

FILL YOUR PANTRY

Freezing Produce



Freezing is an easy and convenient way to preserve your summer harvest and requires less time, compared to other food preservation methods, such as canning or dehydrating foods. Freezing offers many benefits and delivers fresh flavor, natural color, and a higher nutritional value than other preservation methods.

SELECTING PRODUCE FOR FREEZING

Preserving food does not improve its quality, so start by selecting good-quality produce.

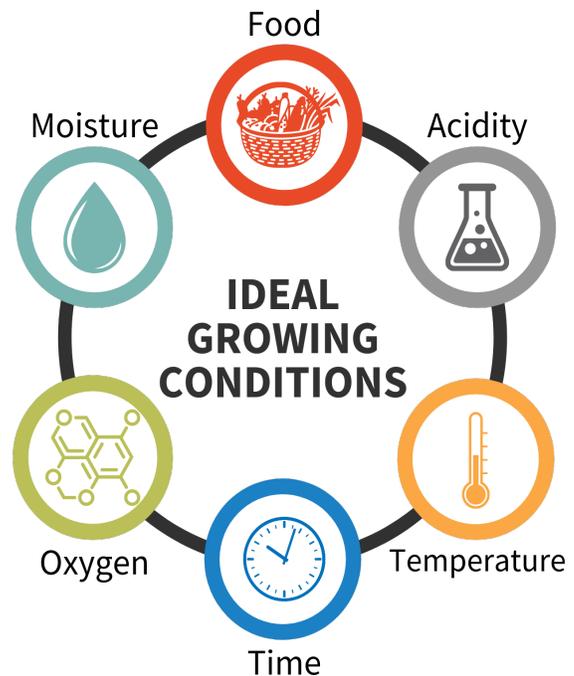
- Quality varies among varieties, so choose a variety best-suited for freezing.
- Fruit and vegetables should be free of disease, mold, or insect damage, and not overripe.
- Freeze produce just after harvesting or shortly after purchasing.
- If unable to freeze within 6 to 12 hours of harvest, store in a cool, dry location to minimize deterioration.

FOOD PRESERVATION GOALS

Microorganisms causing food spoilage include molds, yeasts, and bacteria. These microorganisms can be found anywhere and can easily contaminate foods.

Under ideal conditions, bacteria can easily grow on food and multiply very quickly. This can increase the rate at which food spoils and can cause a foodborne illness.

Controlling the ideal growing conditions for these harmful microorganisms is the best way to prevent food spoilage and decrease the risk of foodborne illness.



FACTORS CONTRIBUTING TO BACTERIAL GROWTH

It is important to remember that **nothing will come out of the freezer in better condition than when it went in**. Understanding these structural changes and why they occur is a key factor in successfully freezing your garden harvest.

Natural chemical changes occur during the freezing process, resulting in structural changes to fruits and vegetables that can impact the taste, texture, and overall quality.

Freezing stops the growth of harmful microorganisms, but once thawed, microorganisms become active and begin multiplying rapidly.



HOW DOES FREEZING WORK

Water makes up 70 to 90% of the weight of most fruits and vegetables. During the freezing process, water expands, and ice crystals are formed, causing cell walls to rupture.

- Water contained in food freezes and expands.
- Cell walls rupture, resulting in a softer texture.
- More noticeable in vegetables that contain a higher water content.
- Less noticeable in starchy vegetables.

Although water will freeze at 32°F, *not all foods will freeze at 32°F*. This is because most food contains a combination of many substances, such as air, fiber, sugar, and water.

TYPES OF FREEZING

Freezing produce as quickly as possible will result in smaller ice crystal formation. Smaller ice crystals cause less damage to cell walls, resulting in a crispier texture and less liquid being lost when thawed.

- **Rapid freezing:** occurs at a temperature of -13°F degrees or less, produces smaller ice crystals, and results in a better quality product.
- **Slow freezing:** occurs at a temperature of -11°F degrees or above, produces larger ice crystals, and results in softer texture and more liquid loss when thawed.
- **Freeze-thaw cycle:** occurs when there are fluctuating temperatures; allows for growth of ice crystals and further damage to cell walls.

FREEZER PACKAGING

Quality freezer packaging is essential when freezing fruits and vegetables. Freezer bags and containers are specially designed for freezer use.

These materials have a different composition and/or thickness compared to regular plastic storage bags and containers, allowing them to provide the best moisture-vapor barrier.

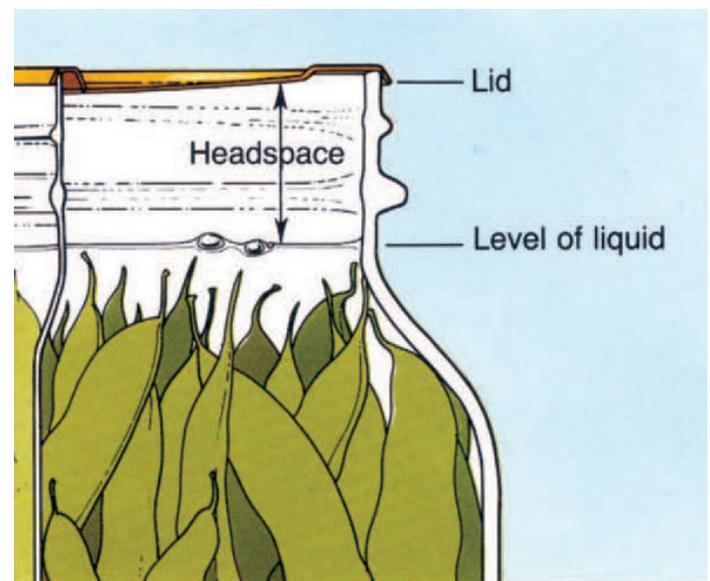
Choosing containers

Freezer containers should keep moisture in and air out, while protecting food from absorption of off-flavors or odors, and freezer burn. Quality packaging should be durable, moisture resistant, leak-proof, and easy-to-seal.

- **If using rigid packaging:** select containers specifically designed to withstand cold temperatures that will not become brittle and break or those with screw-on lids that will not pop-off in the freezer and spill.
- **If using glass jars:** use caution, as glass breaks easily at freezing temperatures.

Container headspace

Headspace, or unfilled space in a sealed container, above the food and below the lid, allows food to expand while processing.



The amount of headspace required depends on the type of food being frozen. Liquids expand more than solids when frozen, so leave ample headspace when processing liquids.



BLANCHING

Blanching is the process of quickly exposing vegetables to either boiling water or steam for a specified amount of time, and then rapidly cooling. It is not required from a food safety standpoint; however, it will affect the quality of frozen vegetables.

- Destroys microorganisms on the surface of vegetables.
- Softens the vegetable, brightens color, and slows the loss of vitamins.
- Inactivates enzymes which can lead to loss of flavor, color, and texture in frozen produce.
- *Freezing does not stop enzyme activity*; only blanching inactivates enzymes in vegetables.

HOW TO BLANCH VEGETABLES

- Use 1 gallon of boiling water per 1 pound of prepared vegetables.
- Place vegetable in a blanching basket and lower into vigorously boiling water. Place a lid on the kettle.
- The water should return to boiling within 1 minute. If water does not return to a boil within 1 minute, too many vegetables are being used for the amount of boiling water.
- Begin counting blanching time as soon as water returns to a boil.
- Keep heat on high during the indicated blanching time.

ENZYME ACTIVITY IN VEGETABLES

Enzymes are large protein molecules in fruits and vegetables that promote chemical reactions, such as ripening, and can affect the quality of your product.

Enzyme activity helps to speed up the breakdown of foods, which leads to the deterioration of food quality.

The activity of enzymes is specific for the actual type of enzyme and is dependent on both pH and temperature.

Enzyme activity affects the quality of your product and leads to a loss of nutrients and to changes in color, texture, and flavor.

VEGETABLE	*TIME
Artichoke – Globe (Hearts)	7
Artichoke – Jerusalem	3-5
Asparagus	
Small stalk	2
Medium stalk	3
Large stalk	4
Beans (Snap, Green or Waxed)	3
Beans (Lima, Butter or Pinto)	
Small	2
Medium	3
Large	4
Broccoli	
Flowerets 1.5 inches across	3
Steamed	5
Cauliflower	
Flowerets 1 inch across	3
Steamed	5
Carrots	
Small	5
Diced, sliced or length wise	5
Celery	3
Collard Greens	3
Greens, All Other	2
Corn-on-the-cob	
Small ears	7
Medium ears	9
Large ears	11
**Whole kernel or cream style	4
Peas	
Edible pod	2-3
Field (black-eyed)	2
Green	1.5-2.5

*Blanching time in minutes

**Ears blanched before cutting corn from cob



FRUIT FREEZING METHODS

When freezing fruit, always know what the intended use for the fruit will be. Most fruit will have a better texture and flavor if packed in sugar or syrup, but sugar is not necessary to safely preserve fruit.

If you intend to pack fruit in sugar or syrup, choose the type of packing method that best fits your intended use.

Sugar pack

Fruits packed in granulated sugar or unsweetened are best for cooking purposes because it results in less liquid. Sugar pack is ideal for **peaches, strawberries, figs, deseeded grapes, plums, and cherries**. Small, whole fruit may be coated with sugar and frozen.

Sprinkle sugar over fruit and gently mix until the juice is drawn out of fruit and sugar is dissolved. For soft, sliced fruits, layer slices with sugar and allow to stand for 15 minutes.

Syrup pack

Fruits packed in syrup are **generally best for uncooked desserts**. A 40 percent syrup pack is recommended for most fruits; however, the proportion of sugar to water will depend upon the sweetness of the fruit being frozen.

Lighter syrups are recommended for mild-flavored fruits to prevent masking of natural fruit flavor. Heavier syrups are recommended for very sour fruits.

Type of Syrup	Percent of Syrup*	Cups of Sugar**	Cups of Water	Yield of Syrup in Cups
Very Light	10%	½	4	4-½
Light	20%	1	4	4-¾
Medium	30%	1-¾	4	5
Heavy	40%	2-¾	4	5-⅓
Very Heavy	50%	4	4	6

*Approximate percent. ** Up to ¼ of the sugar may be replaced by mild-flavored honey or corn syrup; however, this may affect the color and flavor of fruit.

ENZYME ACTIVITY IN FRUIT

When freezing fruit, adding one of the chemical compounds below can help control enzyme activity, which can lead to browning and loss of Vitamin C.

Ascorbic Acid (Vitamin C)

Ascorbic acid is effective at preventing discoloration in most fruits and must be used in powder form.

Purchase Ascorbic acid where freezing supplies are sold.

Ascorbic Acid Mixtures

These are special anti-darkening preparations, consisting of a mixture of Ascorbic acid, with sugar and citric acid.

Citric Acid and Lemon Juice

Although both citric acid and lemon juice can be used, these are not as effective as Ascorbic acid and may mask the natural fruit flavor.

MAKING SYRUP PACK

- Dissolve sugar in lukewarm water, mixing until the solution is clear.
- Chill solution before covering fruit.
- Cover fruit with just enough syrup. (Approximately ½ to ⅔ cup solution per pint.)
- When using a rigid container, place crumpled parchment paper or other water-resistant wrapping material on top of fruit solution.



REFERENCES

Andress, E. L., Harrison, J. A., & Reynolds, S. J. (2014). *So Easy to Preserve (6th Ed.)*. Athens, GA. Cooperative Extension, University of Georgia/ Athens, College of Family and Consumer Sciences, College of Agricultural and Environmental Sciences.

Andress, Elizabeth. *Preserving Food – Freezing Prepared Food*: updated June 2014 - Nation Center for Home Food Preservation – University of Georgia publication bit.ly/2S2IOiF

USDA. *What is blanching and how does it relate to enzyme activity when freezing food?* (2019, July 17). Retrieved June 09, 2020, from bit.ly/3uQ1oYj

Zepp, M. (2018, May 3). *Understanding the Process of Freezing*. Retrieved June 1, 2020, from bit.ly/3vP5RMi

RESOURCES

Books

So Easy to Preserve, 6th Edition: setp.uga.edu

USDA Complete Guide to Home Canning: bit.ly/3z5ljpK

The Ball® Blue Book

Websites and Online Videos

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

YouTube: What's Cooking with Mary Liz Wright: bit.ly/3plFDi5

From Garden Gates to Dinner Plates: go.illinois.edu/CottageFoods

University of Illinois Extension Food Preservation Resources: go.illinois.edu/PreserveFood

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OPTIONS FOR FREEZING UNSWEETENED FRUIT

Unsweetened pack

Packing fruit for freezing in water or unsweetened juice may result in products having a softer texture and a duller color. Fruits will freeze harder and take longer to thaw. This method is ideal for fruits such as:

- Blueberries
- Currants
- Raspberries
- Cranberries
- Gooseberries
- Steamed apples

Dry pack

This method is ideal for **small whole berries** that will result in a good quality product without sugar.

- Pack fruit into container, seal, and freeze.
- To prevent clumping, place fruit in a single layer onto shallow tray and freeze.
- Once frozen, remove from tray, pack in freezer safe packaging, and return to freezer.

Pectin syrup

This unsweetened pack method is ideal for fruits that retain their texture better than if frozen in just water or unsweetened juice. Fruits such as **strawberries and peaches** freeze well in pectin syrup.

How to make pectin syrup:

- In a saucepan, combine 1 box powdered pectin and 1 cup of water.
- Bring to a boil, and boil for 1 minute.
- Remove from heat.
- Add 1-¾ cup water, and let cool.
- Yields 3 cups of moderately-thick syrup.

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