

POTATO STORAGE VENTILATION

Potato storage management factsheets generally give information on storage temperature and ventilation requirements for the various stages in the storage period. What is usually lacking is information on the specific temperature setpoints to use in the ventilation control.

This factsheet elaborates on two basic concepts for controlling potato temperatures in storages. A third concept is a tip to measure potato shrinkage on-farm.

1. Cooling air temperature and relative humidity

Potato cooling should be done with air that is not too cold relative to the potato pile temperature. Cool outside air can dry out the potato pile when it is a lot cooler than the potato temperature even when it is saturated with moisture (when it is foggy or raining outside). When the air is warmed by the potatoes, the relative humidity of the air is lowered. If 100% RH air is warmed by 5 °C (from 5 to 10 °C) then the RH will be lowered to 71% if no moisture is added to the air. If outside air is 10 °C cooler than the potatoes is can lower the warmed air's RH to less than 50% even if it is saturated with moisture to start. In practice, the air will attempt to make up the moisture deficit by taking moisture from the potatoes; there try to keep the supply plenum air no cooler than 2-3 °C below the potato pile temperature.

Table 1. Air relative humidities when saturated outside air is warmed to potato temperatures without adding moisture.

Air Temperature Cooler by (°C)	Potato Temperature (°C)		
	5	10	15
1	93	94	94
2	87	87	88
3	81	82	82
4	75	76	77
5	70	71	72
10	48	50	51

In addition to ensuring that the supply plenum air is not too much lower in temperature, the supply air should be saturated with moisture through the use of a humidifier in the supply air plenum. If a simple ventilation system is used with individual fans and ducts, humidify the air at the duct intake while keeping the surface of the potato pile dry.

Never attempt to cool the potato pile by moving cool air over the surface of the pile. This makes the top of the pile cooler than the interior. Heat and moisture rising from within will cause condensation on the cooler surface, a process referred to as “sweating”. Potatoes near the surface become wet, sometimes to a depth of two or three feet. Serious potato breakdown and losses can result.

During winter storage the exhaust fan system will cause sweating and moisture problems any time that cold air is drawn over the pile. If breakdown of potatoes in the pile occurs, there is little that can be done to remedy the situation, or for that matter, salvage the crop.

2. Potato pile temperature variation

The potato pile temperature should be monitored to determine the amount of temperature variation throughout the pile. The fans forcing air through the potato pile should be operated to cool local hot spots and to maintain the temperature difference in the pile to within acceptable levels. Generally the temperature difference between the top and bottom of the pile should be around 1.0 -1.5 °C. The temperature at the top of the pile should be measured about 50 cm (18 in.) below the surface to get the warmest spot. When temperature differences are less than 1 °C, then fans could be operated fewer hours each day to reduce shrinkage unless they are at the minimum of 2 hours per day.

3. Potato shrinkage measurement

A simple technique to measure potato shrinkage in storage is to weigh and place some sacks of potatoes in the pile while loading in the fall. Then during the unloading process reweigh these sacks to determine the shrinkage. Use sacks of 50 lbs. or more. Be sure to use a piece of metal or something heavy to calibrate your scale to ensure the readings are the same in the fall and the spring. If the 50 lb sack of potatoes loses 5 lb then the shrinkage loss is 10%. Sacks can be placed in appropriate locations to determine if losses vary due to position in the storage, variety or length of storage.

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