Effect of tuber susceptibility and harvester operation on bruise damage

Source: Thornton et al., 1973
Two factors in bruise susceptibility
- Susceptibility to impact damage
- Potential to darken after impact

0 = no damage
5 = severe damage

Photo courtesy J. Stark
Factors Affecting Bruise Susceptibility

- Cultivar (Ex. Ranger, Bannock)
- Maturity
- Tuber Physical Properties
- Hydration
- Temperature
Factors Increasing Black Spot Bruise Susceptibility

- Vine maturity
  - Russet Burbank - 70% dead vines
  - Ranger Russet - 20% dead vines
- Specific gravity
  - Russet Burbank - Above 1.080
  - Ranger Russet - Above 1.085
Tuber Physical Properties Affecting Bruise

- Tuber Size
  - Large tubers > damage small tubers
  - Small radius (end) > damage large radius

Brook, R.C. 1996. National Potato Anti-bruise Committee
Tuber Hydration Level Effect on Black Spot and Shatter Bruise of Russet Burbank at 42ºF

Tuber Hydration

### Influence of Post-Vine-Kill Irrigation on Blackspot Bruise

<table>
<thead>
<tr>
<th>Irrigation Treatment</th>
<th>Percent Blackspot</th>
</tr>
</thead>
<tbody>
<tr>
<td>No irrigation¹</td>
<td>51</td>
</tr>
<tr>
<td>4 days before harvest²</td>
<td>25</td>
</tr>
<tr>
<td>8 days before harvest²</td>
<td>13</td>
</tr>
</tbody>
</table>

1. Soil moisture at 50% or less at vine kill.
2. No effect of irrigation if soil moisture kept at 65% or above after vine kill.

Tuber Temperature and Hydration Effects on Shatter and Blackspot Bruise Susceptibility of Russet Burbank Potatoes

More

42°F

% Bruised Potatoes

56°F

Less

70°F

Dehydrated  Tuber Hydration Level  Hydrated

IMPACT OF TEMPERATURE AND DROP HEIGHT ON BRUISE INCIDENCE

Source: Hyde, G., R. Bajema and R. Thornton, 1993
Relationship Between Soil Temperature and Tuber Bruising During a 24-Hour Period

Effect of tuber susceptibility and harvester operation on bruise damage

Source: Thornton et al., 1973
Position on Harvester Where Tuber Bruising Occurs

41% Cumulative damage by the time tubers reach the boom.

HARVESTERS DO THREE JOBS:

Convey Tubers
Eliminate Vines
Eliminate Soil
Potato Harvesters move 480 ton of soil per acre with blade at 8” depth.
Tuber Damage as Measured on Top of Side Elevator

Source: Hyde, G. M. et al. 1990

Tuber Loading on Conveyors

Soil Loading: Low, Medium, High
To reduce drops tuber + soil load (volume of material) needs to equal conveyor capacity

\[ \text{VOLUME} = \text{CAPACITY} \]
IMPACT OF TEMPERATURE AND DROP HEIGHT ON BRUISE INCIDENCE

Source: Hyde, G., R. Bajema and R. Thornton, 1993
Determine Capacity of Individual Conveyors (size X speed)

Photo courtesy R. Thornton
Set Conveyor Speeds as a Percent of Harvest Ground Speed

Primary:
- Heavy soil: 120 – 150%
- Sand: 100 – 120%

Secondary: 65%
Rear Cross: 70%
Elevator: 70%
Other Places Potatoes May be Bruised during Harvesting and Handling

Photo courtesy W. Bohl
Keep stinger as close to truck as possible.

Photo courtesy W. Bohl
Here are a couple of “great” places to bruise tubers.

Photo courtesy W. Bohl
Even flow bins provide a good way to maintain constant volume.
FACTORS INFLUENCING BRUISE:

- Tuber Condition
- Temperature
- Harvester Operation
- Soil Condition
Educate, educate, educate harvest personnel to minimize bruise damage.

Shatter bruise

Black spot bruise

Photo courtesy W. Bohl