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Moore, J. G. (James Garfield) 1881-
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EXTENSION SERVICE OF THE COLLEGE OF AGRICULTURE
THE UNIVERSITY OF WISCONSIN

How to Store Vegetables for Winter Use

J. G. MOORE



CELLAR STORAGE OF CELERY

Keep the soil moist, the tops dry and the temperature low.

tables is preserved by storing than by any other method.

This fall, more than ever before, it will be to the advantage not only of each family, but to the state and nation as well, if everyone who has a garden will store well the vegetables grown for winter use which are suitable for storage.

In many instances storing will be the best way of preserving vegetables for this winter's use. Prices are almost certain to be high, and storing is cheaper, requires less work, and with many crops, the product is better than if canned or dried. More of the characteristic flavor of vege-

WHERE TO STORE

The places in which the home gardener may store his crops successfully are house-cellars, outside cellars, or caves and pits. All of these are not equally well adapted for storing all kinds of vegetables, but for a majority of kinds will answer the purpose very well. Where more than one type of storage is available greater success will be had if in selecting the storage, the storage requirements of the vegetable and the time it is desired for use are taken into consideration.

STORING IN THE HOUSE-CELLAR.

The house-cellar is by far the most frequently used storage place of vegetables grown in Wisconsin gardens. If it does not contain a furnace and the temperature does not fall below the freezing point, there will be little difficulty in keeping the vegetables well into the following spring. If, however, there is a furnace in the cellar, then the difficulties of successful storage are greatly increased. In such cellars a small portion, preferably well removed from the furnace, should be partitioned off. The storage room should possess at least one window which will make temperature control easier. The tighter the partition fits, the better. As the storage room probably will be quite permanent, it is advisable to exercise considerable care in constructing the partition. An insulated wall or a double wall with a dead air space between is to be preferred. A heavy cement wall is satisfactory. A single board wall is not to be recommended, but a storage room with such a wall gives better results than storing in the same room with the furnace. The storage room should preferably have a dirt floor. Proper storage of vegetables requires a certain amount but not too much moisture. A cement floor is too dry.

OUTSIDE CELLARS OR CAVES

Outdoor cellars are usually preferable to house-cellars, providing they are so constructed as to prevent freezing of the vegetables and are so located and built as to be of easy access during the winter. Some gardeners have an entrance to their outside cellars through the house cellar. This overcomes the most objectionable feature of the outside cellar,—gaining access to the cellar during bad weather. The outside cellar eliminates any unpleasant odors indoors due to decaying vegetables.

REQUIREMENTS OF SUCCESSFUL STORAGE

The three chief essentials of successful storage are—sound vegetables, proper temperature, proper moisture. With certain vegetables maturity and ventilation are also of prime importance. Many people overlook the first of these storage requirements. Careful selection should be made of all vege-

tables to be stored. Soundness should include freedom from disease conditions likely to cause rot, and from mechanical or insect injury which provides an entrance for rot organisms or favorable conditions for their development. It is not the loss of the affected vegetable which is so important, but the fact that decay once started may destroy a considerable portion of the stored crop. The importance of soundness, however, does not stop with the selection of sound specimens. It includes

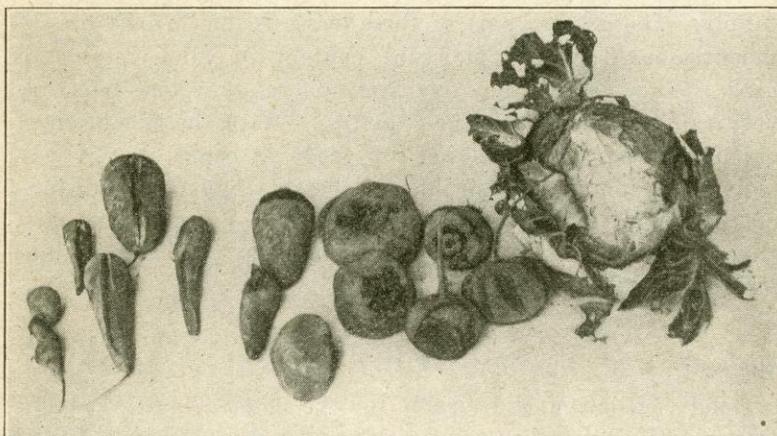


Fig. 2.—DON'T STORE THIS KIND
Injured vegetables do not keep well in storage.

careful handling during the storing process. All of us handle fruits which are to be stored with the utmost care, but practically disregard the bruising of vegetables. While the results are not so marked in the case of vegetables, often much of the loss in storage may be traced directly to rough handling.

STORAGE TEMPERATURES FOR VEGETABLES

The best temperature for storing vegetables may vary considerably for different kinds. There are two fairly well defined limits for most vegetables. The temperature should not be so low that the vegetables freeze. It should not be so high as to encourage premature growth. High storage temperature is also more favorable to the development of most rot organisms, therefore with most vegetables the desired temperature is one close to the freezing point. Some vegetables, as cabbage, will stand slight freezing without injury, but it is usually safest

to maintain the temperature of the storage room at not less than 31 or 32 degrees Fahrenheit. Vegetables will keep well at somewhat higher temperatures, 34 to 36 degrees, but only in the case of squash and pumpkin is a relatively high temperature to be preferred.

SUPPLY SUFFICIENT MOISTURE

Large losses occur in storage because of improper moisture supply. The greater part of these losses is due to lack of sufficient moisture. The moisture content of all vegetables is high. When placed in a dry atmosphere, they lose moisture very rapidly and with it their quality. With the exception of onions, squash, pumpkins and dry seeds, as beans, a relatively moist atmosphere is desirable. Excessive moisture is injurious, as it furnishes favorable conditions for rots. The aim, therefore, with most vegetables, is to keep the surroundings sufficiently moist to prevent wilting.

SOME OTHER REQUIREMENTS

Good ventilation is desirable for the best storage. It helps to regulate temperature and moisture, removes foul odors and may help to prevent decay.

Proper maturity influences storage. With some crops full maturity is necessary, with others slightly immature specimens store best while with some the stage of maturity makes little or no difference.

Cabbage—The Holland or Danish Ballhead type is best for storage, although Succession, Sure Head, Flat Dutch, and other varieties of the mid-season type store fairly well. The essentials of satisfactory storage are low temperature, moist atmosphere, no hard freezing, absence of excessive moisture, and good ventilation.

For cellar storage the stems and outer leaves are removed and the heads wrapped in several thicknesses of newspaper or in heavy paper. Occasionally it is stored in boxes and covered with sand. When stored by this method, it is particularly desirable to keep the temperature near the freezing point to prevent premature growth. Some store by suspending the plants by the roots from the ceiling.

Several somewhat different pit or trench methods are em-

ployed. A common one is to use a trench six to eight inches deep, wide enough to accommodate three heads and sufficiently long to hold the amount to be stored. The trench may be lined as for storing other vegetables. Only the outer leaves of the cabbage are removed and the roots are left intact. Place them head down in the trench and bring the roots together. Straw or litter may be used to cover the heads with a shallow layer of earth put over it. As colder weather approaches increase the earth covering. It is not necessary to cover deep enough to prevent freezing as slight freezing does not injure cabbage stored in this way. The trench method permits of removing the heads as they are needed without disturbing many of those to be left.

Pit storage is essentially the same, except the pit is usually round and somewhat deeper. In some cases in pit storage, a portion of the stems and the roots are removed. Cabbage is sometimes stored in trenches with the roots down, but under Wisconsin conditions this method is probably not as satisfactory as the one outlined above.

Celery—Many home gardeners have difficulty in storing celery. This is usually due to the fact that the crop is stored before it is possible to maintain the proper temperature in the storage or because the plants have been subjected to too severe freezing before harvesting. It is rather exacting as regards storage conditions and care must be exercised to meet as fully as possible its requirements.

Celery to be stored in the cellar should be kept in the garden as late as possible without severe freezing. Protection should be given to prevent frost injury so as to retard the bringing in of the crop. This may be done by banking the plants with earth to within two or three inches of the tops. On cold nights the tops should be protected with mats, blankets or similar devices. The danger of harvesting and storing celery as soon as the first hard frosts come is that comparatively warm weather is likely to follow, the temperature of the storage runs too high and the stalks decay. When steady cool weather comes, the plants may be harvested. Harvest when the plants are dry. Handle carefully so as not to bruise the stalks. Preserve a goodly part of the root system and leave as much soil adhering to it as convenient. Set the plants together closely on a two or three inch layer of sand or light soil and cover them with soil. Protect the outside plants with boards.

The temperature must be kept low, the top of the plants dry, the storage well ventilated and the soil on the roots sufficiently moist to prevent wilting. It is advisable to provide some method of efficiently applying water to the layer of soil without getting the leaves of the plants wet. Drain tile placed at intervals among the plants or a simple system of sub-irrigation will be useful in maintaining the proper soil moisture conditions. Celery stored by this method will usually make some growth, and if green varieties are grown, blanching will take place in storage.

Celery may also be stored out of doors. The trenching method is probably best adapted to Wisconsin conditions. During the early fall the plants are handled as for cellar storage. When danger of freezing occurs, the crop is harvested and placed in trenches. The plants are practically transplanted close together in a trench. Trenches may be shallow or as deep or deeper than the length of the plants. In shallow trenching boards are placed along the outer plants and then banked with earth. This is continued to the top of the plants and the top covered with boards. Straw, leaves or other litter is placed over the boards until the weather is severe enough to make permanent covering necessary, when enough additional banking and covering is put on to prevent freezing of the plants. In deep trenching no banking is necessary. It is more difficult, however, to put in the last plants unless the trench is somewhat longer than needed for storing the crop. It is advisable to water the soil in the bottom of the trench before putting in the plants. The chief disadvantage of this method is the difficulty of getting the celery for midwinter use.

Onions—The essentials of successful onion storage are fully matured, well-cured bulbs; dry atmosphere; good ventilation, and a relatively low temperature. Onions will stand some freezing if they are not handled while frozen, but it is better to keep the temperature somewhat above the freezing point.

Onions to be stored are commonly harvested in August and September. When the tops are dead and shriveled and the outer skins of the bulb dry, the onion is ready to harvest. Harvesting may be hastened somewhat by breaking over the tops. On large areas it is accomplished by running a barrel or light roller over them. The tops may be broken over when they begin to turn yellow.

The bulbs are pulled, thrown into windrows, and allowed to cure for a few days. They should be stirred occasionally exercising care not to bruise them. As soon as well dried, so that the tops rattle when the bulbs are handled, they should be taken inside. If the weather is unfavorable during the harvesting period, onions may be cured in a well-ventilated room, having a dry atmosphere. Curing indoors requires a much longer period than outdoor curing under ordinary conditions.

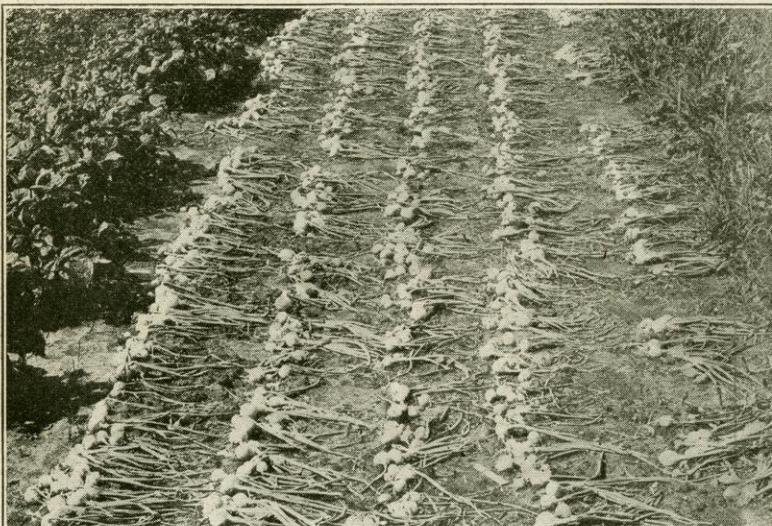


Fig. 3.—CURING ONIONS
Onions stored without curing are likely to decay.

After the bulbs have been thoroughly cured, the tops should be twisted or cut off not closer than one inch from the bulb. Too close topping results in premature sprouting.

At this time discard for storage purposes all bulbs which are soft or which have thick "necks" as they will not store well.

Onions are commonly stored in crates or bags, as they permit better circulation of air and there is less danger from moisture accumulation.

Potatoes—Mature, disease-free tubers; moist atmosphere; freedom from frost and a low temperature insure successful potato storage. Care should be exercised in storing to discard any potatoes which have been frosted in the field. Any of the types of storage previously discussed are suitable for potato storage providing the above conditions are maintained.

Root Crops—Beets, carrots, rutabagas, turnips and winter radishes demand about the same storage conditions. The leaves of root crops should be removed before storage. Do not top so close as to break the skin of the vegetable. Temperatures near the freezing point and relatively large amounts of moisture are necessary. These crops probably suffer more from insufficient moisture in storage than most other crops. Loss of moisture means lost quality and texture and a practically worthless product. If stored in a cellar, packing in sand in boxes or placing in piles and covering with sand will help overcome the difficulty. The sand should be moistened from time to time. Do not get it too wet. Just sufficiently moist to prevent wilting is the desired condition which can be readily determined by examining the vegetables occasionally. In cellars with earth floors the moisture may be supplied by applying to the floor. In cellars with cement floors, some keep the atmosphere sufficiently moist by placing water in tubs or putting it on the floor. A large evaporation surface is best when these methods are used. These vegetables may also be stored in pits, but must be covered sufficiently to prevent freezing.

Salsify (vegetable oyster or oyster plant) and parsnips may be stored as other root crops. They are not injured by being frozen and therefore need less attention as regards too low temperatures. It is advisable to leave at least a portion of these crops in the garden for early spring use. They are even better in the spring than when harvested in the fall. There is quite a common belief that parsnips left in the ground over winter develop poisonous properties. Such is not the case, however. Parsnips so handled may be used without any ill effects until they become too woody to be edible.

Squash and Pumpkins—These vegetables more than any other demand full maturity for successful storage. Harvest before they are exposed to severe frosts, being sure to leave a short stem. Store in a fairly dry room having a temperature of about 50 degrees. The conditions adapted to the storage of other vegetables are not satisfactory for the squash and pumpkin, making the use of a separate storage room highly desirable.