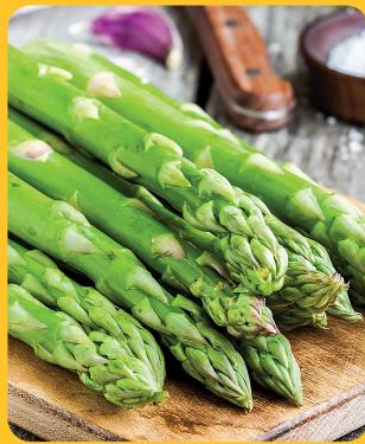
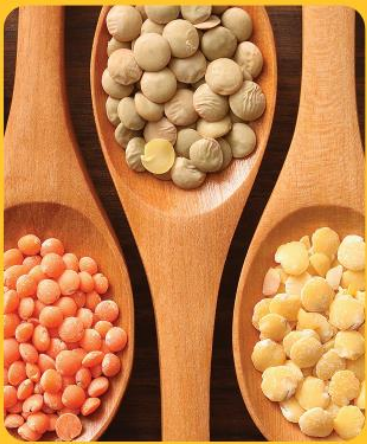
correo postal:
U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
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program.intake@usda.gov.

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Form 475-A - Assisted Notice Formed July 2019

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