

## Storage Guidelines for Fruits & Vegetables

Cold storage of fruits and vegetables was used extensively by our ancestors to keep food after the harvest season. In modern times, the year 'round availability of fresh produce in the supermarket has reduced the use of home storage. However, even today there are benefits to home storage. Home gardeners often have excess fruits and vegetables that cannot be consumed immediately but would store well. Even people *without* home gardens can buy food in season when it is fresh and inexpensive and then store it at home until a later date.

Both options are cheaper than buying food in the winter when it is often quite expensive. In addition, stored food harvested at peak maturity from the garden usually has better flavor and a higher nutritional value.

When harvesting your own produce for storage or buying it locally in season, there are certain guidelines to follow that assure maximum quality and minimum spoilage of your stored food.

- Harvest fruits and vegetables at peak maturity or as near as possible
- Use only produce that is free from all visible evidence of disease
- Pick only fruit or vegetables that are free from severe insect damage
- Handle food carefully after harvest to prevent cutting and bruising it
- Leave an inch or more of stem on most vegetables to reduce water loss and prevent infection
- Use late-maturing varieties better suited to storage

In general, use only the best food for storage. Damaged food is more likely to suffer mold and bacterial decay during storage and thus should be used fresh or it should be discarded.

Once harvested, fruits and vegetables must be stored under proper conditions. These can be classified into four groups:

- Fruits and vegetables that require cold, moist conditions
- Vegetables that require *cool*, moist conditions
- Vegetables that require cool, dry conditions
- Vegetables that require warm, dry conditions



The tables on the following page list temperature and humidity requirements for most vegetables. In addition to proper temperature and humidity, all fruits and vegetables must be kept in a dark, aerated environment. Standing water, however, must be avoided as it will quickly lead to rot.

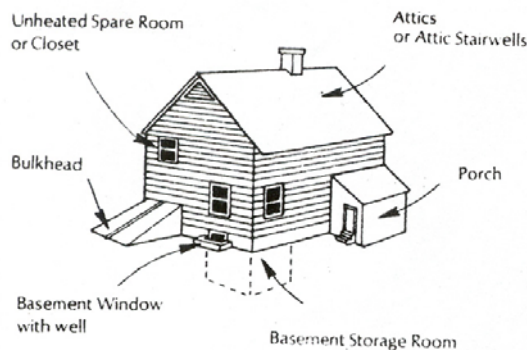
Produce must not be allowed to freeze, and should be protected from animal pests such as mice. It is important to remember that crops held in storage are still living plants, capable of respiration and affected by their environment.

The goal of storage is to keep them in a dormant state. One other note, fruits and vegetables should ALWAYS be stored separately. Fruits release ethylene, which speeds the ripening process of vegetables. Fruits are also very susceptible to picking up the taste of nearby vegetables.

**Indoor storage.** There are many areas in dwellings that naturally provide (or can be adapted to provide) a variety of temperature and moisture conditions for storage. Assess your specific situation. Use a thermometer to monitor temperatures in various areas of your building during the fall and winter to find locations that are convenient and most readily adaptable for food storage.

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<b>Table 1. Fruits &amp; Vegetables that require cold, moist conditions</b>			
<i>Vegetable</i>	<i>Temperature (degrees F.)</i>	<i>Relative Humidity (%)</i>	<i>Length of Storage</i>
• Asparagus	32-36	95	2-3 weeks
• Apples	32	90	2-6 months
• Beets	32	95	3-5 months
• Broccoli	32	95	10-14 days
• Brussels Sprouts	32	95	3-5 weeks
• Cabbage, Early	32	95	3-6 weeks
• Cabbage, Late	32	95	3-4 months
• Cabbage, Chinese	32	95	1-2 months
• Carrots, Mature	32	95	4-5 months
• Carrots, Immature	32	95	4-6 weeks
• Cauliflower	32	95	2-4 weeks
• Celeriac	32	95	3-4 months
• Celery	32	95	2-3 months
• Collards	32	95	10-14 days
• Corn, Sweet	32	95	4-8 days
• Endive, Escarole	32	95	2-3 weeks
• Grapes	32	90	4-6 weeks
• Kale	32	95	10-14 days
• Leeks, Green	32	95	1-3 months
• Lettuce	32	95	2-3 weeks
• Parsley	32	95	1-2 months
• Parsnips	32	95	2-6 months
• Pears	32	95	2-7 months
• Peas, Green	32	95	1-3 weeks
• Potatoes, Early	50	90	1-3 weeks
• Potatoes, Late	39	90	4-9 months
• Radishes, Spring	32	95	3-4 weeks
• Radishes, Winter	32	95	2-4 months
• Rhubarb	32	95	2-4 weeks
• Rutabagas	32	95	2-4 months
• Spinach	32	95	10-14 days
<b>Table 2. Vegetables that require cool, moist conditions</b>			
• Beans, Snap	40-50	95	7-10 days
• Cucumbers	45-50	95	10-14 days
• Eggplant	45-50	90	1 week
• Cantaloupe	40	90	15 days
• Watermelon	40-50	80-85	2-3 weeks
• Peppers, Sweet	45-50	95	2-3 weeks
• Potatoes, Early	50	90	1-3 weeks
• Potatoes, Late	40	90	4-9 months
• Tomatoes, Green	50-70	90	1-3 weeks
• Tomatoes, Ripe	45-50	90	4-7 days
<b>Table 3. Vegetables that require cool, dry conditions</b>			
• Garlic	32	65-70	6-7 months
• Onions	32	65-70	6-7 months
<b>Table 4. Vegetables that require warm, dry conditions</b>			
• Peppers, hot	50	60-65	6 months
• Pumpkins	50-55	70-75	2-3 months
• Squash, winter	50-55	50-60	2-6 months
• Sweet Potato	55-60	80-85	4-6 months



Any spot that is sufficiently and evenly cool (32 degrees to 60 degrees F.) can be stored there. Basements are generally the most logical place to adapt.

Older homes are often less well-insulated and have pantries, back halls, enclosed porches, sheds and bulkheads that are adaptable to storage. Homes heated with wood stoves often have a central area of radiant warmth and peripheral areas that are considerably cooler.

**Outdoor storage.** In areas with cold winters, vegetables requiring cool to cold, moist conditions can be stored in any of several types of outdoor storage areas. Earthen storages (from simple mounds to more elaborate root cellars) naturally provide cool, moist, dark and even conditions for a fairly long time. All outdoor storages have the disadvantage of sometimes being inaccessible, as well as being subject to damage by rodents and other vermin.

To be successful, any outdoor storage must have thorough drainage. A storage into which water settles will not keep produce and may result in total loss.

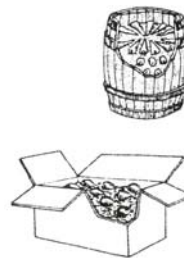
**Packing materials.** Packing materials used in storage perform several functions – insulation against fluctuating temperatures, moisture retention, and reduction of disease transmission. In outdoor storages, clean straw, dry leaves, corn stalks, hay, or sawdust are commonly used for insulation. These materials may be purchased relatively cheaply from local farms or garden centers. A slightly more expensive alternative is peat moss.

Use these materials for a single storage season only, because they can become contaminated with molds and bacteria. They often can be recycled as mulch in the garden. Moisture retention of produce is usually achieved with moistened sand, sawdust or peat moss. Plastic bags, lined boxes, crocks, metal cans with liners, or plastic garbage cans are all items that retain moisture. Perforate plastic bags or liners at regular intervals to allow air circulation and prevent condensation.

Vegetables requiring moist storage should never be left directly exposed to air. Alternating layers of produce with packing materials reduces disease transmission. Wrapping individual items of produce with newspaper aids moisture retention and reduces the possibility of cross-transfer of odors and disease.

**Packing materials:**

- clean straw
- sawdust
- sphagnum moss
- peat moss
- dry leaves
- sand



**Timing of storage.**

Placing fruits and vegetables in storages, either in pits or in basement rooms, *before* cold weather starts in the fall is a frequent cause of early spoilage. One of the most difficult steps in successful storage is to keep the produce in prime condition from the time of optimum maturity until the night temperature is low enough to cool the storage area. The length of storage and retention of nutrients will be maximized if the produce can be stored under the proper conditions immediately after harvest.

Following are a few examples of storage areas for fruit and vegetables.

**Refrigerator storage.** One of the best ways to store small quantities of vegetables requiring cold or cool moist conditions is to use an old or extra refrigerator. The amount of current required to run a storage refrigerator is usually low because it is opened infrequently and can be located in an out-of-the-way, cool location. For best storage, produce

should be washed free of soil and placed into plastic bags with 2 to 4¼” holes for ventilation. The 5- or 10-pound bag size is usually most convenient for the average family. Vegetables in plastic bags do not wilt nearly so rapidly as those stored openly in the refrigerator.

**Outdoor sheds.** Sheds, breezeways, enclosed porches, and garages can be used to store insulated containers. An insulated container stored in an unheated area should have 6-8” of insulation on the bottom, sides, and top with 2-3” between layers of produce. Additional blankets or other coverings may be necessary depending on how cold the outside temperature reaches. *Remember that produce must not be allowed to freeze!*

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References:

- Fact sheet, *Storage of Home Grown Vegetables* by F.M.R. Isenberg, Cornell University Department of Vegetable Crops, Master Gardener Reference, and
- Bulletin 7, from Northeast Regional Agricultural Engineering Service (NRAES-7), *Home Storage of Fruits and Vegetables*, by MacKay, Susan, 1984.

**Basement storage room.** Modern basements with furnaces are generally at least 50-60 degrees F. and dry. While this is appropriate for some types of food storage, in order to achieve the cool, moist conditions necessary for most fruit and vegetables it may be necessary to construct a separate room. This separate storage area should be located in the coldest part of the basement, away from the furnace. The north and the east sides of the house are preferred. Avoid heat ducts and hot water pipes that generate heat. The room should have an outside window for ventilation.

While the exterior walls do not need to be insulated, the inside partitions should have 3½” thick fiberglass insulation. Faced insulation should have the vapor barrier closest to the warm side of the storage. If unfaced insulation is used, a vapor barrier such as 6-mil thick polyethylene can be used. The ceiling also requires insulation and a vapor barrier. Temperature can be controlled in this storage room by opening and closing the outside window. Humidity can be kept high by pouring water on the floor or by keeping wet burlap sacks or some similar material in the room.