

Preserving The Harvest

Dehydrating

Produce should be washed before going in your dehydrator.

Some things, mostly vegetables, need to be blanched (put into boiling water for a short time) and may need shocked (put into ice water) before going in the dehydrator.

Vegetables that are high in starch like potatoes need rinsed several times to reduce browning.

Drying Temperatures

95°F - Herbs, Spices, & Greens

105°F - Nuts & Seeds

115°F - Crafts

135°F - Fruits & Vegetables

160°F - Meats, Fish, & Jerky

Why Dry Them at That Temperature?

Herbs and greens are very sensitive and should be done between 90°F and 100°F. Too much heat or too long of a drying time causes a loss of the aromatic oils in the plants. Nuts and seeds are higher in oil and will go rancid or develop strange flavors if dried at too high of a temperature. Fruits and Vegetables dried between 130°F and 140°F will keep more heat-sensitive vitamins like A and C. Meat and fish should be dried on the highest temperature to keep bacteria and other harmful organisms to a minimum.

Drying Time

There are many factors that influence drying time. If the trays are loaded very heavily, if food is in more than one layer, if pieces are large/thick, or if it is a day with high humidity, your produce will take longer to dry. Generally you will want to check your items every hour or so. For my dehydrator, herbs and greens take 1-2 hours, but some like Kale (with the thick midrib) can take 4-6 hours depending on the day. Fruits and vegetables are 4 hours minimum, but I usually expect 6-8 and will dry them overnight.

Dehydrating Tips & Tricks

- You can cut window screen to fit inside your dehydrator trays so smaller pieces do not fall through.
- When drying sauces, liquids, or fruit rolls use a solid drying sheet.
- When drying jerky put a fruit roll sheet on the bottom tray to catch drips.
- After opening store foods in the refrigerator or freezer, or vacuum seal the container shut again.
- For bulk greens that take up a lot of tray space dehydrate them on a cookie sheet in your car on a hot summer day.

Rehydrating

Vegetables are rehydrated by adding an equal volume of dried vegetables and water. It can take between 15 minutes to 3 hours depending on the texture, thickness, and size of pieces. To rehydrate fruit put just enough boiling water to cover fruit and wait 10 minutes. Serve immediately or use in a recipe calling for fresh fruit.

Rehydrating Tips

- Small, thin pieces rehydrate faster than large, thick pieces.
- Blanched vegetables rehydrate more quickly than those that weren't.
- Boiling water shortens the rehydration time.
- Vegetables rehydrate faster in soft water than hard water.
- Strawberries do not rehydrate well.

Dehydrating Cautions

- Remove the trays and accessories before your dishwashers dry cycle or they can warp.
- Make sure to keep foods away from the air intake.
- Do not dehydrate food that has been marinated or prepared with alcohol. Alcohol + heat = fire.
- Read your owner's manual. Some dehydrators have unique requirements like using 4 trays at all times, even if 3 are empty.

Preserving The Harvest

Freezing

Freezing will slow down bacteria and enzymes, but it cannot remove them so produce should be washed before freezing. Freezing has 3 main quality control issues: freezer burn, ice crystal formation, and oxidation. These can all be prevented by using a moisture-proof and vapor-proof container/wrap or a vacuum sealer. Everything can be frozen in a vacuum sealer and some of the bags are even resealable after opening so it is a great investment if you will be freezing a lot of things.

Fruit Packing Methods

Dry Pack - blueberries, cranberry, currants, figs, kiwi, melon, pineapple, plum, rhubarb and strawberries. This is great for fruits where you will want to be able to pull out individuals instead of a block.

Everything else:

Sugar Pack - 1 cup sugar to 4 cups fruit will yield 2 pint containers or 1 quart container.

Syrup Pack - Sugar and water are used to make a syrup that is then poured over the fruit and frozen. Syrup varies from extra-light to heavy.

Peaches, strawberries, and cherries are enhanced using the sugar or syrup pack methods.

You can also make a wide variety of fruit purees and freezer jams.

Vegetables

Vegetables will have a blanching time (3-10 minutes) and shocking time (the same length as blanching time), but once processed will keep in the freezer for up to 1 year. They are best frozen raw since fully-cooked vegetables lose their flavor quickly. Blanching is an absolute must with vegetables. It helps to remove any missed surface dirt and microorganisms, preserves the color, retains vitamins, and reduces the enzyme activity. Without blanching your produce can go bad in as little as 4 weeks. Veggies are packed without extra seasoning, sugar, salt, etc. Pack them into meal-size portions and seal shut in a single layer. After they have been frozen 24 hours, you can restack the bags into nice columns.

Meats

Freezing keeps the fresh natural qualities of meat better than any other method. Canned meat is good and flavorful, but canned meat will become softer and break apart easier. Dehydrated meat becomes tough and jerky like while frozen meat will keep its original texture. Don't freeze in the store packaging. You want a moisture and vapor-proof wrapping in order to prevent quality control issues, and the store package is not acceptable.

Breads and Baked Goods

You can freeze breads and many baked goods too. You can freeze unbaked dough (bread, cookie, pizza, etc) on a baking sheet. Once it has hardened simply place in a bag and seal. You can do the same for baked bread. If freezing baked cookies, place a piece of parchment or wax paper between layers.

Freezing Tips

- Mushrooms deteriorate quickly so freeze them the same day and do not allow them to soak in water during preparation time. Mushrooms do not need blanched if they have been sauteed first.
- Most vegetables are cooked without thawing. Corn on the cob is the exception (thaw completely).
- Partially thaw greens so that they will be easier to separate during cooking.
- Frozen vegetables cook for less time than fresh since they've already been blanched.
- Frozen vegetables must be cooked right before serving since nutrients are quickly lost if left sitting after cooking.
- Don't refreeze vegetables after cooking unless for soup - they turn to mush.
- Keep 2 large bags or tupperwares in the freezer to toss leftovers and veggie scraps. After a while you will have the makings of a good pot of soup in one bag, and the vegetable ends will make a good broth.

Preserving The Harvest

Canning

While canning is a very old tradition, things have changed - in a good way. We now have new and more flavorful vegetables and vegetables bred for specific preservation methods. We also have safer, easier to use equipment. Unfortunately, we also have more resistant microbes that take more effort to kill. Because of this recommendations on canning times and methods have changed. There are now only two safe methods of home canning, and only research based recipes from trusted sources should be used. Before 1994 they did not have the safer, research based recipes we have now.

Unsafe Canning Methods

Open Kettle - recommended by the USDA before 1944. This is where hot food is added to the jar, the lid and ring are put on, and the jar is never processed. The jar is left to seal on its own.

Oven Canning - Recommended by stove manufacturers before 1942.

Dishwasher - NEVER recommended by any reputable source. It can be used to wash your jars, but not for sealing or processing your jars.

Add Aspirin - NEVER recommended by any reputable source.

Steam Canners - recommended by the USDA before 1923.

Microwave Canners - marketed in the 1970s but no longer recommended for use.

Paraffin - recommended by the USDA and pectin produces before 1978 to be used to seal jars of jam and jelly. This method does not keep out molds.

Solar Canning - placing jars in a solar oven to heat up. The heating is uneven and the temperatures do not get hot enough.

Canned Bread or Cake in a Jar - Bread or cake is baked in a canning jar and then a lid is put on an a vacuum forms as it cools. Pathogens can still grow and people can die from eating it.

Boiling Low-Acid Foods Extra Long - the temperatures still will not get hot enough to kill the *botulinum*.

There are only two approved methods of home canning. Boiling water canning (212°F), and Pressure canning (240°F). Follow directions exactly!

What am I Worried About?

Bacteria (primary concern in canning), viruses (disease), parasites (disease), mold (spoilage), and yeast (spoilage). Yeast, molds, and most bacteria are destroyed at boiling temperatures (212°F). *C. botulinum* spores require higher temperatures over a period of time (240°F - 250°F).

Botulism

Colstridium botulinum bacteria are found naturally in soil and water. The bacteria produces heat-resistant spores that thrive in airless, low acid, high moisture environments with temperatures of 40-120 degrees. These are exactly the conditions that are produced in canning jars. These spores release a toxin that causes botulism. These spores can be killed at 240 degrees or above for a reasonable amount of time. According to the CDC there are ~20 cases of botulism per year from home canned foods. A very small amount is all it takes to sicken elderly or children, and food will show no signs of having botulism.

Safety

Bacteria, botulism, it can all sound scary, and it is a concern, but it doesn't have to be. The USDA and other trusted resources use equipment and test each and every recipe to ensure safety. Not only do they know the temperature in the jar throughout the entire process, they also test to see what bacteria or spores have been killed or are still alive. Before publishing the recipes, they take their effective times, and add buffers to it. You may be canning that jar for 30 minutes, but any harmful microorganisms may have been dead at 20. The built-in safety window from trusted recipes helps to take the guesswork and fear out of canning.

Preserving The Harvest

How Canning Works

Heating the food kills microorganisms and also inactivates enzymes. Not only is the cooking time of the food before canning important, but the heating up and cool down times are also important. The heating time and cool down time of the canning process counts towards the sterilization value of the process - don't rush them. In addition to the food being processed, air leaves the jar during heating. As the jar cools a vacuum seal forms. You end up with a sterile food product that is vacuum sealed and preserved for later use.

Follow the recipe exactly to allow proper heat penetration. Adding extra sugar or fat will slow the heat penetration. Oversized food pieces will slow heat penetration, as will added thickeners.

What Method Should I Use?

To figure out what method of canning should be used, look at the food's acidity and at trusted recipes. High acid foods are those with a pH of 4.6 or lower. These foods can be safely processed in a water bath canner. Low acid foods are those with a pH of 4.6 or higher. These foods must be processed with a pressure canner in order to be safe.

High acid foods ph 4.6 or lower include:

- All fruits except figs, tomatoes (must be acidified), and melons.
- Fermented pickles such as sauerkraut.
- Acidified foods such as pickles.

Why acidify? The numerous varieties of tomatoes have different acidity levels. So we must add bottled lemon juice to be safe. 2 Tbsp per quart of tomatoes.

Low acid foods ph above or equal to 4.6 include:

- All vegetables (except for rhubarb)
- Meats, Poultry, and Seafood
- Soups
- Mixed canned food (low and high acid foods together like spaghetti sauce with meat)

Jars

Only use jars intended for home canning. Just because your spaghetti jar says Mason underneath the label doesn't mean it's appropriate for home canning. Incorrect jars can break and waste your hard earned produce.

Check your jars - there should be no cracks or chips.

Bigger is not always better - the half gallon jars can only be used for high acid juices.

Packing Methods

Raw pack - raw food goes directly in jars and boiling hot liquid is poured over them. This is done for foods that will lose their shape when heated. Pack firmly but don't crush the food.

Hot pack - cook food in liquid before packing. Cooking liquid is then poured over the food in the jar. Hot pack is the preferred method for most foods. Advantages include fewer jars needed, less floating of food pieces, better food color and flavor, and foods are more pliable making it easier to pack the jars. Always follow the directions, you cannot switch out a hot and a raw pack.

Headspace

Headspace is the space in the jar between the inside of the lid and the top of the food/liquid. The directions will specify what headspace to use. Usually it is between ¼" for jellied fruit products, and 1"-1¼" for low-acid foods. Too little headspace causes food to bubble out during processing and you may see food on the rim. This can prevent the jar from sealing properly. Too much headspace means food at the top of the jar may turn colors because of leftover air, and the jar may not seal properly because not all the air may have been forced out during processing to make a complete vacuum.

Preserving The Harvest

How to Close the Jars

- Remove air bubbles (nonmetal utensil).
- Adjust headspace if needed
- Wipe jar rims (no food particles on there or it won't seal properly)
- Adjust lids fingertip-tight. Don't over tighten lids.

Sealing

After 12-24 hours a good seal should be obvious. The lid will dent down in the middle after the jar has sealed. The button should not move when pressed. You can also listen for a pop as the jars seal, but not all jars will seal at the same time. A sealed jar has a clear ringing sound when tapped in the middle of the lid. An unsealed jar make a dull thud.

You can reprocess the food within 24 hours of the first process if everything was done correctly but they didn't seal. You have to start the entire process over with a new lid. Alternately you can refrigerate the jar and use it within 1 or 2 days, or freeze it for later.

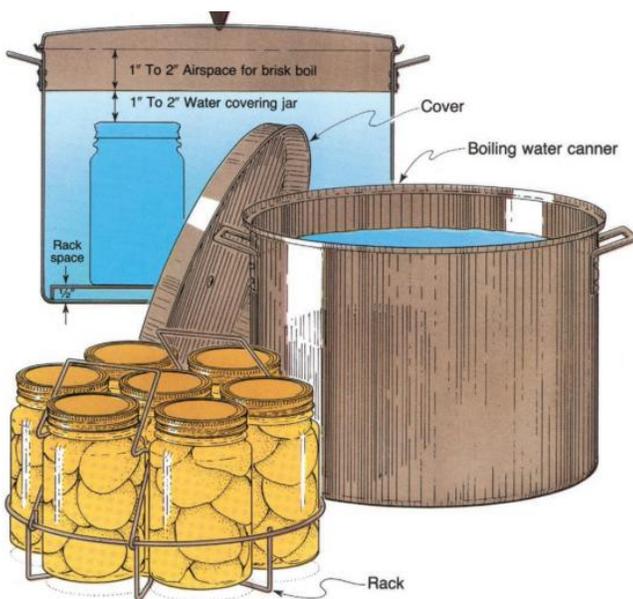
Storage

- Label and date
- Store in a cool, dry, dark place. Avoid extreme temperatures. Don't store them near heat pipes.
- Use within 1 year for best quality. Food is still safe after that, but texture and color may deteriorate.
- **NEVER** stack or hang jars.
- **NEVER** store jars with the rings on. They can come unsealed, reseal and be unsafe without your knowledge.

Water Bath Basics

Water must be over the tops of the jars by at least 1-2". Fill the canner up with 6" of water and set it to simmer while you prepare the food. Wash the jars if needed and heat them up to avoid breaking.

Wipe the rims with a clean, damp cloth. Put the lids and rings in place and tighten fingertip tight. Do not overtighten. Lower jars into the canner with a jar lifter or using the basket. Process the jars in a rolling boil for the time in the recipe. At the end of the time, turn off the burner, remove the lid, and allow the canner to sit undisturbed for 5 minutes. Then remove the jars (keep them upright), and sit them somewhere to cool for 12-24 hours undisturbed.



Water Bath Tips

- The dishwasher is great for heating up clean jars - just run it without soap.
- Have another pot of water simmering incase you do not have enough water in the canner.
- You cannot substitute liquid pectin for powdered pectin or vise versa.

Preserving The Harvest

Pressure Canning Basics

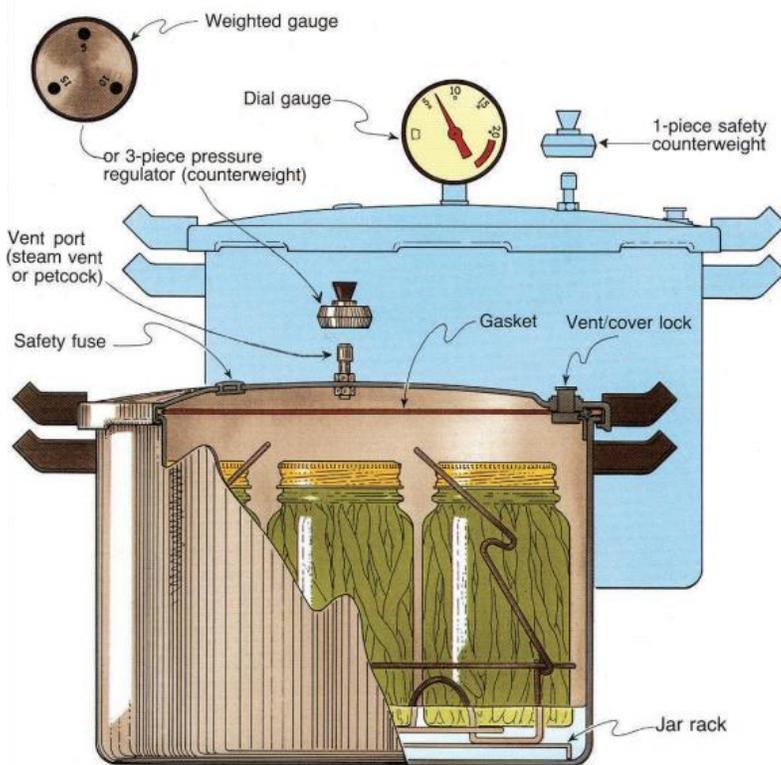
Have your pressure canner tested every year. Your local extension office can check your canner over for free. They will inspect the canner, seals, safety valves, and even test the dial gauge. This is extremely important for both food safety and kitchen safety. A 1 pound error in a 20 minute process causes more than a 10% decrease in sterilizing value. A 2 pound error reduces it by more than 30%.

Only pressure can in a pressure canner (holds 4 quart size jars). Pressure cookers and saucepans with smaller volume capacities don't deliver enough heat during pressurizing and cool down to safely process foods.

Fill the pressure canner with 3" of water and get it simmering. Pack food according to the directions. Wipe the rims with a clean, damp cloth. Put the lids and rings in place and tighten fingertip tight. Do not overtighten. Lower jars into the canner with a jar lifter. Lock on the canner lid and remove the wobble to exhaust all air from the cooker.

Air + steam mixture has lower temperature than just steam. The higher steam temperature is necessary to kill the botulism spores. Processing should take place in a pure steam environment. Allow a funnel of steam to run out for 10 minutes. Without proper venting up to 30% of the sterilizing power can be lost. After venting place the weight on the vent to close it off, and the pressure will raise. Timing when the correct pressure is reached on the dial or when the weight rocks gently back and forth or jiggles 2-3 times a minute depending on the type of weight. Once the time has stopped, turn off the burner and allow the canner to come to 0 pressure on it's own (don't speed up the process). For safety's sake, wait an additional 2 minutes before handling. Then remove the weight and open the petcock and wait an additional 10 minutes. Next open the canner and tilt lid away from you to vent steam. Remove jars and cool undisturbed 12-24 hours away from drafts. Then remove the bands and check for seals.

Caution: If pressure drops below the target any time bring the canner back to pressure and start timing the process over from the beginning. Yes it sucks, but it's needed to prevent spoilage or bacteria.



Pressure Canning Tips

- Weights from other canners are not interchangeable. Some weights rock, others jiggle.
- You must use 1" cubes for squash. Mashed or pureed squash will not heat properly to kill all of the pathogens and would be unsafe to eat.
- Do not can wild mushrooms. They can react differently to the process than cultivated mushrooms.
- Don't can Rutabagas. They get a strong off flavor.

Preserving The Harvest

Helpful Resources And Reputable Sources for Recipes

Michigan Extension Office or other state extension office 1-888-678-3464
Find yours at <http://msue.anr.msu.edu/county>

Michigan Fresh: http://www.canr.msu.edu/mi_fresh/

National Center for Home PReservation: <http://nchfp.uga.edu/>

USDA Complete Guide to Home Canning:

Online http://nchfp.uga.edu/publications/publications_usda.html

Hard Copy: <https://www.extension.purdue.edu/usdacanning/>

Books

University of Georgia's *So Easy to Preserve* book (4th edition +) <https://setp.uga.edu/>

Ball Blue Book (2009 edition or later) ISBN 0-9727537-4-5

Ball Complete Guide to Home Preserving ISBN 978-0778801399

Courses

Online Food Preservation Course Through MSU (\$10) - MI Food Preserve

<https://campus.extension.org/course/view.php?id=912>

Still have questions? Feel free to email me and I will do my best to point you in the right direction.
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Preserving the Harvest - Can, Dehydrate, or Freeze?

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| <u>Vegetable</u> | <u>Can</u> | <u>Dehydrate</u> | <u>Freeze</u> |
|------------------|------------|------------------|---------------|
| Artichoke | | | X |
| Asparagus | PC | X | X |
| Beans, Green | PC | X | X |
| Beans, Dry | PC | | |
| Beets | PC | X | X |
| Broccoli | | X | X |
| Brussels Sprouts | | | X |
| Cabbage | PC | | X' |
| Carrots | PC | X | X |
| Cauliflower | | X | X |
| Corn | PC | X | X |
| Garlic | | X | |
| Greens | PC' | X | X |
| Herbs | | X | X |
| Onions | | X | X |
| Peas | PC | X | X |
| Peppers | PC' | X | X |
| Potatoes | PC' | X | X |
| Radish | | X | X' |
| Rhubarb | WB | | X |
| Rutabaga | | X | X |
| Sweet Potato | PC' | X | X |
| Squash | PC' | X | X |
| Tomato | WB | X | X |
| Turnip | PC' | X | X |
| Zucchini | PC' | X | X |

' Not the best way to preserve this item. Try small batchest first to ensure you like them processed this way. They may become mushy or off flavored.

| <u>Fruit</u> | <u>Can</u> | <u>Dehydrate</u> | <u>Freeze</u> |
|------------------------|------------|------------------|---------------|
| Apple | X | X | X |
| Apricot | X | X | X |
| Berries* | X | X | X |
| Berries - Aggregated** | X' | X | X |
| Currants | X | X | X |
| Cherry | X | X | X |
| Cucumber | X | X | X' |
| Grape | X | X | X |
| Kiwi | X | X | X |
| Melons | X | X | X |
| Nectarine | X | X | X |
| Peach | X | X | X |
| Pear | X | X | X |
| Plum | X | X | X |
| Quince | X | X | X |
| Strawberry | x | x | x |

* Includes blueberries, cranberries, elderberries, goji berries, gooseberries, honeyberries, and strawberreis.

** Includes blackberries, marionberries, mulberries, salmonberries, raspberries. These must be raw packed or they will break apart when heated.

| <u>Miscellaneous</u> | <u>Can</u> | <u>Dehydrate</u> | <u>Freeze</u> |
|----------------------|------------|------------------|---------------|
| Meat | X | X | X |
| Mushrooms | X' C | X | X |
| Sauce | X | X | X |
| Soup | X | X | X |

C Caution. Never can wild mushrooms.