

FACTORS ASSOCIATED WITH POTENTIAL POTATO BLACKSPOT BRUISING AND RECOMMENDATIONS FOR MINIMIZING IT

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INTRODUCTION

Blackspot bruise is caused by a chemical reaction resulting from an impact that damages cells beneath the tuber skin, but does not break the skin. Within the damaged cells, a substrate, primarily tyrosine, mixes with an enzyme, polyphenol oxidase, to turn normally white tissue dark gray to black in color. It takes 24 to 48 hours after an impact for the damaged tissue to change color, and the damaged area can only be seen after the tuber skin is removed. Not all potato varieties are susceptible to blackspot bruising, and there are varying degrees of susceptibility among varieties exhibiting this damage.

Bruise damage occurs during harvest and handling, but the question was raised whether there were conditions prior to harvest that would increase the potential for blackspot bruising. And, if so, what management practices could be used to minimize this damage.

To answer this question, a field survey consisting of 17 Russet Burbank and 3 Ranger Russet fields in 1993, and 28 Russet Burbank and 8 Ranger Russet fields in 1994 was conducted in central and eastern Idaho.¹ The survey determined if there was a relationship between vine maturity, available soil moisture at harvest, specific gravity, or plant nutrient level and the amount of blackspot bruising.

SURVEY RESULTS

In this survey, growing conditions partially influenced the amount of blackspot bruise observed in tubers after harvest. Tubers harvested from vines that were rated in August as more mature (less green) tended to blackspot bruise more than tubers harvested from plants that were less mature (more green). For Russet Burbank, more blackspot bruising occurred on tubers harvested from fields that had 70 percent or more dead vines in August (Table 1), and for Ranger Russet more blackspot bruising resulted from fields where 20 percent or more of the vines were dead in August (Table 2).

Table 1. Field maturity as it relates to blackspot bruising of Russet Burbank potatoes.

Blackspot Severity Group¹	Field Maturity (Percent Dead Vines in Late August)	
	1993	1994
Resistant (<2.5)	17	54
Moderately Susceptible (2.5 – 3.0)	33	59
Susceptible (3.1 – 3.5)	48	61
Very Susceptible (>3.5)	59	89

1. Abrasive peel test ratings where 0=no bruise and 5=most damage.

Table 2. Field maturity as it relates to blackspot bruising of Ranger Russet potatoes.

Blackspot Severity Group¹	Field Maturity (Percent Dead Vines in Late August)
	1994
Moderately Susceptible (2.4 – 3.4)	5
Very Susceptible (3.7 – 4.5)	30

1. Abrasive peel test ratings where 0=no bruise and 5=most damage.

The survey also revealed that tubers with higher specific gravity generally were more susceptible to blackspot bruising. Russet Burbank tubers with a specific gravity above 1.080 and Ranger Russet tubers with a specific gravity above 1.085 were more susceptible to blackspot bruising than tubers with lower specific gravities.

Additionally, available soil moisture affected the amount of blackspot bruising. Fields with lower available soil moisture at harvest tended to have more blackspot bruising. Fields with sandy or loamy sand soil generally had lower available soil moisture at harvest resulting in tubers with a higher amount of blackspot bruising. No relationship was seen between blackspot bruising and plant nutrient levels.

INTERPRETING SURVEY RESULTS

This survey indicates that environment affects the susceptibility of tubers to blackspot bruising. Remember, however, tubers are blackspot or shatter bruised only after sustaining an impact of sufficient force to cause damage. A potato crop harvested from fields with the least potential for blackspot bruising can still be damaged if the tubers are not handled properly. This includes timing harvesting equipment, using padded chains, minimizing drop heights, and harvesting with a tuber pulp temperature of 50 to 65°F.

RECOMMENDATIONS TO MINIMIZE BLACKSPOT BRUISING

Results from this survey indicate the following recommendations may help minimize blackspot bruising:

- Adequately fertilize the crop to avoid stress.

- Kill Russet Burbank vines before 40 percent have died; kill Ranger Russet vines before 5 percent have died.
- Maintain available soil moisture above 60 percent from the time vines are killed to harvest, but avoid saturating the field because this may increase tuber rots.
- Harvest tubers with a pulp temperature of 50 to 65°F.
- Use all bruise prevention recommendations such as using padded chains, properly timing harvesters, and reducing drop heights to minimize impacts.

1. Survey information was adapted from the following research journal article:

Corsini, Dennis, Jeff Stark, and Mike Thornton. 1999. Factors Contributing to the Blackspot Bruise Potential of Idaho Potato Fields. *Amer J of Potato Res*: 76: 221-226.

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