

# Root Cellaring and Food Storage in Vermont: Why and How to Do it.

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## WHY STORE FOOD?

If you are not already convinced that food storage is a good idea, you are invited to consider the following. Over the last half century it has become easy to have inexpensive food anytime we want it. This has been made possible by cheap energy, agribusiness, transportation over long distances, and modern inventions such as refrigerators and freezers. We've become used to having all the food we want, whether in season or not, at an increasingly low cost relative to income. This situation may be changing quite soon as we begin to feel the twin impacts of peak oil and climate change. Food prices have increased significantly with the price of oil. The localvore movement has taken off as concerns grow about the safety, quality, and freshness of food and the cost of transporting it long distances. Consider the following reasons for growing and storing your own food:

- It's satisfying and there is inherent joy in doing it.
- Eating more fresh, nutritious vegetables when they are readily available in your root cellar is good for your health.
- It increases our security and community resilience and decreases our vulnerability to distant food suppliers, especially when emergencies such as blackouts, droughts and floods and economic hard times occur.
- If present trends of energy prices and a volatile worldwide economy continue, growing and storing our food might become the only affordable option.

It's becoming clearer by the day that shipping carrots from California or apples from New Zealand to Vermont is not sustainable. Below is a brief introduction to some of the skills involved in learning the art of long-term food storage. By practicing these skills in both our homesteads and communities we can begin to create a more secure and sustainable food system, and have a lot of fun in the process.

## VARIOUS WAYS TO STORE FOOD

Most of us have refrigerators in our homes or apartments. Many of us have freezers for keeping berries, peppers and spinach. Some of us do a bit of canning and preserving – tomatoes, applesauce, jams and pickles. A few of us may do a bit of drying – apples and mushrooms. And even fewer try our hand at sauerkraut and kimchi or dry beans and grains. Another way of storing food that is both simple and inexpensive in time and money, and which is also very versatile, is root cellaring – the main subject of this article.

## ROOT CELLARING

Root cellaring is just what the word implies, putting roots (and other vegetables and fruits) into the cellar. But there is more to root cellaring than just throwing a bunch of root vegetables into the basement and hoping for the best. Better results are obtained when attention is given to some details. The critical details lie in what can be called "The Heart of the Art." Root cellaring is an art with nuances dependent on each particular situation. Three conditions are of critical importance in root cellaring. How well you pay attention to them will determine

the degree of your success. These are temperature, humidity and ventilation.

**Temperature** – Most root vegetables store best when the temperature is very near to freezing but not quite. Getting them cool or cold very soon after harvesting is key. The root cellar must be cooled down in the fall as soon as the night air starts to become cooler than the temperature of the earth. This is done by letting cold night air flow into the root cellar through a window or vent and shutting out the warmer air during the day. In winter, keeping the right temperature may mean adding some heat to the root cellar.

**Ventilation** – With natural, convective circulation through windows or with forced air through pipe penetrations through an outside wall, cool or warm air is brought into the root cellar as needed to keep the right temperature. With a 4- or 6-inch diameter pipe extending from the ceiling to the floor, cold air can be introduced at the lowest level. Warm air should exit from a place near the ceiling, because warm air rises as it is forced up by denser, heavier cold air. Depending on the weather conditions, windows are either opened or closed and fans in pipes are turned on or off. Since warm air is moister and cold air is dryer, humidity in the root cellar will be affected.

**Humidity** – To keep root vegetables until spring, it is critical to keep air in the root cellar moist. Usually a dirt or gravel floor accomplishes this, allowing moisture from the earth up into the cellar. If the floor is concrete, humidity can be maintained by misting the air periodically or by watering the concrete floor. Humidity can also be “locally controlled” for root vegetables by storing them layered between moist (but not wet) sawdust or sand in buckets. It is quite helpful to have a thermometer and a humidity sensor in the root cellar to monitor temperature and humidity. By continually checking and “tending” your stored crops, you soon learn what does and does not work.

Knowing and applying these factors of temperature, ventilation and humidity is the heart of the art of root cellaring.

The size of root your cellar depends on how much and what you will store. But for the average household, about 80 to 100 square feet is usually adequate to accommodate the vegetables from an average homestead garden of a quarter of an acre (100 by 110 feet). Designs and arrangements can be found for such arrangement and the “standard” basement root cellar in the references listed at the end of this article.

### VARIOUS ROOT CELLAR ADAPTATIONS

It’s easiest to build the root cellar as one constructs a house. All the needed features – location, size, dirt or gravel floor, ventilation, insulation, and access – can be designed right into the plans. Ideally a root cellar should be located on the north side of the cellar and where the earth is deep against the root cellar walls. Many of the homes we live in were built without food storage in mind. Yet in most situations something can be done to create adequate conditions to store root crops, fruits, onions and garlic, winter squash, and canned goods. Modifications can be made to a cellar, basement, mud room, or closet to create the right conditions of temperature, humidity and ventilation. In a heated basement this often means creating a separate insulated room with its own ventilation. For onions and garlic, which require dryer conditions, this could mean insulating an unheated space like a mudroom or closet that stays cold (but not freezing) and dry. For winter squash, it might mean building shelves in a spare, unheated room that stays between 50 and 60 degrees. Experiment with a thermometer and humidity sensor to find the best possibilities. One might need to consult a carpenter, electrician and/or plumber for construction.

If a root cellar is really not possible in one’s home, a separate hillside root cellar might be

possible. Though not as convenient, barrels or trenches in the ground covered with mulch or straw have also been used successfully. Sometimes conditions will not allow, or it will be too complicated or expensive to create a root cellar at your homestead. In this case it's worth exploring the possibility of working with neighbors to build and maintain a root cellar/food storage system in common.



Photo Credit: Ben Falk

Cabbages, leeks, and other stored goods  
in Richard's root cellar

### IDEAL STORAGE CONDITIONS FOR VARIOUS VEGETABLES AND FRUITS

Various fruits and vegetables require different temperatures and humidity for best long-term storage.

- Root vegetables such as carrots, beets, turnips (placed in five gallon buckets between layers of slightly damp sawdust) and potatoes (in sacks or boxes) store best at humid (90-95%), cold (near freezing) conditions. Remember that potatoes must be kept in the dark or else they will become green. These will keep from 3 to 9 months, and often until the new crop comes in.

- Onions and garlic like cold and dry (55-60% humidity) conditions and will keep from 3 to 7 months.

- Cabbage, celery and leeks do best in cold, humid (90-95%) conditions and will also keep for months.

- Apples should also be kept cold (near 32F) and humid (90%). And, because they exude gases that affect vegetables, they should be kept separate, layered with newspapers in boxes that are relatively tight to keep gases from escaping freely.

- Squash and pumpkins do best at around 55 degrees F. and in slightly dry (70-75% humidity) conditions. A cool spot in your house such as an entryway or attic or cold pantry, where the temperature does not fluctuate widely, may be ideal for keeping squash.

### VEGETABLE VARIETIES THAT GROW AND STORE WELL IN VERMONT

Listed below are the vegetable varieties that have stored well in my root cellar over the past 30 years. Experiment to find out what varieties grow and store best for you.

Beets – Detroit Dark Red, Lutz Green Leaf

Carrots – Scarlet Nantes, Red Cored Chantenay, Danvers

Onions – Copra, Stuttgart (sets), Bernie's Red, New York Early

Leeks – Lincoln

Garlic – Russian Red (hard neck), German White (soft neck)

Turnips – Gilfeather

Cabbage – Danish Ballhead, Ruby Perfection

Parsnip – Harris

Potatoes – Red Norland, Idaho Russet, Yellow Finn, Green Mountain

Apples – Prairie Spy, Liberty, Northwest Greening (all late season types)

### **WAYS TO EXTEND FOOD STORAGE BEYOND THE ROOT CELLAR**

There are ways to complement root cellaring for food storage by utilizing an unheated greenhouse, various parts of your house, and even the garden itself.

An unheated greenhouse, (especially if it is connected to your basement which provides a thermal mass), can extend the fresh produce season by as much as two months or more on both ends of the growing season. Before the first frost kills sensitive vegetables such as peppers, transplant them into the greenhouse. Be sure to carefully dig them up with a root ball. The peppers will not grow, but they will be kept in “suspended animation” well into December.

Likewise, lettuce can be transplanted into the greenhouse when the weather gets frosty outside and it will produce into November. If covered to prevent serious freezing during the deep winter, these lettuce plants will begin to grow again in March. Parsley, chard and kale can be handled in similar way.

As the weather gets colder and serious freezing occurs in the unheated greenhouse, cabbages and leeks should be transferred to the warmer root cellar. By this time you should have eaten all the peppers!

The garden itself can be used for storage. Carrots and beets can be left in the ground. If covered with heavy mulch or straw before or just as the ground begins to freeze, these root crops will keep well into spring, and can be dug throughout the winter. Of course you must protect them from deer and rodents or they will be gone before the snow flies!

Growing grain and beans for drying is another excellent way to store food and have it on hand for the very long term. Growing, threshing and winnowing grain is a bit difficult without a threshing machine, but it can be done with a flail as our grandparents did. Dried beans, however, are much easier to thresh and winnow. Children can be involved, making for good family fun as well as teaching them how one small part of the earth works and developing their skills for use in the future.

The sprouting jar is good way to extend the salad season. Alfalfa, radish, beans and other seeds can be sprouted in few days. These, combined with sliced cabbage, carrots and apples from the root cellar, make delicious salads.

Nut trees, berry bushes and fruit trees might also fit into your homestead permaculture landscape. Black walnuts, butternuts and hazelnuts grow well in Vermont and store for years in a cool dry attic. Strawberries, blackberries, raspberries and blueberries are all proven producers in our northern climate and can be turned into jams or dried.



Richard stores carrots in sawdust

Photo Credit: Ben Falk

## LEARNING BY EXPERIENCE & CURIOSITY

Now that you have an idea about the possibilities of storing food and some of the requirements for doing so, the rest is up to you. The references below will help considerably to fill in the details. Root cellaring and other food storage methods are best learned by trial and error. By experimenting and becoming aware of how different vegetables and fruits respond to variations of temperature, humidity and ventilation in the different environments of your home situation, you can acquire a natural sense of the art of food storage.

As a final note, it is good practice to check the status of the fruits and vegetables in your root cellar and storage rooms often during the winter to remove and salvage (by having them for dinner) the ones that are beginning to go by. You can dry the apples that are shriveling or have a bit of rot and enjoy them later as a snack while hiking in the summer or on your breakfast cereal. Or if you have too much for yourself, pass on what might otherwise go by to your neighbors or to the Food Shelf.

## REFERENCES

*Root Cellaring, Natural Cold Storage of Fruits and Vegetables*, Mike and Nancy Bubel, Storey Publishing, 1991 (1979).

- An excellent basic reference that covers what to plant that stores well, harvesting, and what conditions are needed for various fruits and vegetables to keep well. It even has recipes for turning your root cellar veggies into tasty meals.

*Stocking Up, How to Preserve the Foods You Grow Naturally*, Editors of Organic Gardening and Farming, Rodale Press, 1977.

- This book covers the gamut of food storage including dairy products, meat and fish, and nuts, seeds and grains besides root cellaring.

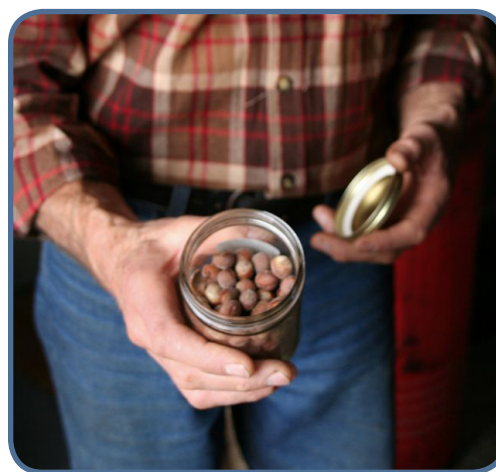
*Putting Food By*, Ruth Hertzberg, Beatrice Vaughan and Janet Greene, 1976 (1973), Bantam, Chapter 6, Root Cellaring.

- Very simply and concisely, Chapter 6 describes the various types of root cellars – classical packed earth floor, modern basement, bulkhead stairs, dry shed, attic and outdoor methods. It also gives the conditions (temperature and humidity) for best storage of apples and various vegetables. Other chapters on canning, drying, sprouting and other means of putting food by are very thoroughly described. An excellent overall reference.

*The Home Vegetable Garden*, The Extension Service – University of Vermont, Circular 138, April 1969.

- A basic reference for the Vermont vegetable garden and how much to plant of each variety for a family.

Online, Search/Google “Extension – Root Cellaring” and several University Extension service bulletins dealing with root cellaring will come up which are very informative.



Hazelbert nuts

Photo Credit: Ben Falk

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