

## Harvest Bruise Management

What can be done to minimize bruises and wounds this harvest season? There are two major components to bruise management: factoring in tuber conditions and variety susceptibility to bruise with a harvest and handling operation designed to minimize physical impact or damage of the tubers. There are two types of harvest bruises: blackspot and shatter. There are two components involved in blackspot bruise formation: a physical impact, followed by a chemical reaction that causes the discoloration. There is no open wound with blackspot bruising. Conversely, a shatter bruise only needs a physical impact, but that causes a break in the skin or flesh. The level of shatter bruise, or open wounds, can have a huge impact on the potential for disease development and higher weight loss in storage. The pathogens that cause Fusarium dry rot and Pythium leak need a wound to infect the tuber, whereas pathogens that cause pink rot, late blight, early blight and others may not need a wound, but infection is dramatically increased with wounding. Regardless of the type of wound, economic losses can occur due to disease invasion, shrinkage, and discoloration.

A key bruise management strategy is to factor in tuber conditions, while also minimizing impacts from equipment operation to successfully reduce bruise potential.

*Tuber condition.* Tuber temperature, hydration level (crispness) and maturity interact to influence bruise susceptibility. In general, the lower the pulp temperature, the more susceptible tubers are to both shatter and black spot bruising. Pulp temperatures below 45°F make it very difficult to handle potatoes without causing significant shatter bruise damage. The more hydrated or crisp the potatoes are, the greater the susceptibility to shatter bruise. In contrast, dehydrated potatoes are susceptible to black spot bruise. Likewise, as plants mature, the tubers become more susceptible to black spot bruise. Tubers that sit in dry soil under dead or dying vines can become very susceptible to black spot. Knowledge of the relative bruise susceptibility of the potato varieties allows the use of tuber hydration level to your advantage. For example, Bannock Russet is known to be relatively susceptible to shatter bruise, but resistant to black spot. Therefore, it is recommended that Bannock fields be harvested under slightly drier conditions to reduce shatter bruise. Another example is the use of green digging Ranger Russet tubers to lessen blackspot bruise development.

*Harvester and handling operation.* The more susceptible the tubers are to damage, the more important it is to operate the harvester under optimum conditions. Achieving optimum harvester operation requires reducing drops, cushioning impact areas, and setting chain speeds in relation to ground speed so that harvester chains are filled to capacity. If the volume of material (tubers and soil) passing over each chain can be matched to the capacity of that chain, then damage due to excess tuber movement, rollback, and drops can all be reduced.

It has been reported that about 30% of all bruise damage found on tubers in storage occurs after the harvester. Bruise reduction during the trucking and piling operations involves minimizing

drops, matching conveyor speed to tuber volume, and piling in a progressive, stepwise fashion to minimize tubers rolling down the face of the pile.

*Education and identify potential bruising situations.* Spend time to educate employees about bruise prevention and to be vigilant in identifying any drops that may be too high and make adjustments on the fly to remedy it.

Monitoring bruise incidence throughout your harvest system is a useful way to determine whether bruise susceptibility is higher for a particular lot or field. Taking tuber samples at different points throughout the harvest and handling process (eg. hand dug, harvester, conveyors, any drop points or turns, etc.) and holding them at warm temperatures will allow you to assess the tubers for blackspot damage. The higher the temperature, the quicker the pigment formation will occur and the sooner the results will be available. It typically takes about 24 to 48 hours for the black/blue pigment to develop. There are “hot boxes” commercially available for purchase, or rooms can be constructed for this same purpose. Shatter bruise will be apparent regardless of warming the tubers. The use of an instrumented sphere is another way to determine where unacceptable impacts are occurring in harvest, handling or packaging systems.

Photo 1.

