

POTATO STORAGE MANAGEMENT

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The factors involved in potato storage management are given adequately in Idaho Agricultural Extension Service Bulletin No. 436, which was put out in January 1965 and a second print of this was put out in January, 1966. This bulletin shows the management practices which should be followed before harvest, during harvest and after harvest. It also gives the temperature and humidity recommendations for the best wound healing and storage results with the least amount of storage loss.

Actually, it can be said that potato storage management begins when the field in which the potatoes are to be planted is worked in the spring and during the summer. As it was pointed out in the previous article, the number of injuries caused during the harvesting and handling operations have a tremendous effect upon the storageability of the potato tubers, and as pointed out previously, uninjured tubers store well without much trouble or attention; whereas, injured tubers require special attention!

Before the harvest is begun, the cellar should be cleaned thoroughly and disinfected. In most cases, old rotten tubers have been left in the storage from year to year and provide inoculum for the rotting of tubers which are brought in each fall. In order to avoid this, all old tubers and the debris should be cleaned out of the cellar and the cellar disinfected with one of the various disinfectants, one of the best is copper sulfate. Even though it is very corrosive, it does have a residual effect and will remain on top of the soil and help counteract any rot which might be carried on the soil.

The next very important thing should be to wet down the floor and this means -- not to merely sprinkle it -- but in many cases it would be of great value to run irrigation water in so that at least two or three inches of water is standing in the cellar. This is to insure that the dry soil will be completely saturated with moisture. This wetting down operation will have to take place long enough or far enough ahead of the harvest operation so at the time of storage the soil will be moist but not muddy.

One of the greatest reasons for dripping from the ceiling and wet spots on tubers is the fact that the insulation in the roof of the storage structure is inadequate. Therefore, before the storage season arrives, all of the insulation in the structure should be adequately checked and those places where the insulation has been torn or vapor barrier broken should be repaired.

Before you actually get into the storage season, all of the fan

motors, controls, air ducts, and other equipment necessary for proper air distribution should be completely checked over to see if they are in proper operating condition.

As the harvest season begins, of course, the most important item that should receive your attention is to prevent the bruising of the individual tubers. As I said in the previous paragraph, the more injuries present on the tubers, the more careful the storage management practices have to be in order to maintain the quality of the tubers.

Also, as before stated, it is a very excellent idea to remove all rotten, frosted, cut or seriously bruised tubers before they go into the storage structure. This will reduce the possibility of contamination through the various bruises and also cut down on the amount of inoculum present to be spread to the other tubers in the storage.

As the potatoes start going into the storage, one of the most important factors which should be taken into account is the relative humidity in the potato structure during the filling operation. If at all possible, the relative humidity in the potato storage building should be kept above 90 percent and during the filling operation it would be well to keep it above 95 percent. A high relative humidity is one of the most important things that you can do during the first month of storage to promote the healing of cuts, bruises, and other wounds. It not only helps promote the healing but it prevents dehydration and weight loss. It has been found at the University of Idaho Aberdeen Branch Experiment Station that suberization "wound-healing" will take place as rapidly at temperatures of 45 to 55°F as it will at higher temperatures, providing the relative humidity is above 95 percent. This temperature is high enough to promote very rapid wound healing and still low enough to prevent the rapid invasion of rot organisms. If, however, the presence of water rot, field frost, or leak are found, the storage temperatures should be lowered as soon as possible to 40°F and maintained there throughout the storage season. The 40°F temperature is below the invasion threshold of the water rot organism and will not allow water rot to invade and penetrate throughout the tubers; whereas, if the temperatures are allowed to 55 or 60°F, the water rot organism can spread throughout the tuber in six days. Therefore, it is suggested that if any of these conditions are present, the temperature should be lowered as rapidly as possible to 40° after harvest. Otherwise the management practice should be to lower the temperature as rapidly as possible to 45 to 50° and maintain this temperature for the first few weeks.

Depending upon when the potatoes are to be taken out of the storage and the purpose for which they are to be used will dictate the temperature of the storage after the harvest period. If the potatoes are to be used prior to December 1 for processing or commercial fresh market use, the storage temperature should be maintained around 45°F. If the tubers have been treated with a sprout inhibitor and are to be used for processing, a 45° storage temperature can be maintained throughout

the storage season, provided the humidity is maintained at a very high level and adequate air distribution system is present in the storage structure. If, however, the potatoes are to be used for seed, the storage temperature should be gradually lowered so that it is around 40° by December 1. It can be maintained there until 2 or 3 weeks prior to planting, at which time it should be raised so the tubers will be warmed up and are beginning to sprout by the time they are taken out into the field to be planted.

Russet Burbank tubers when maintained at a temperature of 45° have practically no build-up of sugars, whereas, those that are kept at 40° will have a build-up of sugars occurring throughout the storage season. Therefore, those tubers which are to be used for processing, it is suggested that a storage temperature not be lower than 45° and that a sprout inhibitor be used. It has been shown that the actual weight or shrinkage loss of Russet Burbank potatoes kept at 45° is less than when stored at 40°F. In order to reduce the shrinkage to a minimum at this temperature, it is necessary to not only apply the inhibitor, but also to have adequate humidity in the air stream to prevent dehydration.

At this time, I believe it is well to point out that it is absolutely necessary to have the tubers warm when they are handled out of storage. It must be remembered cold potato tubers bruise easily, whereas, warm tubers resist bruising. Therefore, the tubers should be warmed up to up to 45 or 50° before they are moved from the storage.

The question of the amount of air to be used might be variable, but we have found at the Aberdeen Branch Experiment Station that an air-flow of 10 cubic feet of air per minute per ton of potatoes has provided very adequate amount of air to maintain a uniform and constant temperature in a pile of potatoes 22 feet deep. In fact, in one pile of potatoes, where there are over 500,000 hundredweight, the temperature has been maintained within a 1° differential by the utilization of only 10 cubic feet of air per minute per ton on an intermittent basis.

A constant and uniform tuber temperature is much more desirable than a fluctuating tuber temperature. It has been found that a constant temperature will prevent sprouting longer than a fluctuating temperature.

The following points will summarize the storage management recommendations:

1. Have tubers mature at time of storage.
2. Maintain high humidity (95%).
3. Reduce temperature to 45-50° as soon as possible, but if water rot or field frost are present, reduce temperature to 40° as soon as possible.

4. If tubers are for processing, maintain temperature at 45°F to reduce sugar build-up. For long period storage this requires the use of a properly applied sprout inhibitor, the correct rates of airflow with adequate distribution.
5. Forced air ventilation throughout the potato pile is necessary to maintain a uniform temperature.
6. Warm potatoes up (to at least 45°F) before handling. Cold tubers bruise easily.