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Potato Storage Management Tips

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Proper storage management is critical to benefitting from the work and costs associated with producing a potato crop. Managing the storage as intensely as the field is critical to the bottom line. For quick reference, keep the following points in mind during the storage season.

It=s Alive! It=s Alive!

Common images of the Acouch potato@ as an inert, immovable, and, most important, inactive object are certainly at odds with real potatoes in storage. Real potatoes in storage are quite active themselves and are home to many other living, active organisms. Holding a potato in your hand, perhaps one plucked from among the millions that may occupy a storage, one may never guess that on top of and beneath its skin is a miniature world teeming with biochemical activity. Cells of the potato are busy doing the things they need to in order to stay alive B especially consuming water and converting the stored reserves of carbohydrates and other compounds built up while the plant was alive into much needed energy. The potato is also home to living microorganisms also needing food and water. Some of these microorganisms, of course, regularly Aconsume@ potato flesh.

One of the most important feats to pull off in potato growing and selling is to manage the life in the storage so that when it is time to sell the crop the potatoes are in the kind of shape that bring the highest return. This is done primarily through the manipulation of three aspects of the storage atmosphere.

Cure - Cool - Humidify - Ventilate - Watch

Even the most carefully harvested crops suffer some damage during the process. Allowing tubers to complete built-in curing processes soon after harvest is part of successful long-term storage management. Proper curing conditions include: moderate temperatures (55-60?F), high relative humidity (90% or greater), and aggressive ventilation (fresh air daily for at least 2-3 weeks).

Maintaining the appropriate storage temperature once the crop is cured is critical. The fact that biochemical activity is faster at warmer temperatures is like gravity, an unwavering natural law. The biochemical activity taking place in a potato is not necessarily grower-friendly. Starch being converted to reducing sugars and the gradual breaking of dormancy put the grower and crop on the clock as quality can be maintained for only so long. Lengthening this period by keeping the crop at the correct temperature is key. Ideal temperatures for long-term storage often vary by

variety and market. Generally, temperatures should remain at 38-40?F for fresh market and seed crops and 45-55?F for processing crops (exact temperature will depend on variety, chip versus fry market, and estimated ship date). Regardless of the holding temperature, the pile temperature should not vary by more than 3?F top-to-bottom.

Potatoes can be thought of as little more than fancy ways to package water. Indeed, potatoes may exceed 90% water by weight. So, in this case, more water in the potatoes often means more money in the grower=s pocket. A storage that is too dry literally pulls water out of potatoes, blowing profit potential out the ventilation system and increasing the occurrence of pressure bruising. A storage that is too wet promotes condensation, thereby favoring bacterial soft rot. The storage=s relative humidity (RH) is strongly tied to its temperature (especially of incoming air) as small changes in temperature create larger changes in relative humidity. For example, increasing the temperature of a water-saturated (100% RH) volume of air at 40?F to 45?F lowers its RH to nearly 80%. Relative humidity in a potato storage should remain 94%-98%. At present, this is usually best accomplished by maintaining the desired temperature in the storage rather than through operating the humidification system.

Like us, potatoes soon perish without an adequate supply of fresh, oxygenated air. Normal biochemical activity tends to promote the consumption of oxygen and build up of carbon dioxide. Unless given fresh air frequently, the storage will warm, lack oxygen, and fill with carbon dioxide. Of course, carbon dioxide rarely builds to lethal levels in an entire storage. More often, anoxic (oxygen-deficient) pockets develop and tuber quality in a portion of the storage is reduced. Anoxia changes tuber chemistry negatively and promotes the growth of anaerobic microorganisms, thereby promoting the development of Ahot spots@ or Ameltdowns@ caused by decaying tubers. Therefore, ventilate frequently and ensure that the entire storage is receiving an adequate supply of fresh air. When bringing in fresh air, keep in mind that its temperature and water content relative to the pile=s temperature will either raise or lower storage relative humidity (RH). Water-filled air colder than the pile will actually drop storage RH while water-filled air warmer than the pile will raise storage RH and possibly lead to undesirable condensation.

With the stress and rapid pace of day-to-day concerns typical of the growing season melting away, growers may want to spend time in other ways. This is understandable. But, in doing so, don=t forget that storage management is the final hurdle to making money on the past year=s crop. Good crops can go bad in storage in relatively little time. Watch the storage and stay informed of the conditions inside it, making adjustments if necessary. This requires more than looking from the back window of the house or seat of the pickup to make sure the green and not the red light is on or dialing up the storage=s computer. Electronic systems are excellent but there is no substitute for checking storage and crop conditions directly. Check equipment and look for leaks in the roof, sagging parts of the pile, condensation, etc.
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Summary. If you have put a good crop into storage, how you manage it until you ship it will influence the bottom line. The figure at left depicts why. Sugars made during

the growing season are stored in the potatoes. Normal living processes convert these sugars into by-products (shown at right) which must be removed from the storage. These processes proceed faster at warmer temperatures. Two important points should be taken from this figure. First, the amount of sugar and water (profit potential) going into storage is fixed at harvest. Second, failure to slow and remove the by-products of the conversion shown above reduces tuber quality and weight. Therefore, profit largely depends on storage management.

Research News

Researchers at the Gilat Experiment Station in Israel recently described how the use of an advanced humidification system may maintain crop quality in storage. Dr. Afek and coworkers report that water droplets produced by a spinning disk humidifier often create a Awet fog@ and may be deposited on the floor. In contrast, droplets created by the Tabor Atomizer System may be one-fifth the size of droplets produced by a spinning disk and create a Adry fog.@ In three years of study, the researchers found that after six months= storage in rooms managed with the atomizer system, tuber weight loss was less and firmness greater than in rooms managed with a spinning disk humidifier. The authors report that the atomizer system can generate 96%-98% relative humidity without depositing free water on potatoes.

Selected References for More Information

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