

TEMPERATURE AND HUMIDITY REQUIREMENTS OF STORED WASHINGTON POTATOES

by

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According to the Washington Crop Reporting Service a record total of 1,395,000 tons of potatoes were placed into storage in Washington last fall. If we assume a value of \$60/Ton, the crop in storage would be worth over 83 million dollars. The average loss due to shrink is generally figured at about 6%. If we add another 2% for loss due to rot making a total of around 8% loss in some of the better storages. In a 5000 ton storage the loss would amount to 400 tons for a value of \$24,000. This would be pure profit or bonus above all costs. It certainly would be worth a little extra effort to properly manage stored potatoes.

As cost of production goes up and the value of potatoes in storage increases we should be thinking about better and more sophisticated storages. You cannot afford to spend money and effort in growing potatoes, and let them rot or develop grade defects in storage. Rot development is always a big potential hazard and there are things you can do to ensure yourself of keeping rot development to a minimum.

In order to manage a storage intelligently and keep losses to a minimum, it is necessary to understand what is going on, what changes potatoes undergo in storage. How does temperature and humidity influence these changes? There is a tendency to harvest potatoes in an immature condition. Is this good or bad? What are the possible problems? What influence does ventilation have on sprouting, sprout development, general keeping quality of potatoes.

Storage of potatoes involves the management of only 3 factors, temperature, humidity and air circulation. On the surface it appears quite simple. However, to properly manage a large storage is more difficult and complicated than it appears. The following are the factors we are trying to prevent from occurring in storage: rot development, sprouting, weight loss and sugar development. The tools we have to use to prevent these things from occurring are temperature, humidity and air circulation.

Temperature has considerable influence on rot development as can be seen in Fig. 1. This is the reason why we recommend cooling potatoes down to 50 F as soon as possible after harvest. At 50 F rot development is slowed down considerably, however the temperature is high enough for suberization to take place.

Why is suberization important? The cuts and bruises incurred during harvest operation should be healed over to prevent penetration of rot organisms. Bruised areas which develop into rot cause considerable increase in labor costs required to trim these areas during processing. The labor costs required in the spring to process potatoes out of storage is double, sometimes triple the costs for trimming of potatoes in the fall.

Another common cause of rot development in storage is poor aeration or ventilation through the pile. During the previous storage season there was considerable amount of rot development because of poor aeration due to dirt in the pile. No matter how good a ventilation system a storage has, the presence of dirt throughout a pile will prevent proper aeration. Another cause of poor ventilation and air distribution is carelessness in placement of air ducts during filling of storages. Numerous storages have been observed in which the following faults were observed: ducts were somewhat flattened because the gauge of the pipe was too light to withstand the weight of potatoes, ducts were not placed properly, holes on one side were too close to the ground, the ends of galvanized pipes were bent impeding flow of air, and connections between galvanized pipes were not properly sealed causing uneven distribution of air. For even and adequate distribution of air in a storage, the ducts should be of a specified diameter with holes at least 1-1/4" in diameter spaced evenly

apart along the length of the duct and at a 45° angle across from each other. It is important that the total area of all of the small holes be slightly less than the total cross sectional area of the duct at the mouth. This is to obtain a static head in the duct of at least 1/2" of water to provide even air distribution. The importance of adequate air distribution cannot be overemphasized. Not only can rot development be controlled but also less sprout activity occurs in properly ventilated piles.

High air velocity rates does not necessarily cause increased weight loss, provided that relative humidity of the air used for ventilation is at least 95%. The following Table shows the amount of weight lost after 2 months continuous ventilation.

Table 1. Amount of weight loss after 2 months of continuous ventilation with different air velocity rates.

Air flow rate cfm/T	Percent Weight Loss
0	1.2
10	0.6
20	0.9
40	0.9

The present recommendation of 17 to 20 cfm of air/T of potatoes will not cause any more weight loss than lesser amounts of air. This amount of air is necessary for cooling of early harvested potatoes. Adequate humidity at this time is necessary not only to prevent excessive weight loss, but also for suberization and rot control. Dehydration is a stress condition which increases susceptibility of tubers to internal sprout development and possibly greater reducing sugar formation.

Proper temperature management is also very important in insuring successful storage. If potatoes are harvested somewhat immature, they should be held at 50-55 F at least a month to mature the skin and prevent excessive weight loss and sugar accumulation. The longer potatoes are held at suberizing temperatures of 50 F, less sugars will accumulate when temperatures are dropped to holding temperatures of 45 or 42 F.

Figure 1: Percent decay of tubers in storage as influenced by temperature.

