Getting to the Root of Cold Storage for Winter Vegetables

by Christina Tyler Wenks, Fairfax Master Gardener

Winter food preservation techniques include freezing, canning, dehydration and cold storage. The method of choice depends on the vegetable, personal taste preferences, available time, know-how and storage space. Some veggies allow gardeners to hit the easy button and can remain in the garden until needed. Parsnips, turnips, horseradish and carrots can stay planted until the ground freezes, but they can also be stored in a root cellar, basement, outbuilding or outdoor food-storage pit.

Potato storage in root cellar

Long-term cold storage extends root crop freshness best. Potatoes, beets, turnips, rutabagas, carrots and parsnips can last three to four months or longer under ideal conditions. Non-root vegetables, such as cabbage, cauliflower, kohlrabi, winter squash, onions, garlic and mature green tomatoes may keep up to four weeks or longer.

Late-maturing crops store better. Optimal storage conditions lengthen storage time. Fruit and vegetable condition at time of storage result in longer shelf life. Temperature, humidity and ventilation are key to preventing rot, but determining the right storage space is the first essential.

Finding or creating a cold-storage site

Root cellars are nearly obsolete in many areas due to climate-controlled modern housing, but fresh fruits and vegetables can still be stored in unheated basements, cellars, outbuildings and pits until time to cook or another preservation method, such as canning, is available.

If average winter temperatures are below freezing from mid-November to mid-March, basements, cellars, out-buildings and pits that allow cold outdoor air to ventilate inside are practical for keeping stored vegetables cold, but above freezing. Unheated basements with dirt floors are ideal for humidity control and successful longer storage. An outdoor entrance or window aids ventilation.

Furnace-heated basements are too warm for long-term fruit and vegetable storage but are ideal for ripening tomatoes and short-term storage of potatoes, sweet potatoes and onions. To create storage up to three to six weeks or for ripening, partition a north or east side of a basement without heating pipes or ducts. Choose a location with at least one window for cooling, but prevent light from coming through the windows during the storage period.

Some fruits and vegetables can be stored in outdoor pits, in-ground storage including the use of drain tiles, barrels or plastic or metal garbage cans sunk into the ground. Use straw and plastic bags around produce for additional insulation.

Vegetables like cabbages can be stored in shallow, covered ground trenches that are framed with stakes, poles or wood and covered with straw. Set cabbage heads side by side, and pack soil around roots. Then, build a 2-foot-high

frame around the trench. Frames may be made of boards, poles or stakes driven into the ground. Create a soil bank around the frame and place and secure a cover of straw or hay on top.

A traditional cellar, separate from the house, is another option, if available. Heads of cabbage may also be stored on shelves in an outdoor storage cellar. Do not keep turnips or cabbage in a basement, because their odor spreads throughout the house.

A refrigerator located in a cool garage or unheated area and opened infrequently is a reliable alternative produce-preservation method.

Harvest and handling

Choose vegetable varieties that are late maturing or have good storing qualities.
Harvest as late in the season as possible before a damaging frost. Vegetables should be harvested in the morning after dew dries but before the warming sun. Brush or wash dirt off the edibles and allow them to dry well to prevent rot.

Start with fresh produce that is free from cuts, cracks, bruises or insect or mechanical injury. Damaged specimens can spoil the rest of the supply. Foods from the farmers market or grocer can also be stored.

Produce can be grouped into four groups by storage requirements – cold and very moist, cold and moist, cool and dry, and warm and dry. The chart below identifies varying storage needs.

Use containers that have smooth inner surfaces, free from protrusions such as wire staples or splinters. To increase storage quality, potatoes, sweet potatoes, winter squash, pumpkins, garlic and dry onions should be cured before storage to allow skins to toughen, cuts to seal and excess moisture to decrease.

Storage

Stored fruits and vegetables are living organisms and need specific storage conditions to maintain quality and nutritional value. Most root vegetables need a cold, moist storage area because of thin skin or leaves. Thin-skinned produce, including beets, kohlrabi, turnips, carrots, parsnips, radishes and cucumbers, should be harvested with a half-inch stem to retain moisture during storage. Packing material, such as perforated plastic bags, is helpful. Layer vegetables with materials such as moist sawdust from untreated wood, sand and peat moss.

Root vegetables need humid storage areas to prevent shriveling. Slightly damp sphagnum moss packed around roots or root veggies placed in perforated plastic bags can aid moisture retention without allowing stored edibles to retain excessive moisture that results in damage.

Although temperatures and moisture requirements are similar, vegetables and fruits should not be stored together. Ripening fruits such as apples and pears give off ethylene gas, which decreases storage life of vegetables. Potatoes sprout early when stored near some fruits.

Environment

Do not allow fruits and vegetables to freeze. The optimum storage temperature for most vegetables is between 32 and 40 degrees Fahrenheit. This temperature can be maintained by using insulation on walls and ceilings, thermostats and a heat source, if needed. A 100-watt light bulb placed near the floor can be an adequate heat source. Warmer air hovers at the top of the root cellar or storage area. Thermometers can monitor temperatures.

High humidity between 80 and 95 percent keeps vegetables from drying out. Thick-skinned cucubits, such as squashes and onions, are the exception and prefer dry storage conditions because they mold with high moisture.

Concrete or wood floors in dedicated cold-storage may require pans of water on the floor to maintain humidity. Dirt floors keep moisture constant and high during the winter. Vegetables are 90 percent water. The fuller the root cellar, the higher the humidity. A small, full root cellar will work better than a larger one.

Ventilation helps control temperature and humidity. Periodically a fan may be needed to circulate air and moisture and discourage mold. Flues or ventilation systems outdoors should be screened to thwart rodents. A storage space needs airing out when not in use.

Dehydration

An alternative to cold storage is dehydration. This is one of the oldest and easiest processes of preserving vegetables and involves removing water and moisture from the produce. This is usually accomplished by use of heat or a food dehydrator.

The concept is to remove the moisture that bacteria and molds must have to grow and cause spoiling. Preservation is also achieved by reduction of water that slows the enzymatic reactions in the produce that causes deterioration.

photo: Illinois Extension

Tabletop dehydrator

Ripe foods are preserved by one of three methods. Simply using the sun is the easiest method, although care must be taken to control insects and time. An oven can be used to easily dry the food to a satisfactory state without cooking it. The quickest way and best controlled method is to use an electric dehydrator that is built for this purpose. It allows less time and is more efficient than using an oven.

Blanching is usually recommended before the produce is dehydrated in order to halt any enzyme reactions prior to preserving. Specific instructions for safety and types of produce can be found in the dehydration resources listed below.

Root Vegetable Storage Requirements

Apples, Pears

- Cold and moist
- Do not store with vegetables
- 32 to 40 degrees Fahrenheit
- 80 to 90 percent humidity

Beans, dried; Garlic
• Cool and dry
• Home and commercially prepared foods also need a cool, dry storage place.
• 32 to 50 degrees Fahrenheit
• 60 to 70 percent humidity

Beets
• Leave 1-inch stem
• Cold and very moist
• 32 to 40 degrees Fahrenheit
• 90 to 95 percent humidity

Brussels Sprouts, Cauliflower, Celeriac, Endive (Escarole), Cabbage, Chinese Cabbage, Kale, Kohlrabi, Leeks
• Cold and very moist
• 32 to 40 degrees Fahrenheit
• 90 to 95 percent humidity

Carrots, Parsnips
• Carrot roots may be harvested when roots reach an acceptable size. Allow the remainder to increase in size without mulch. Carrots may be left in the ground throughout the winter and dug as needed or stored as a root veggie by leaving quarter-inch stems.
• 32 to 40 degrees Fahrenheit
• 90 to 95 percent humidity

Celery
• Dig with roots
• Cold and very moist
• 32 to 40 degrees Fahrenheit
• 90 to 95 percent humidity

Grapefruit, Grapes, Oranges
• Cold and moist
• Do not store with vegetables
• 32 to 40 degrees Fahrenheit
• 80 to 90 percent humidity

Horseradish, Jerusalem artichoke, Salsify, Oyster Plant
• Cold and very moist
• 32 to 40 degrees Fahrenheit
• 90 to 95 percent humidity
• May be left in the ground undisturbed until needed. Digging can be done unless the soil is frozen hard. A thick layer of mulch may extend your harvest season.

Onions
• When tops fall over and begin to dry, pull onions from the ground. When tops dry, cut tops off, 1 inch from the bulb and dry for two weeks. After curing, place onions in a dry, well-ventilated location. Mesh bags or slatted crates aid cool, dry storage.
• 32 to 35 degrees Fahrenheit ideal
• 60 to 70 percent humidity

Pumpkins
• To cure, place in a warm, ventilated location for 10 days before placing in dry storage.
• Warm and dry
• 50 to 55 degrees Fahrenheit
• 60 to 75 percent humidity

Radishes, Rutabagas, Turnips
• Cold and very moist
• 32 to 40 degrees Fahrenheit
• 90 to 95 percent humidity
• Waxing rutabagas is sometimes used to prevent shriveling but is not recommended.

Squash, winter
• Leave 2-inch stem
• Warm and dry
• 50 to 55 degrees Fahrenheit
• 60 to 75 percent humidity

Tomatoes
• Store in a single layer in covered boxes
• Warm and moist
• To keep green tomatoes from spoiling in moist storage, do not let temperatures drop below 50 degrees Fahrenheit
• 80 to 90 percent humidity

References

- Root Crops, Diane Relf and Alan McDaniel, Virginia Cooperative Extension, Publication 426-422
- Storing Vegetables and Fruits at Home, Washington State University Extension
- Vegetable Storage in Root Cellars, University of Alaska Cooperative Extension
- Home Storage of Fruits and Vegetables, Leslie Bertsch, University of Missouri Extension
- Home food preservation, Virginia Cooperative Extension
- Using Dehydration to Preserve Fruits, Vegetables, and Meats, Renee Boyer & Karleigh Huff, Virginia Cooperative Extension, 348-597