FIG. 1. Sugarbeet cultivars being compared for storability on top of an indoor storage pile in Paul, Idaho. Each bag contains roots from a different cultivar produced in a commercial field infested with natural levels of rhizomania. Cultivars that retained the most sucrose had rhizomania resistance and the least fungal growth and weight loss.

Cutting YOUR Losses

Reducing sucrose loss in sugarbeet storage

Controlling sucrose loss in sugarbeet storage has been an industry goal since the 1950s. Sugarbeet roots utilize sucrose for energy to maintain themselves.

Dessication from wind and sun or too much rain and microbial activity can negatively influence stored roots, increasing respiration and the buildup of impurities.

Factors such as scalping, impacts and wounding during harvest and transport, mud and weeds in piles, and unusually high and low temperatures can also lead to sucrose loss.

Disease and drought stress during production can also predispose roots to sucrose loss in storage.

In particular, rhizomania caused by Beet necrotic yellow vein virus has been shown to compromise the storability of roots allowing for significant sucrose losses in storage by early December.

Sucrose losses over 90 percent have been documented in long-term storage (142 days) with cultivars that lack storability. Thus, developing a cultivar selection program for storage could be of considerable benefit to the sugarbeet industry.

Trial Runs

Healthy roots in storage lose 0.2 to 0.5 lb sucrose per ton roots per day. Thus, losses of 8 to 17 percent would be expected for healthy roots after 100 days in outdoor storage under ambi-

ent conditions. Losses in roots from rhizomania infested fields could be considerably higher.

In an effort to develop a cultivar selection program for storage, experiments in Idaho were conducted with roots from commercial sugarbeet fields infested with natural levels of rhizomania.

From each plot the center two rows were harvested to determine tonnage and two 8-beet samples were collected to determine percent sucrose.

Additional 8-beet samples from each plot were collected to determine sucrose yield after storage.

The storage root samples were held in nylon mesh onion bags, and placed inside outdoor piles and on top of indoor piles (**Fig. 1**).

The outdoor piles were subject to ambient conditions while the building holding the indoor pile had a set point of 35 degrees F.

After 142 days (Oct 2006 to Feb 2007) in storage inside a commercial outdoor pile, sucrose losses ranged from 13 to 32 percent depending on cultivar.

When roots from the same plots were stored over the same period under warmer conditions on top of an indoor commercial pile, losses ranged from 13 to 90 percent depending on cultivar (**Fig. 2**).

Some cultivars lost twice as much sucrose as other cultivars. The experiment was repeated the next year and after 159 days (Oct 2007 to Mar 2008) of storage inside a commercial outdoor pile, sucrose loss ranged from 28 to 60 percent depending on cultivar.

Indoors, losses ranged from 57 to 100 percent depending on cultivar. More consistent cultivar separation was achieved with the samples held indoors, which should provide a reliable means of cultivar selection for storability.

Best Performance

In previous research the ability to separate cultivars for storability with healthy sugarbeet roots was problematic since variation in the data made it difficult to separate cultivars. Using our indoor storage system with roots from a rhizomania infested field, the ranking of cultivars was the same as storage with healthy roots outdoors, but the separation between cultivars was greater and could be proven statistically.

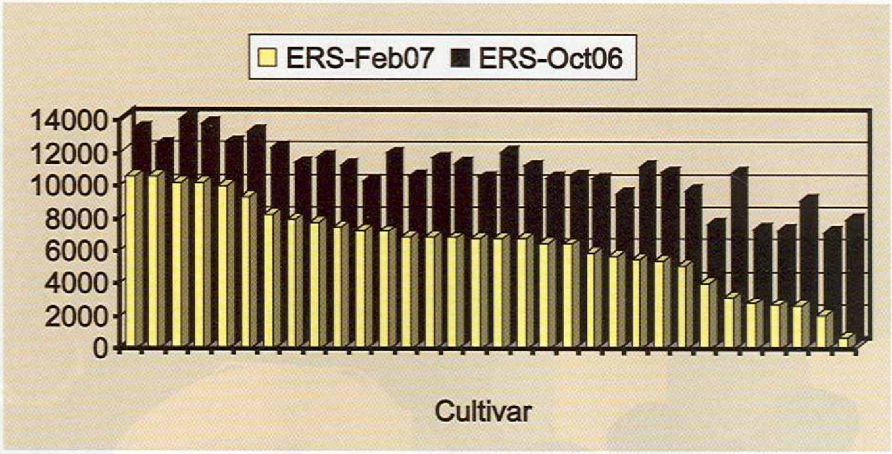


FIG. 2. Estimated recoverable sucrose (lb/A) is shown at harvest in October 2006 (ERS-Oct06 in black) and later after 142 days in storage in February 2007 (ERS-Feb07 in yellow) with roots from 32 commercial sugarbeet cultivars. The roots had been produced in a commercial sugarbeet field with natural levels of rhizomania and held in a commercial indoor storage facility in Paul, Idaho; with a temperature set point of 35 degrees F. Some cultivars lost as little as 13 percent sucrose (left side) and others lost 90 percent of their sucrose (right side) in storage.

In **Fig. 2**, some commercial cultivars lost more than twice as much sucrose as other cultivars emphasizing the point that storability can be an important economic trait. Cultivars that performed the best in storage possessed rhizomania resistance, and had the least fungal growth and weight loss.

These storage data collected through this indoor/rhizomania cultivar selection method should allow grower group seed committees to make informed decisions on cultivars for storability. The potential for reducing losses in storage is considerable and can now be addressed with repeatable methods.

Separate Out

Given the negative impact that diseases in the field such as rhizomania, curly top, Aphanomyces root rot and other diseases can have on storability—growers should also consider segregating roots at harvest.

Roots from fields with heavy disease pressure or other production issues could be placed in piles targeted for earlier processing since it is clear that compromised roots will not store well.

For piling grounds with multiple pilers, segregating roots should be a possibility.

Tradition

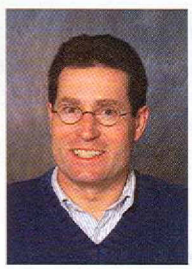
Growers have traditionally only been concerned with percent sucrose and tonnage at harvest. For companies that are grower owned cooperatives, those are not just roots sitting in those piles.

Those roots are the grower's money sitting there. In Idaho only one-third of the crop is direct processed through the factory during harvest.

Another one-third of the crop is held in short term storage (< 90 days) and one-third is held in long term storage. As noted above, the recoverable sucrose at processing can be a lot less than that determined at harvest.

Roots from some cultivars maintain themselves considerably better in storage than roots from other cultivars. Thus, selecting cultivars for storability has the potential to have major impact on the sucrose saved or lost.

Combining cultivar selection for storability along with segregating roots at harvest could lead to considerable economic benefit for sugarbeet growers. ■



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