Storing Fresh Fruit and Vegetables
by Anton S. Horn and Esther H. Wilson

Many fruits and vegetables can be stored fresh. But the home gardener must gather them at proper maturity and observe correct temperature, humidity, ventilation, and cleanliness rules.

Basements or outdoor cellars can serve as temporary storage for some produce. A cellar mostly below ground is best for root vegetables. It can be run into a bank and covered with 2½ feet or more of soil. Sometimes outdoor root cellars are made with a door at each end. Combining the outdoor storage cellar with a storm shelter in the event of tornadoes or other needs may be a satisfactory solution.

Modern basements are generally too dry and warm for cool moist storage. However, a suitable storage room may be built by insulating walls and ceiling and ventilating through a basement window. You may ventilate by extending a ventilating flue from half of the window down almost to the floor. Cover the other half of the window with wood and the outside openings of the ventilator with a wire screen for protection against animals and insects.

Keep the room cool by opening the ventilators on cool nights and closing them on warm days. If properly cooled, the room temperature can be controlled between 32° and 40°F during winter. To maintain the humidity, sprinkle water on the floor when produce begins to wilt. A slatted floor and slatted shelves will provide floor drainage and ventilation. A reliable thermometer is needed for operation of any home storage room.

A cool corner in the basement, a back room of a small house with no basement, or a trailer may be suitable. One lady we know uses part of a closet built into the outside corner of a bedroom. It is also possible to adapt storage sheds in carports by insulating and proceeding as outlined earlier.

Pits and trenches or mounds may be used for storage if a root cellar is not available or basement storage is impractical. Also, you may bury a barrel, drainage tile, or galvanized garbage can upright, with four inches of the top protruding above ground level. This will keep potatoes, beets, carrots, turnips, and apples through winter. For convenience, place the produce in sacks or perforated polyethylene bags of a size to hold enough for a few days. Then you can easily take out fruits and vegetables as needed.

Place the barrel on a well drained site, and make a ditch so surface water will be diverted and not run into the container. A garbage can has a good lid, but for a drainage tile or barrel a wooden lid may have to be built. The lid should be covered with straw, and a waterproof cover of canvas or plastic placed over the straw.

Requirements of fruits and vegetables differ. Controlled cold storage or refrigerated storage are best.

Good references are Storing Vegetables and Fruits in Basements, Cellars, Outbuildings, and Pits, USDA Home and Garden Bulletin No. 119, and bulletins on this subject prepared by your State Extension service. Your county Extension office may have the bulletins. This office may also be able to tell you how to obtain plans for a fruit and vegetable storage room, or a storm and storage cellar.
Brief notes on specific storage problems follow:

With proper care, hard-rind varieties of winter pumpkins and squash will keep for several months. Harvest before frost, and leave on a piece of stem when you cut them from the plants.

Store only well-matured fruits that are free of insect damage and mechanical injuries.

Pumpkins and squash for long-term storage keep better when cured for 10 days at 80° to 85° F. If these temperatures are impractical, put the pumpkins and squash near your furnace to cure them. Curing hardens the rinds and heals surface cuts. Bruised areas and pickleworm injuries, however, cannot be healed.

After curing pumpkins and squash, store them in a dry place at 55° to 60° F. If stored at 50° or below, pumpkins and squash are subject to damage by chilling. At temperatures above 60°, they gradually lose moisture and become stringy.

Acorn squash keep well in a dry place at 45° to 50° F for 35 to 40 days. Do not cure acorn squash before storing them. They turn orange, lose moisture, and become stringy if cured for 10 days at 80° to 85° or if stored at 55° or above for more than 6 to 8 weeks.

A dark green rind at harvest indicates succulence and good quality.

Do not store pumpkins and squash in outdoor cellars or pits.

Parsnips, Salsify, Horseradish can be left undug (stored) in the ground.

These vegetables withstand freezing, but alternate freezing and thawing damages them. If you store them in the ground, mulch lightly at the end of the growing season. Keep them covered until outdoor temperatures are consistently low. Then remove the mulch to permit thorough freezing. After they have frozen, mulch deep enough to keep them frozen.

Root Crops

Root crops such as beets, carrots, celeriac, kohlrabi, rutabagas, turnips, and winter radishes should not be put in storage until late fall. Root crops keep best between 32° and 40° F. They require high humidity to prevent shriveling. Continued storage at 45° causes them to sprout new tops and become woody.

Large and overmature root crops may become tough and stringy in storage. Small and immature root crops probably will shrivel.

Dig root crops when the soil is dry and the temperature consistently low. Prepare them immediately for storage. Cut the plant tops about a half inch above the crown. Beets will bleed unless 2 to 3 inches of the top is left. You may wash the roots if you let them dry again before storing. Do not expose them to drying winds, and be sure they are cool when put in storage.

Prevent bitterness in carrots by storing them away from fruits such as apples, which give off volatile gases while ripening.

Turnips and rutabagas give off odors, so don’t store them in your basement. Find a separate spot, or store them with other root crops and vegetables in an outdoor cellar or pit.

Some fruits and vegetables can be stored outdoors in a partially buried galvanized garbage can or wooden barrel.
Turnips may be left in the garden longer than most other crops. They withstand hard frosts, but are damaged by alternate freezing and thawing. All other root crops can be stored together in your basement storage room.

Root crops keep their crispness longer when bedded in layers of moist sand, peat, or sphagnum moss. However, perforated polyethylene bags and box liners are easier to use than bedding. Root crops can be stored in crates or boxes in moist air, but they gradually lose moisture and quality unless polyethylene liners are used. Carrots and beets may be stored in 10-gallon crocks or any container that will prevent excessive shriveling.

Quick dipping of dried and trimmed turnips, rutabagas, or parsnips in wax will prevent shriveling. Float a layer of jelly-type paraffin on top of a kettleful of heated water which is deep enough to cover the vegetable. Dip room temperature vegetables quickly through the layer of wax.

For a thinner, harder wax film add a little salt and 10 to 20 percent clean beeswax.

Potatoes are the principal root crops you will probably store. Potatoes are eaten from the time they are of sufficient size for early use until storage time, and during storage when the vines have fully ripened.

If potatoes are harvested before maturity the skin may flake off easily. They are all right for immediate use, but not for storage. Immature potatoes shrink badly, bruise easily, and will not keep well very long.

For storage, potatoes should be allowed to mature and develop a thick skin. When the tops lie down the tubers should be mature enough for storage.

Dig potatoes carefully to avoid bruises, for better storage life.

Handle newly dug potatoes with care until the surface has dried or cured a few hours or more. You can keep them in baskets or slatted crates in single layers at first.

Store sound mature tubers in darkness at a minimum relative humidity of 95 percent and 45° to 48° F for highest quality. For very long storage keep at a temperature of 38° to 40° to prevent sprouting. The starch changes to sugar if potatoes are held below 45°. Potatoes may not show any external effect from exposure to these lower temperatures, but sometimes darkened tissue will be seen if the potato is cut and exposed to air.

Light causes considerable "greening" in potatoes. The green portion contains an undesirable substance that gives a bitter flavor.

Sweet potatoes that are well matured, carefully handled, properly cured, and stored at 55° to 60° F can be kept until April or May.
Sweet potatoes are easily bruised and cut. Handle them carefully and as little as possible. Put them directly in storage containers at harvest.

Cure freshly dug sweet potatoes by holding them about 10 days under moist conditions at 80° to 85° F. In the absence of better facilities, sweet potatoes can be cured near your furnace. To maintain high humidity during curing, stack storage crates and cover them with paper or heavy cloth. If the temperature near your furnace is between 65° and 75°, the curing period should last 2 to 3 weeks. After curing, move the crates to a cooler part of your basement or house where a temperature of about 55° to 60° can be maintained.

In houses without central heating, sweet potatoes can be kept behind a cookstove or around a warm chimney. If you keep sweet potatoes this way, wrap them in fireproof paper (to slow down temperature changes) and store them in boxes or barrels.

Sweet potatoes are subject to damage by chilling. Do not store them at 50° F or below.

Outdoor pits are not recommended for storing sweet potatoes, because dampness of the pits encourages decay.

**Tomatoes**

Even though the home canner has canned plenty of tomatoes, it may be desirable to keep some of the fresh fruit. Keep tomatoes in the garden as long as possible. You can protect against early fall frosts by covering the plants with burlap or old carpets in the evening when frost is predicted. Polyethylene may also be used but injury will occur wherever it touches the plant.

In the summer, tomatoes should be harvested when fully vine-ripened for best quality. Pick when the color is a dark red in red varieties. During fall when frost is likely, mature green fruit can be picked and it will develop a red color when kept in a fairly warm place. The fruit is in the "mature-green" state if the tissues are gelatinous or sticky when the tomato is cut and the tomato interior is yellowish. Immature green tomatoes don't ripen satisfactorily.

To check your judgment, cut a tomato in half that you feel is mature green. If the pulp that fills the compartments is jelly-like, it is mature green. The seeds are dragged aside easily by the knife and not cut through. In immature green tomatoes, seeds are easily cut through and the jelly-like pulp has not yet developed. Usually you can recognize the mature green ones by their glossiness, less hairiness, and more whitish green color.

You can pick mature-green fruits and bury them in deep straw or place in a room where the temperature is 60° to 70° F. The tomatoes will ripen over a period of 3 or 4 weeks. Sunlight is not needed to ripen green-ripe tomatoes, so don't bother to put them on window sills. They ripen satisfactorily in the dark. Generally, tomatoes store best at 55° to 60° and ripen at 70° or room temperature.

You can wash the mature green fruits in a weak solution of household bleach and then wrap in paper to store and ripen.

Some people pull up the vines just before frost and hang them in the basement or garage to ripen their fruit.

**Onions**

Harvest onions for storage when the neck of the plant dries down, the tops have fallen over, and the roots are dry and have stopped growing from the stem plate. At that time the outer scales of the bulb are drying out and do not cling tightly (outer scales of yellow-skinned varieties change to a darker color).

Pull the onions by hand and lay in a windrow to cure with the tops
placed over the bulbs to prevent sun-scald. Onions may also be cured in an open shed. Remove onions with thick neck (seeders) before storage and discard all diseased bulbs.

After curing, place onions in open-slatted crates or burlap bags for further field curing or drying. Then place in storage. You may use either common storage or refrigerated storage.

Low temperatures in storage reduce shrinkage due to moisture loss and stop disease development. Keep the humidity as low as possible. Good management of ventilation is important. Ventilate storage early in the morning.

Onions held in cold storage should be placed there immediately after curing. A temperature of 32° F is ideal and will keep onions dormant and relatively free of rot. If sprouts grow it indicates too high a temperature, poor curing, or immature bulbs. If you have root growth the humidity is too high. The humidity should be 65 to 70 percent.

Do not store onions with produce that is likely to absorb the odor. Onions stand slight freezing, but do not handle or move them until they thaw. You can store onions in a dry, well ventilated attic or unheated room. Maintain as near 32° F as you can and keep as dry as possible. You can hang open-mesh bags, about half full, from overhead hooks or nails. Slatted half full crates of onions may be stacked on cross bars.

You may slow respiration by cooling fruit as rapidly as possible after picking. The sooner this is done the longer the fruit will keep.

Research indicates that when apples are stored at 30° F, about 25 percent more time is required for them to ripen than at 32°. Stored at 40°, the rate of ripening is about double that at 32°. At 60° the rate is close to three times that at 40°, and at 85° the softening and respiration rates have been found to be about double those at 60°. This emphasizes the importance of cooling quickly and keeping cold. The average freezing point of apples is about 28° or 29°.

Most apple varieties keep best at a temperature of 30° to 32° F and a relative humidity of 85 to 88 percent. However, McIntosh, Yellow Newton, and Rhode Island Greening apples do best at 35° to 38°. This prevents internal browning and brown core.

Pears can be stored ideally at 30° to 31° F. The highest freezing point for pears is about 29°. Since pears are likely to shrivel, keep the humidity at 90 percent. Most pears won't ripen satisfactorily for eating at the above temperatures. They should be taken out of storage and ripened between 65° and 70°. This is ideal for Bartletts.

Bartlett pears ripen faster than apples. If you store pears too long they will not ripen properly. Don't store Bartletts after 3 months or Anjou longer than 6 months.

Maintaining desired temperatures for home storage of apples and pears may be difficult. If you must settle for 40° F or even higher, you won't get the good results you would if you refrigerate at the optimum temperatures. Sometimes cold storage facilities are available where you may store your fruit for a set price per container.

Don't mix windfalls (fruits that have dropped to the ground) with
## Home Storage Chart

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<th>Storage period</th>
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<td>Many Years</td>
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<tr>
<td>Beets</td>
<td>Storage cellar or pit</td>
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<tr>
<td>Cabbage</td>
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<tr>
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<td>Fruit storage cellar</td>
<td>32</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

- **Fruit you pick from the tree.** Windfalls are overripe and give off ethylene gas which speeds ripening of picked fruit.
- **Desirable temperatures may be possible in refrigerator hydrator drawers for small quantities.** An extra refrigerator can be used to store fruit, but do not take the shelves out. When it is empty, for safety reasons take off the doors.

### Other Fruit

- **Storing fresh cherries, peaches, and apricots very long is difficult. Refrigerate as close to 32°F as possible.** Peaches ripen well at 65°F to 85°F and refrigerate well in hydrators for as long as 4 weeks. Peaches may be stored in walk-in refrigerators in larger quantities.
- **Grapes are generally not adapted to long storage.** Concord grapes may be stored 4 to 6 weeks at 31°C to 32°C. Catawba and Delaware varieties can be held 8 weeks. Vinifera table grapes such as Emperor and Ribier will keep 3 to 6 months at 30°C to 31°C.
- **Since apples, pears, grapes, and other fruit absorb odors from pota-**
toes, onions, and other vegetables, store them separately.

Some kitchen garden herbs, such as chives and parsley, may be potted and cared for as house plants. These plants will supply flavoring and garnishing to enhance wintertime meals.

Trying to predict exactly how long your fruits and vegetables can be stored is next to impossible. Much depends on condition of the product and how successful you are in maintaining correct temperatures and humidity. Generally, you can keep parsnips and carrots all winter, late potatoes 6 to 8 months, cabbage 3 months, onions 6 to 10 months, and pumpkins, squash, root crops, and tomatoes 3 to 6 months.

Cleanliness. One last precaution: Keep the storage areas clean and free of decaying fruit and vegetables; otherwise, molds and bacteria will spread to your sound produce.

If you store nuts (especially peanuts), soybeans, other dry beans or peas, make every effort to prevent growth of molds. Moisture, temperature, and time are necessary to promote their growth. A harmful toxin may be produced if mold growth is allowed to progress. It is important that storage areas be regularly checked so as to avoid this type of contamination.

Discard all produce that shows any sign of decay.

Insects, rats, and other pests can spread disease and are unwanted guests in any food storage area. To escape these undesirables:

—Build them out. Close all cracks and use adequate screening over all openings
—Prevent trash piles from accumulating
—Keep the storage area clean
—Control rats inside and outside. (Seek the advice of your county Extension office or a sanitarian)
—Destroy any infested food
—Remove all containers at least once a year. Wash them and air dry in the sun
—Remember that good housekeeping practices apply to all places where food is stored

For Further Reading: