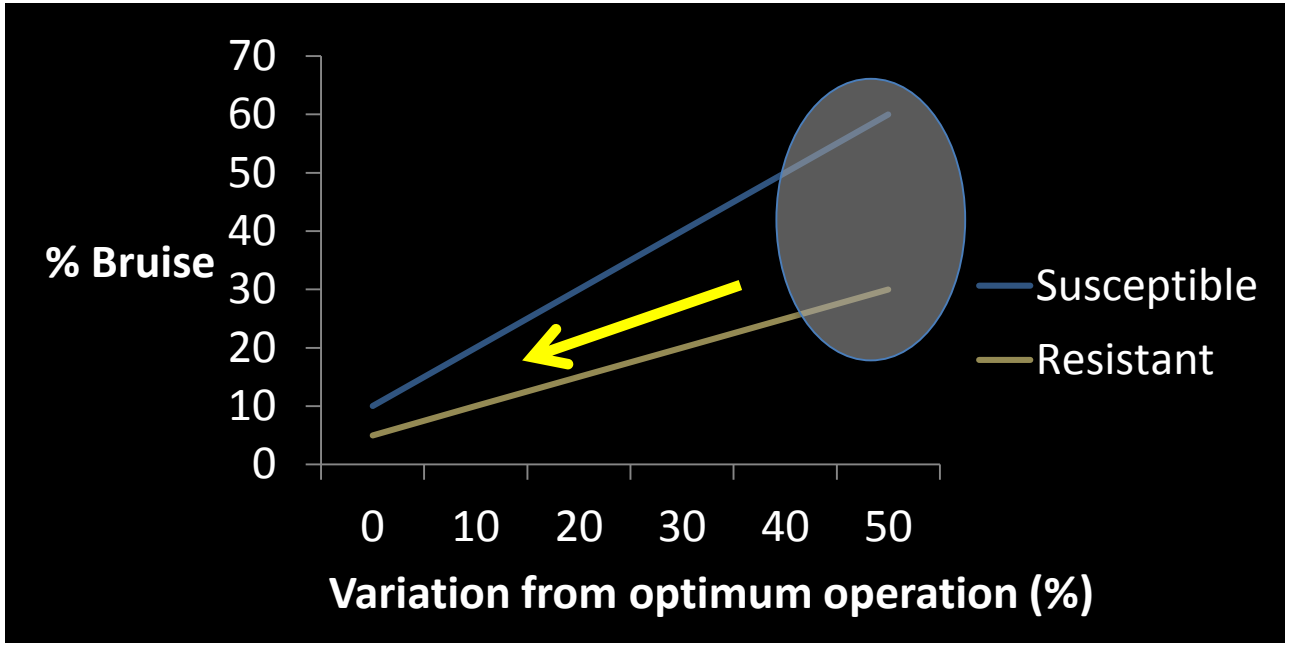
Effect of tuber susceptibility and harvester operation on bruise damage



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

Brook, R.C. 1996. Potato Bruising. National Potato Anti-bruise Committee

Factors Increasing Black Spot Bruise Susceptibility

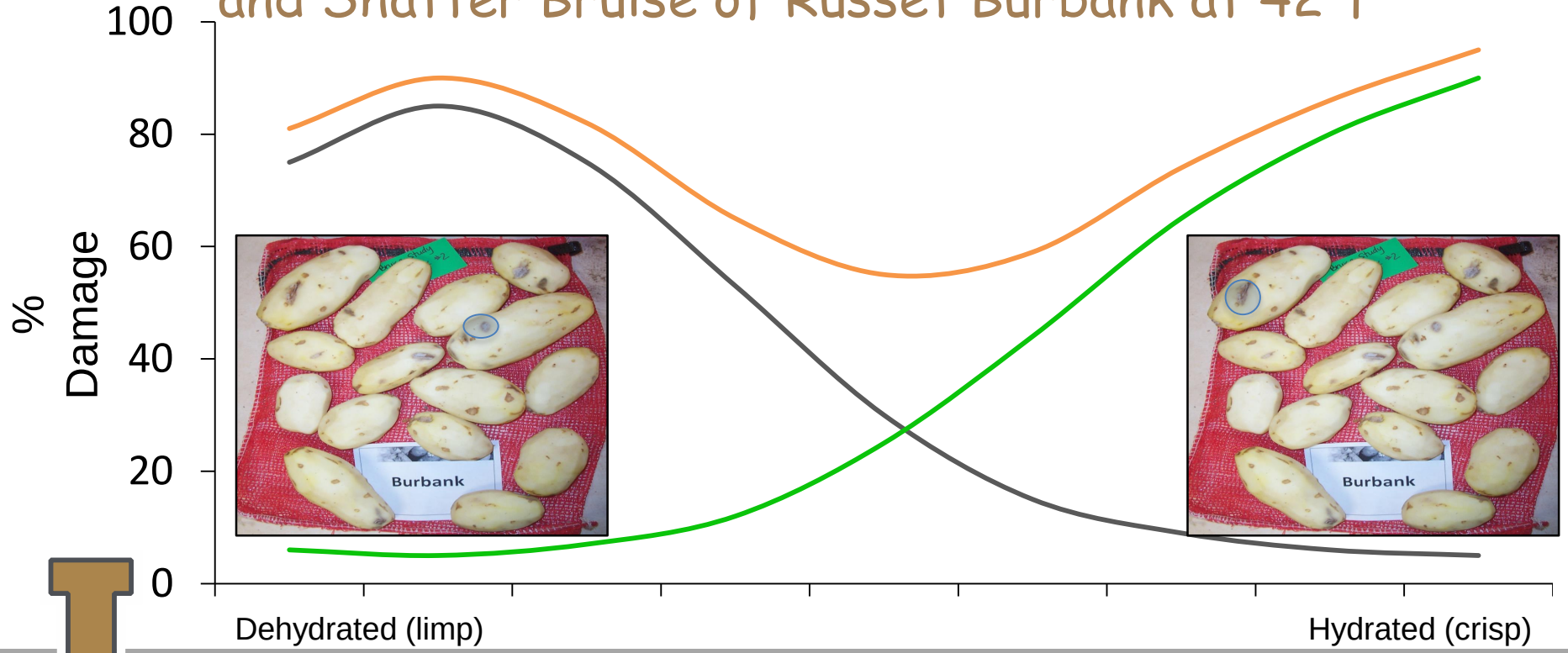
- Vine maturity
  - Russet Burbank - 70% dead vines
  - Ranger Russet - 20% dead vines
- Specific gravity
  - Russet Burbank - Above 1.080
  - Ranger Russet - Above 1.085

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 42°F



Tuber Hydration

Source: Smittle, D.A., et al. 1974.

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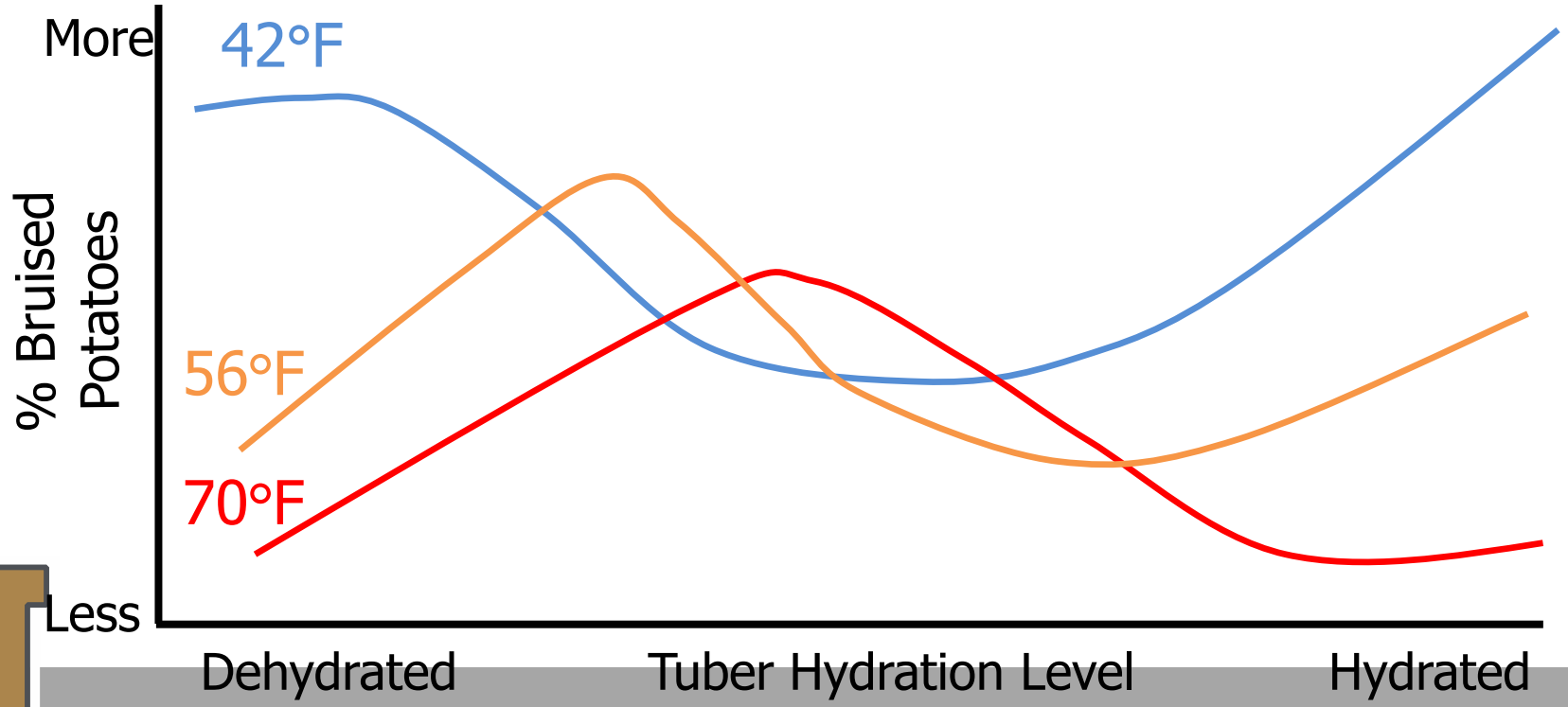
Influence of Post-Vine-Kill Irrigation on Blackspot Bruise

Irrigation Treatment	Percent Blackspot
No irrigation [1]	51
4 days before harvest [2]	25
8 days before harvest [2]	13

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.

Source: Stark, J. C. 1987.

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



Source: Smittle, D.A., et al. 1974.

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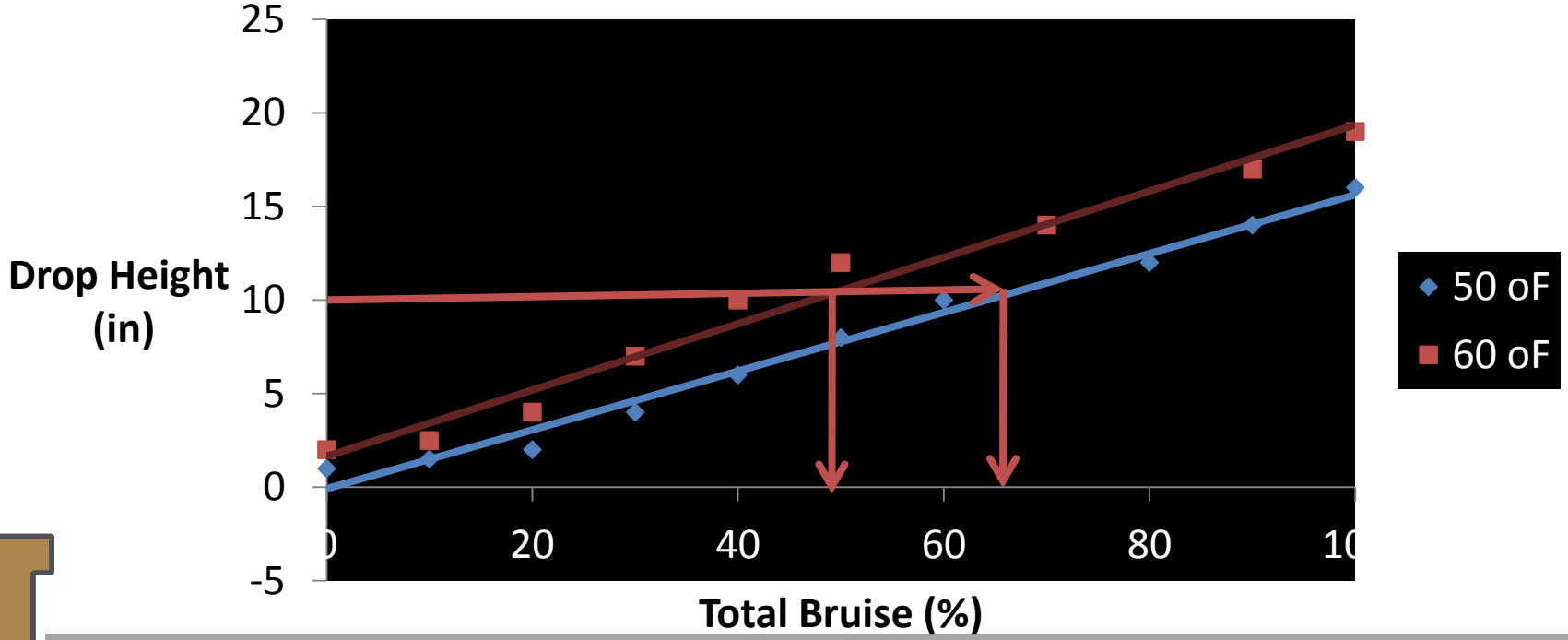
IMPACT OF TEMPERATURE AND DROP HEIGHT ON BRUISE INCIDENCE



Source: Hyde, G., R. Bajema and R. Thornton, 1993

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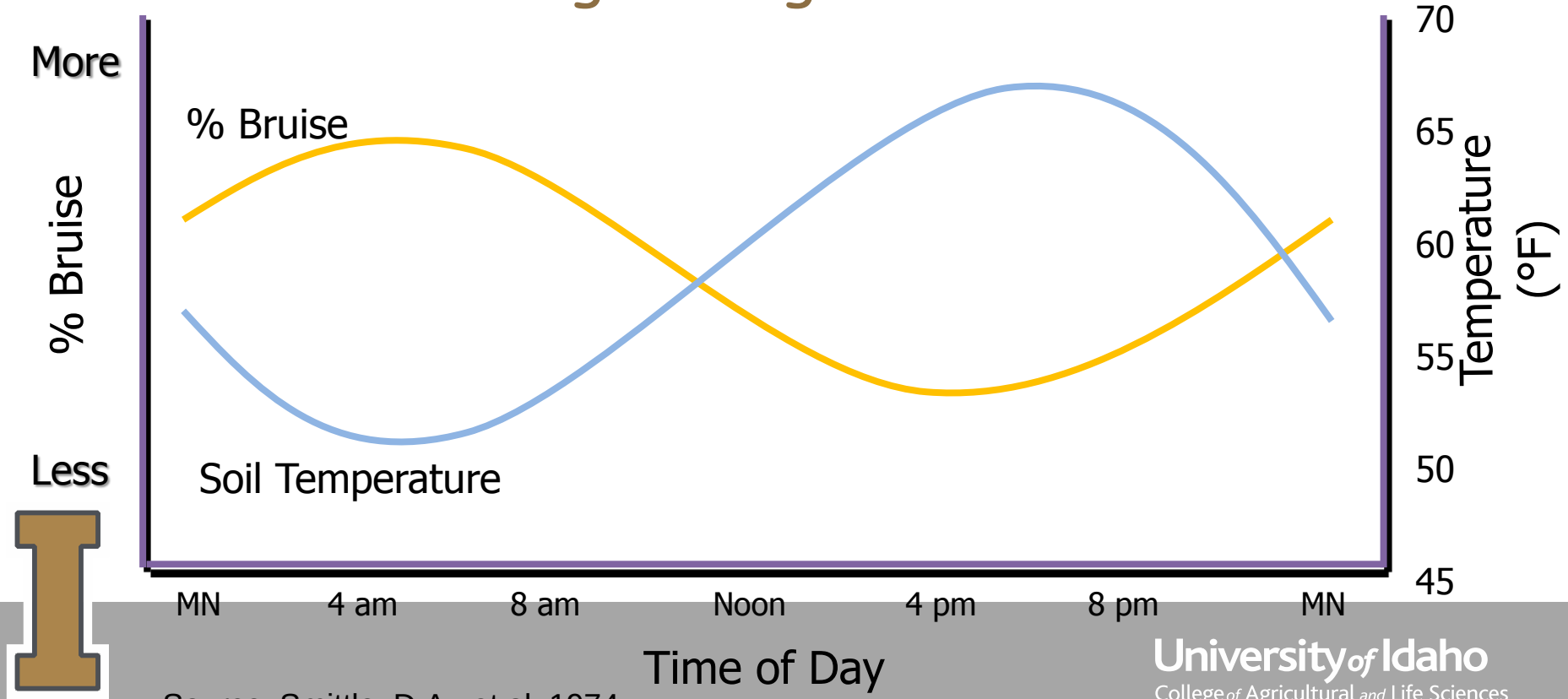
Relationship Between Soil Temperature and Tuber Bruising During a 24-Hour Period



Source: Smittle, D.A., et al. 1974.

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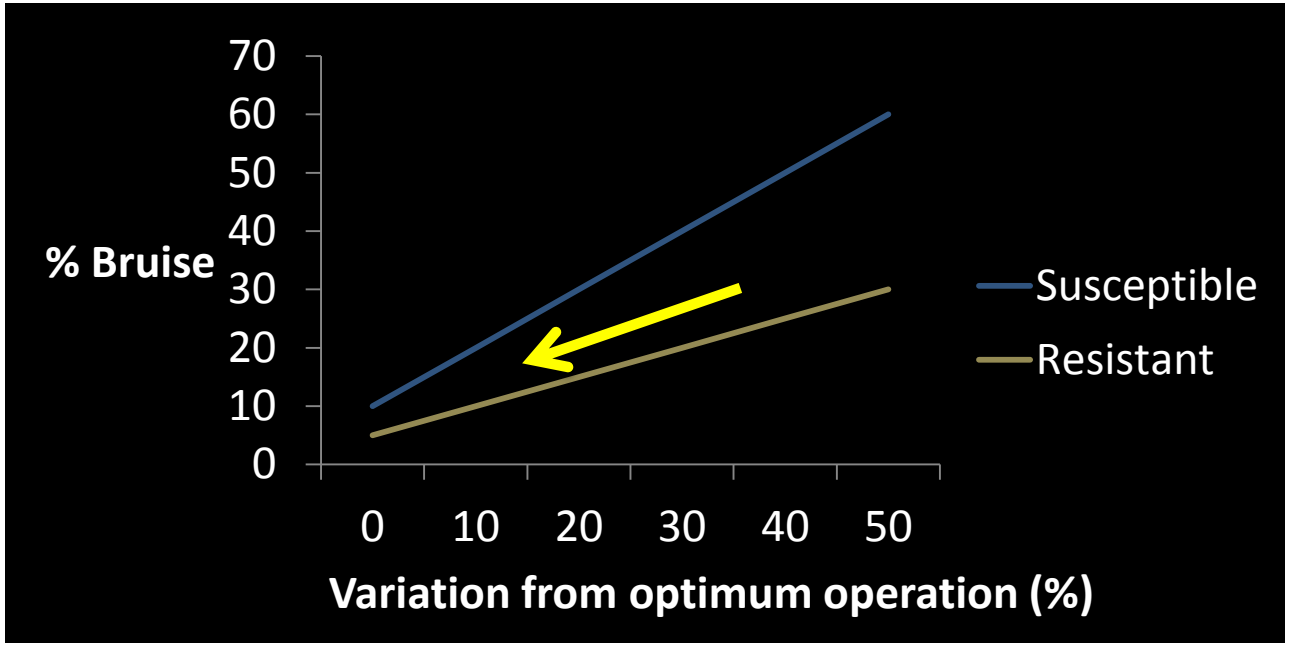
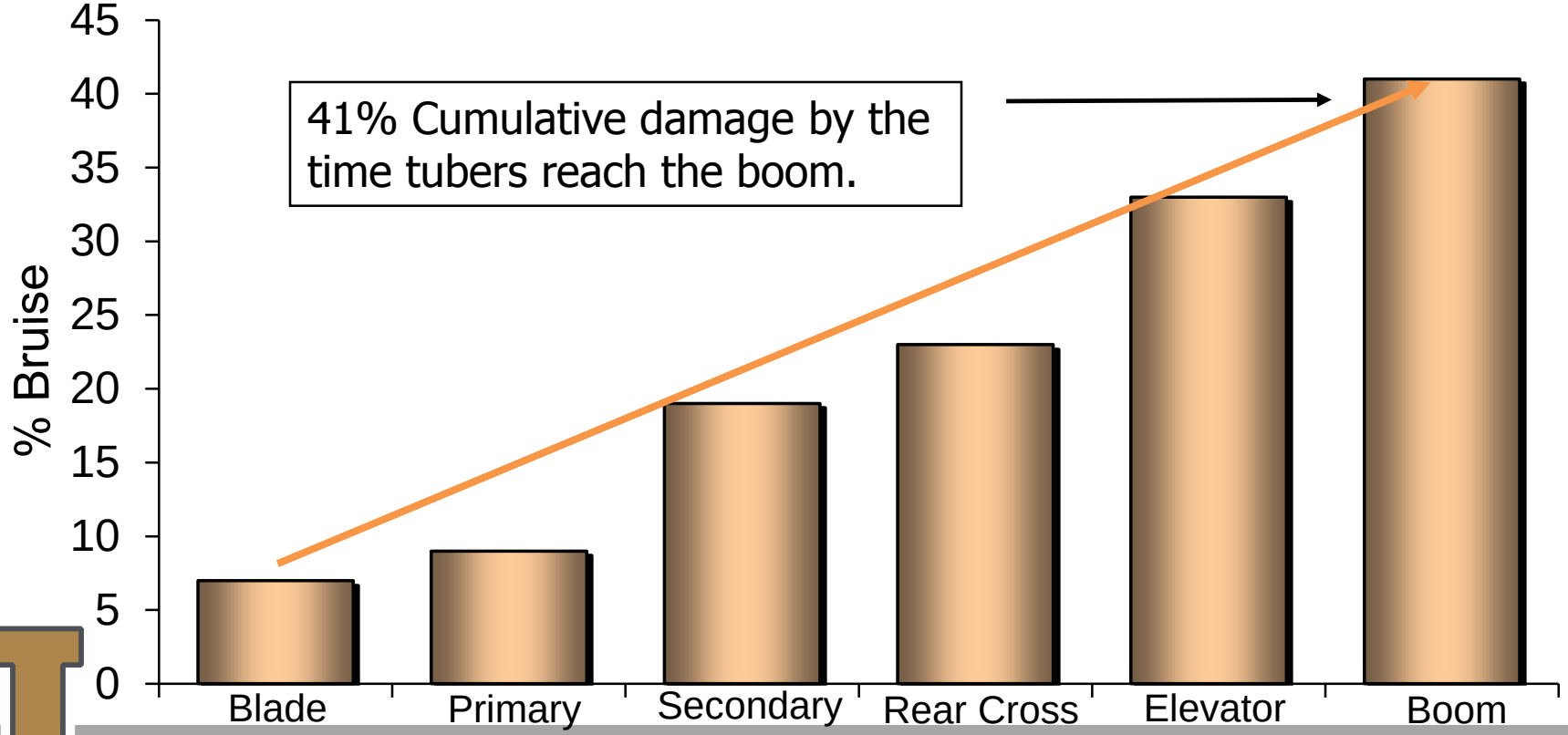
Effect of tuber susceptibility and harvester operation on bruise damage



Source: Thornton et al., 1973

Position on Harvester Where Tuber Bruising Occurs



Source: Smittle, D.A., et al. 1974.

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HARVESTERS DO THREE JOBS:

Convey Tubers

Eliminate Vines

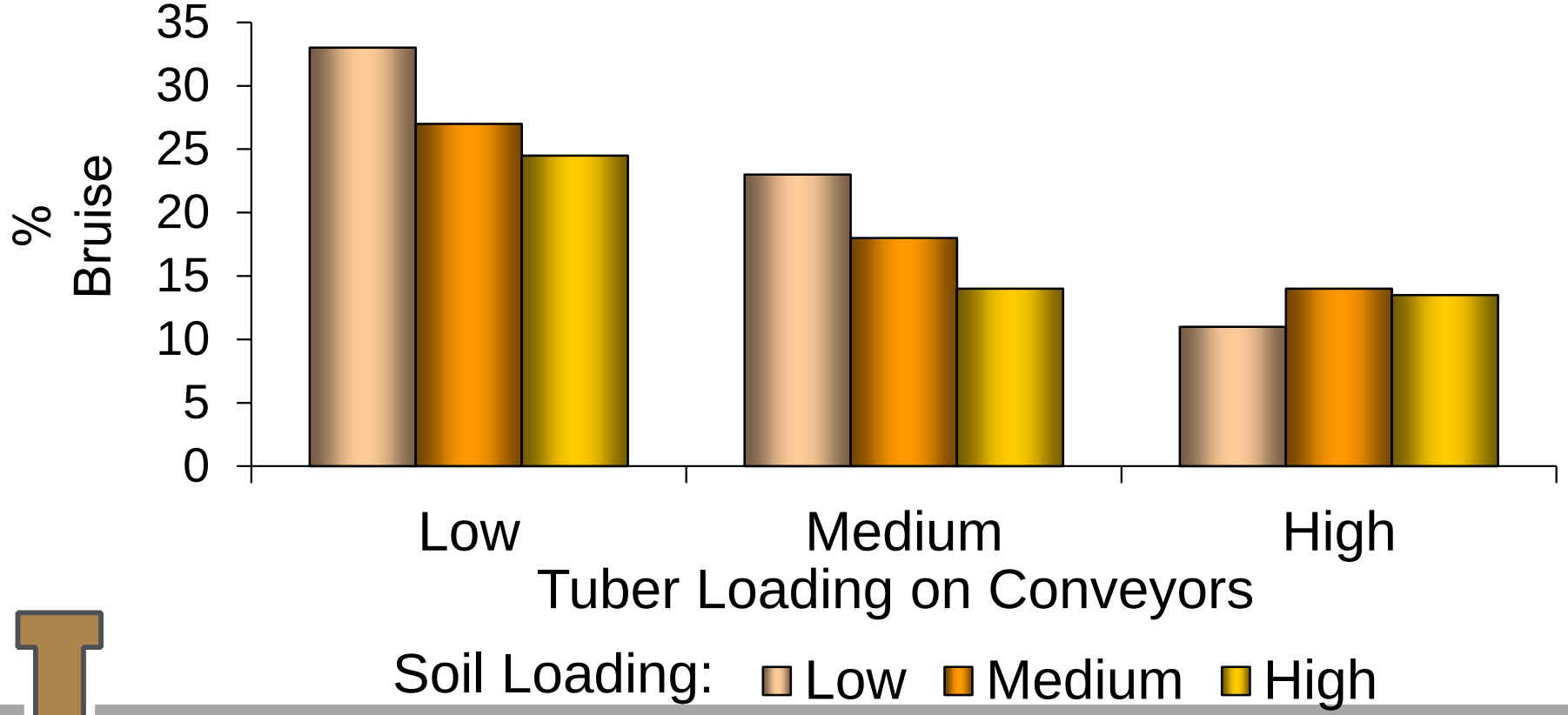
Eliminate Soil

Photo courtesy W. Bohl

Potato Harvesters move 480 ton of soil per acre with blade at 8” depth.

Photo courtesy W. Bohl

Tuber Damage as Measured on Top of Side Elevator



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

Photo courtesy R. Thornton

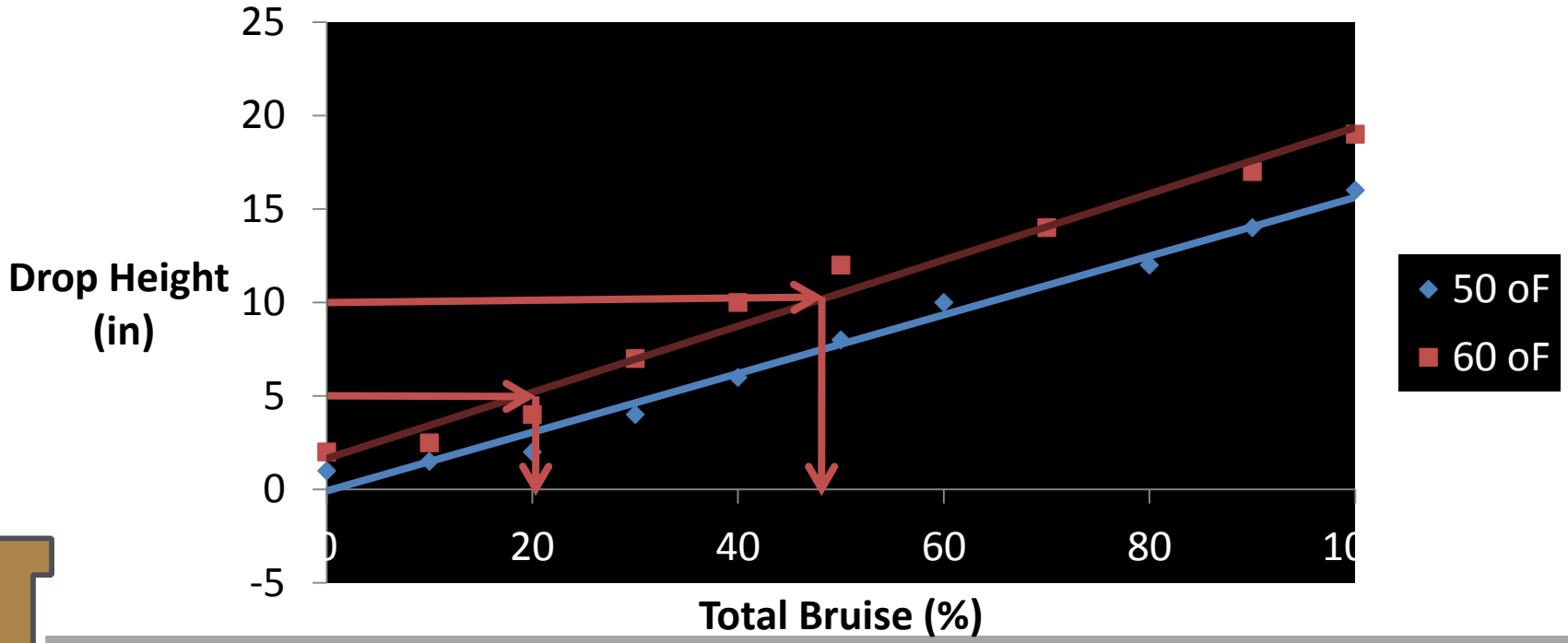
Photo courtesy R. Thornton

To reduce drops tuber + soil load (volume of material) needs to equal conveyor capacity

VOLUME = CAPACITY

Photo courtesy R. Thornton

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%

Photo courtesy W. Bohl

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.

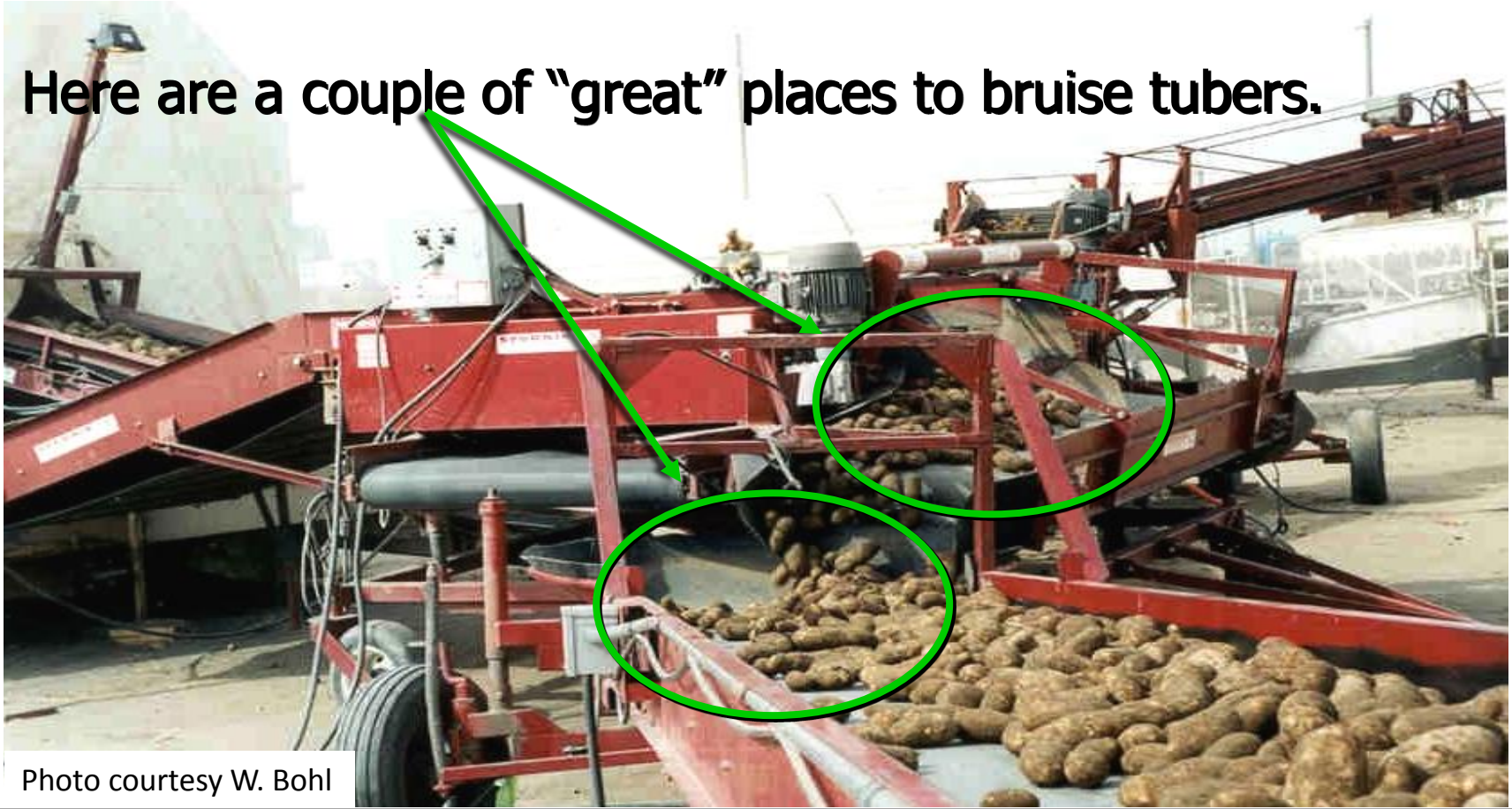


Photo courtesy W. Bohl

Even flow bins provide a good way to maintain constant volume

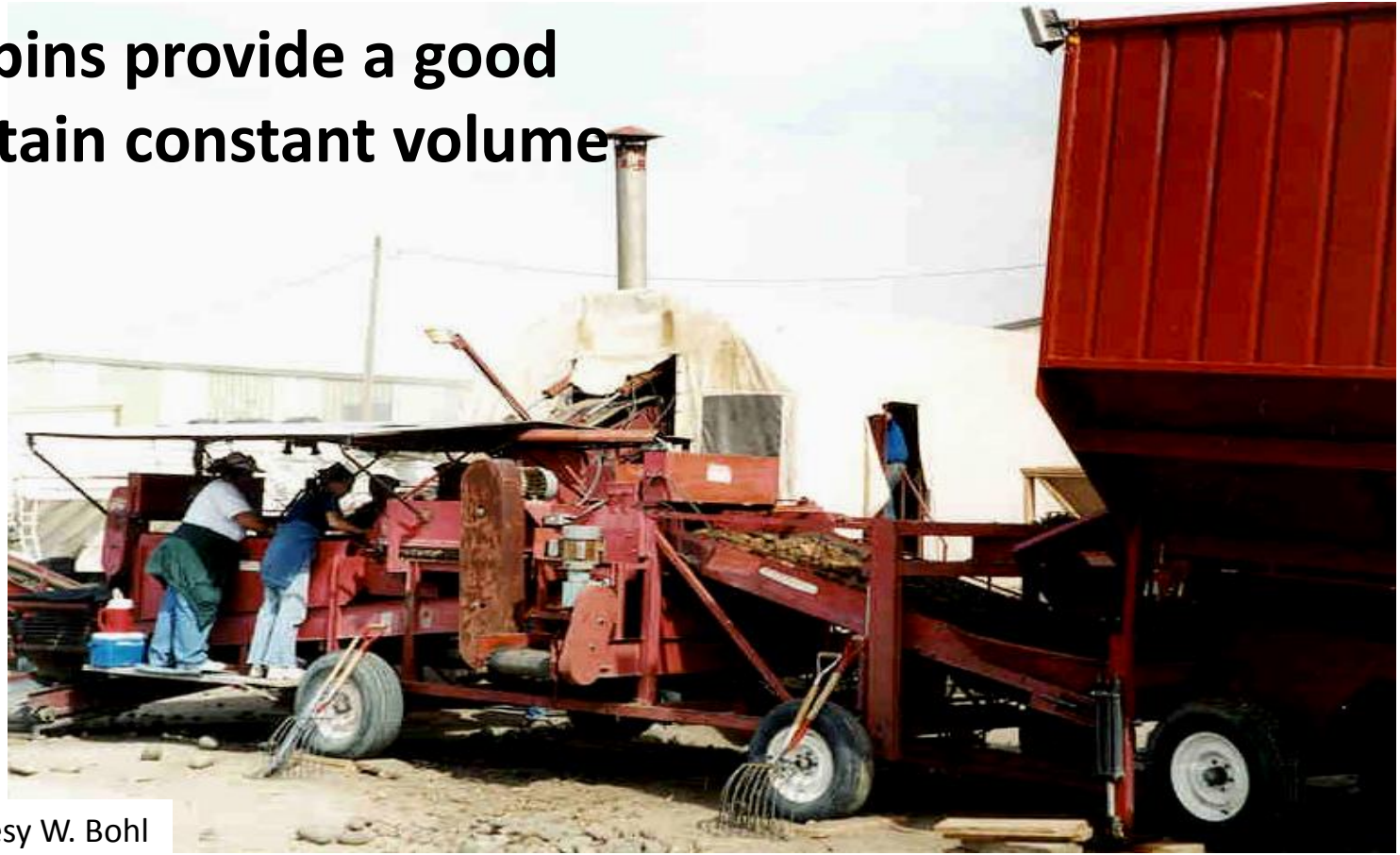


Photo courtesy W. Bohl

FACTORS INFLUENCING BRUISE:

- Tuber Condition
- Temperature
- Harvester Operation
- **Soil Condition**

Photo courtesy R. Thornton

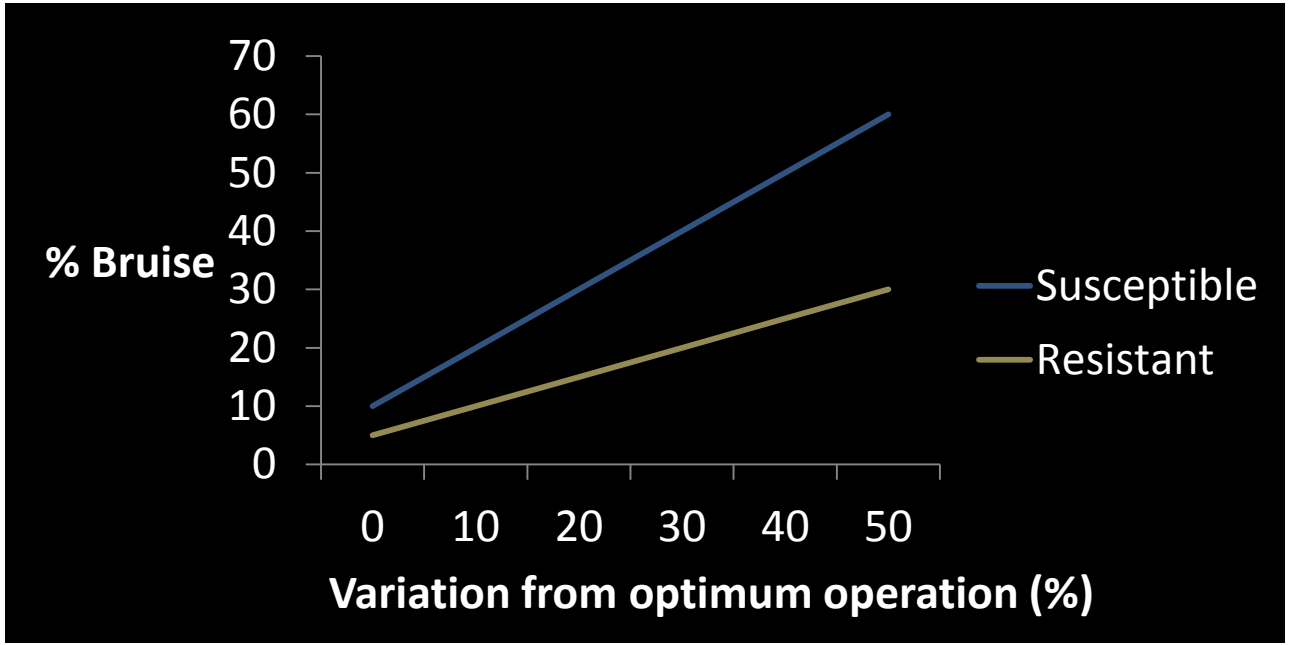
Educate, educate, educate harvest personnel to minimize bruise damage.

Shatter bruise

Black spot bruise

Photo courtesy W. Bohl

Questions?



Source: Thornton et al., 1973