

HARVEST MANAGEMENT

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Harvest management, in large part, is bruise management. Bruising significantly affects potato tuber quality, whether the potatoes are sold for fresh consumption or are processed into frozen or dehydrated products. Tuber bruising is affected by soil and tuber condition, temperature, vine-kill date, and equipment maintenance and adjustment.

MANAGEMENT PRACTICES BEFORE HARVEST TO MINIMIZE BRUISE DAMAGE

Minimizing tuber bruising requires a season-long management plan beginning before potatoes are planted and extending through harvest.

Field Selection

Fields with numerous sharp rocks or with soil that easily forms clods will be less suitable than those without rocks or with friable soil.

Field Preparation

Tillage practices can greatly influence potential tuber damage at harvest. Clods formed from spring tillage will usually not break apart before harvest and have the potential to damage tubers in much the same way as rocks.

Planting

Timely planting will help the crop reach maturity before harvest time. Timely planting is important for many reasons, including proper maturity at harvest, which helps with prevention of skinning.

Fertilizer and Irrigation Management

Mineral nutrition may directly influence the susceptibility of tubers to bruising, or have an indirect effect by affecting tuber size, dry matter content, or plant maturity. Excessive nitrogen delays vine maturity, thus delaying tuber maturity, which results in more skinning at harvest. It is important to schedule water applications to maintain uniform plant growth throughout the growing season.



Vine Kill

Vine maturity at the time of vine killing influences the potential for both shatter and blackspot bruise. Generally, as vines mature, tubers become more susceptible to blackspot bruising. Proper vine kill timing depends on the susceptibility of the variety produced. Growers should plan on digging tubers about 2 to 3 weeks after killing the vines. This allows adequate time for tuber skins to set, which makes tubers less susceptible to shatter bruise and skinning damage.

MINIMIZING BRUISE DAMAGE FROM VINE KILL THROUGH HARVEST

Soil Condition

Soil moisture at harvest is an important factor with regard to bruising. The soil should be just moist enough to carry to the secondary conveyor on the harvester (this is typically between 60 and 75 percent available soil moisture or ASM) where it should separate completely from the tubers. Timing of the pre-harvest irrigation depends on soil type.

Hydration Level

Tuber hydration level influences the type and amount of bruising. When tubers are dehydrated, blackspot bruise is more prevalent, whereas hydrated tubers have a tendency to have more shatter bruise. An intermediate level of hydration results in the least amount of tuber bruising. Irrigation practices used to condition soil, typified by a light application of water 1 to 4 days before harvest, may not impact tuber hydration. For this reason, soil moisture should be monitored during vine kill and maturation.

Pulp Temperature

Ideally, potatoes should be harvested when pulp temperatures are between 50° and 60°F. Cold tuber pulp temperatures increase both blackspot and shatter bruise, but the type of bruise damage also depends on tuber hydration level. Cold, hydrated tubers tend



to shatter bruise more readily, whereas warm, dehydrated tubers develop blackspot bruise more easily. Tuber pulp temperature is directly influenced by soil temperature. Tuber pulp temperature in each field should be checked before starting harvest. Having an accurate tuber pulp thermometer and using it regularly to monitor pulp temperatures is important. Warm tubers, greater

than 60°F, may actually have less bruise than cold tubers, but cooling tubers in storage is difficult and tubers with warm pulp temperatures are more susceptible to rot organisms.

Variety

Varieties must be managed differently to achieve minimum bruising. However, all varieties should be harvested at pulp temperatures between 50° and 60°F. In addition, the soil should be conditioned for harvest with a preharvest irrigation so the soil is moist enough to carry to the secondary conveyor on the harvester. *Please refer to **Potato Production Systems** book for more detailed information [\(Order Potato Production Systems\)](#).*

PREPARING HARVEST EQUIPMENT

Equipment maintenance and setup are critical aspects of harvest and bruise management. Recognition and modification of problem points, addition of padding, calibration of moving parts, and training of operators are all important grower practices that will result in reduced harvest damage.

Harvester Inspection

A large percentage of tuber harvest damage occurs on the harvester. Particular attention must be paid to this piece of equipment as a means to minimize potato bruise damage. Following is a list of common areas that should be evaluated before harvest each year.

- **Blade**

The harvester digger blade should be positioned such that the potatoes evenly flow up the blade onto the primary conveyor and do not bump into the primary conveyor links. The backside of the blade must be even with the top of the primary conveyor.

- **Conveyor Chain Padding and Flights**

Padding on all conveyors should be inspected to be sure it is in good condition. There are definite differences in cushioning characteristics of conveyor padding designs. Tubers dropping onto a bare steel chain will be damaged the most, and having only a rubber coating over steel offers little to no bruise reduction. On harvesters using flights to minimize rollback, the flights should be checked regularly and worn ones replaced immediately.



Photo courtesy Potato Grower Magazine

- **Impact Points**

The harvester should be checked for impact points where tubers may be damaged, such as places where tubers have long drops or strike bare steel. Other possible damage points are where tubers off-load from one conveyor to another, and on the sides of the sorting table. These potential damaging sites should be covered with padding.

- **Clod Eliminator**

Rollers on the clod eliminator should be inspected for wear and damaged rollers replaced. The off-load end of the clod eliminator should be set lower than the front of the eliminator so the tubers will smoothly flow across.

ADJUSTING HARVESTER CONVEYOR SPEEDS

Tubers falling onto tubers are less likely to be damaged than tubers falling onto a harvester conveyor. For that reason, the speeds of all conveyors on the harvester in relation to the harvester ground speed must be adjusted to keep conveyors full of potatoes. A properly adjusted harvester will not only minimize tuber damage but will eliminate nearly all dirt before it reaches the truck. *Please refer to **Potato Production Systems** book for more detailed information about harvester conveyor speed adjustment and worksheets that can be used to adjust conveyor speeds ([Order Potato Production Systems](#)).*

MINIMIZING BRUISE DAMAGE AFTER POTATOES ARE HARVESTED

Not all tuber bruising occurs during the harvesting operation. Bruising can occur after loading potatoes into a truck, and while potatoes are moving through equipment into and out of storage.

Tarping Trucks

Tubers can be damaged if a worker steps on them when tarping a truck, especially if the person is wearing hard-soled shoes. The best way to avoid walking on tubers is to have an automatic tarping device.

Unloading Trucks

The stinger should be kept as close to the truck as possible; this may require remodeling some equipment. Potatoes hitting potatoes are less likely to result in bruised tubers, so conveyors should be kept filled to capacity at all times.

Even-Flow Bins

Even-flow bins will help maintain a smooth flow of potatoes going into the storage building and allow for faster unloading of trucks. They help to keep conveyors full, but this is an advantage only if the drop from the conveyor into the even-flow bin is kept minimal.



Conveyors

Any point where tubers off-load from one conveyor to another should be checked for excessive fall distance. Slides can be installed at places with large drop distances so tubers roll from one conveyor to the next. Skinning of tubers can occur where tubers make a 90° turn from one conveyor to the next. A slide can be installed at

these turns so the tubers make a smooth transition.

Dirt Eliminator

The eliminator table should slope downward so tubers quickly move from one end to the other without excessive rolling and tumbling.

Piler

The end of the piler should be kept as close to the pile as possible. Optimally, the pile should be built in a stair-step manner to reduce the number of tubers rolling down the face of the pile. One person should be designated to operate the piler. That person should not be expected to perform other duties that would be a distraction from this operation.

EDUCATING HARVEST PERSONNEL

An important part of harvesting a high percentage of bruise-free potatoes is making sure that all workers know and understand their part in accomplishing this goal. It is critical to educate and reeducate personnel who work during harvest about practices that keep bruising to a minimum— it will be time well spent.