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# Vegetable Storage in Root Cellars

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In Alaska, cold winter temperatures and cold soils all year long, make root cellars a good method for storing vegetables. Root cellars offer gardeners a method for storing produce through the winter or for holding produce until there is time for canning and freezing. Consumers can also use root cellars to store produce bought in bulk from the farmers market or grocery. High quality, locally-grown vegetables can be available from the root cellar throughout the winter.

Stored fruits and vegetables are living organisms and to keep the quality and nutritional value high, certain storage conditions should be met. The best conditions for each crop will vary, but the important requirements include temperature, moisture, and ventilation. To have the best success using cold storage, select late-maturing varieties of vegetables that have been allowed to grow late into the fall and fully mature.

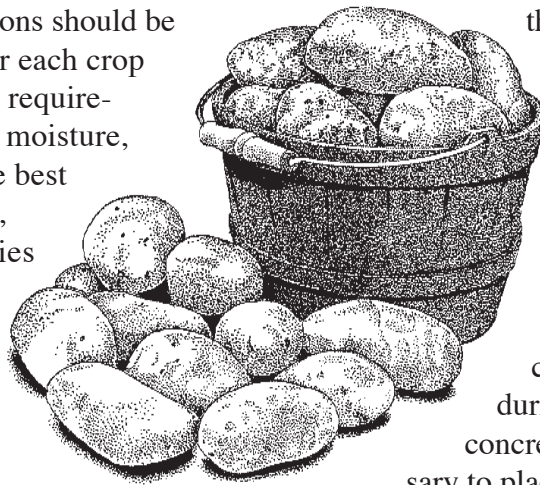
## Temperature

During the day, plants make food through photosynthesis. At night or during storage, plants respire or use the stored food to survive and keep alive. To keep produce at the highest quality, it is important to slow down the growth and respiration with cool temperatures. Respiration reduces quality and speeds up with warmer temperatures. The optimum storage temperature for most vegetables is between 32° and 40°F. This temperature can be maintained by a combination of utilizing insulation on walls

and ceilings, thermostats, and a heat source when needed. An adequate heat source can sometimes be a little as a 100 watt light bulb placed near the floor. Keep in mind that heat rises and warmer temperature will be found at the top of the root cellar. Thermometers can be positioned throughout the cellar to monitor temperatures.

## Humidity

High humidity (between 80 to 95 percent relative humidity) keeps vegetables from drying out. The exception to this rule is with cucurbits (squash family) and onions—vegetables that produce a thick wall. These vegetables prefer dry storage conditions and tend to mold when the moisture is high.



The easiest way to keep the moisture high is to have a dirt floor which helps the root cellar keep a constant moisture during the winter. If the floor is concrete or wood it may be necessary to place several pans of water on the floor. Vegetables are 90% water. The fuller the root cellar the higher the humidity. That is why a small, full root cellar will work better than a larger one.

## Ventilation

Ventilation is used to help control the temperature and humidity. Excess moisture that encourages mold, can be exhausted and the room aired out when not in use. Be sure the ventilation system is screened to keep rodents out.

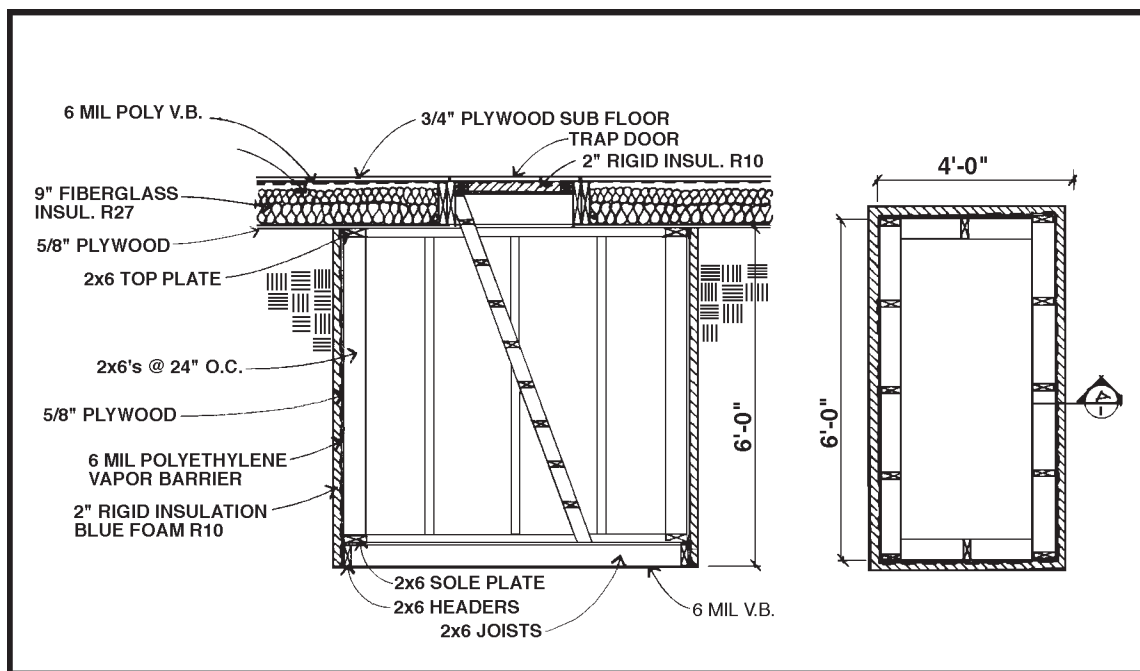


Figure 1. Example blueprint for below floor root cellar.

### Harvest and storage

Choose to grow vegetable varieties that are late maturing or have good storing qualities. Harvest as late in the season as possible before a killing or damaging frost. Vegetables should be harvested in the morning after the dew has time to dry but before the afternoon heats up the vegetables. Remove the field heat by cooling in a cold place.

Produce can be grouped according to storage requirements into four groups; cold and very moist, cold and moist, cool and dry, and warm and dry.

Most vegetables need a cold and very moist storage condition because of thin skin or leaves. Thin-skin produce including **beets, kohlrabi, turnips, carrots, parsnips, radishes, and cucumbers** are harvested leaving a  $\frac{1}{2}$  inch stem and stored to retain moisture. This can be done with packing material or perforated plastic bags. Layer vegetables in packing materials such as moist sawdust, sand, and peat moss.

Leafy vegetables such as **celery, Chinese cabbage, endive, kale, and cauliflower** should be lifted out of the garden with roots attached and replanted in moist packing material. Vegetables with strong odors such as **cabbage and turnips** are best when individually wrapped in newspaper to prevent drying out and reducing smells.

**Potatoes and tomatoes** need a cold, moist storage condition. Potatoes need to be cured in a warm environment before cold storage. Harvest potatoes late in the season and store in the dark at a warm temperature for 7 to 10 days to allow the potato to dry and develop a thick skin. Then potatoes should be moved to a cold, dark area. If potatoes are stored in crates or boxes together they will share moisture and keep each other from shriveling. Do not store potatoes above 40°F or they will begin to sprout.

Tomatoes are harvested leaving a short stem attached. Place tomatoes one layer deep in a shallow box and cover with newspaper to keep them from drying out.

**Onions**, like potatoes are cured for several weeks after harvest. This allows the skin to become papery and roots to shrivel. Onions are best stored in a cool dry location with good air circulation. Onions are often braided or put in a mesh bag and hung from the ceiling of the root cellar.

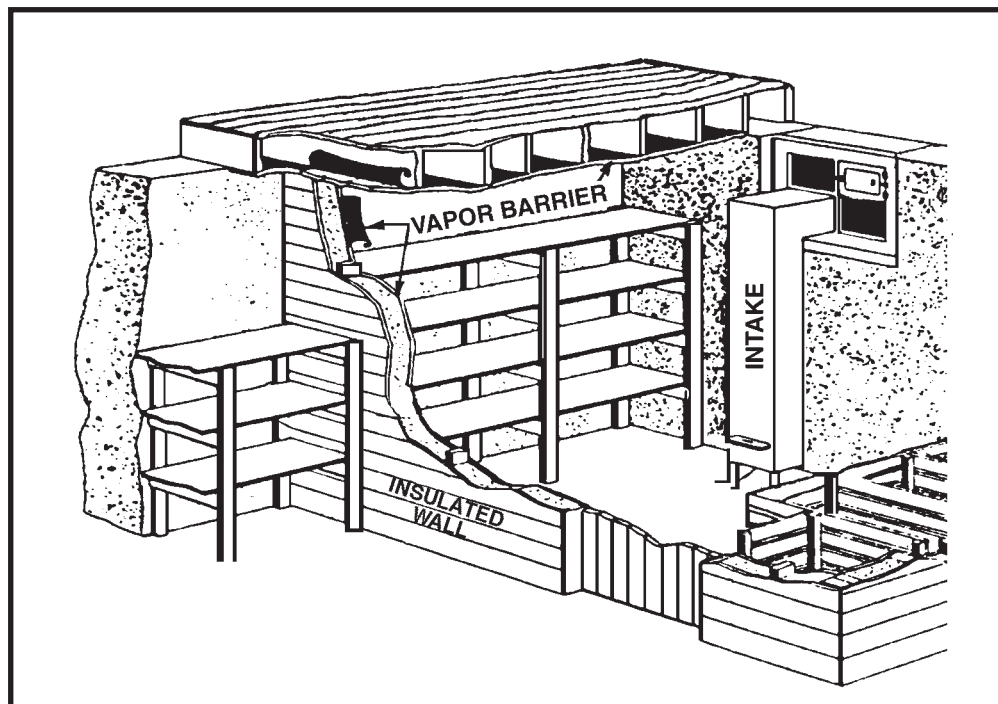
**Winter squash and pumpkins** are best stored in a dry warm spot such as the corner of a room indoors. Cut as late as possible before a frost, leaving a 2 inch long stem. The more mature, the thicker the skin and more resistant to decay and drying out the vegetables will be. If stored in a moist location, squash will quickly mold.

### **Building a root cellar**

A root cellar should be cold, dark, and damp and be in a convenient location. It is easier to control temperature and humidity in a small cellar. Most families can get by with an area 4 x 6 feet in size. The most convenient locations may be

a walled off part of a basement or garage area containing a window for ventilation. A common location in rural Alaska is in the floor of the kitchen. With an inside installation be sure to put a vapor barrier towards the inside of the root cellar protecting the rest of the house from excess moisture and rot.

In both attached and separate structures select wood designed for direct burial for the walls and floor. Check with supplier to be sure that the wood treatment is not toxic in this application. Uninsulated masonry walls will conduct the cool ground temperature into your root cellar and are very durable. Water drainage is important for keeping out surface water in the spring and during summer rains. Insulate above-ground walls to protect from cold temperatures in winter and warm temperatures in summer. Be aware that seasonal frost can extend over 4 feet deep seasonally into the soil. Keep this in mind being sure to have the insulation extend below the frost line.



*Figure 2. A well-insulated room in the basement can provide good, cool, moist storage for vegetables.*

## Storage Time and Temperature for Some Vegetables Grown in Alaska

Vegetables	Temp F.	% Humidity	Storage Time	Comments
Beets	32°	90-95	3 Months	Leave 1" stem.
Brussels Sprouts	32°	90-95	4 Weeks	Wrap to avoid drying
Cabbage	38°	90-95	4 Months	Late maturing varieties **
Carrots	32°	90-95	5 Months	Top leaving 1/4" stem *
Cauliflower	32°	85-90	3 Weeks	Wrap in leaves *
Celery	32°	90-95	4 Months	Dig with roots ***
Chinese cabbage	32°	90-95	2 Months	Dig with roots ***
Cucumbers	50°	85-90	3 Weeks	Waxed or moist packing *
Kohlrabi	38°	90-95	3 Months	Trim leaves *
Onions	32°	55-60	8 Months	Dry for two weeks.
Parsnip	32°	90-95	6 Months	Top leaving 1/4" stem *
Potatoes	38°	85-90	8 Months	Pack in boxes unwashed.
Squash	60°	55-60	3 Months	Winter types, leave 2" stem
Tomatoes	60°	55-60	8 Weeks	Single layer in covered boxes
Turnips	38°	90-95	3 Months	Waxed or moist packing *
Small Fruits	32°	85-90	7 Days	

\* **Pack in moistened sawdust or sand.**

\*\* **Wrap in clean newspaper.**

\*\*\* **Replant in moist sand.**

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