

## STIB, ITS APPARENT CAUSES AND CONTROL

R. Kunkel

Horticulturist, Washington State University, Pullman, Washington

In 1962 I proposed calling blackspot "internal bruise" and coined the word "STIB" to mean "Susceptibility To Internal Bruising," because it would emphasize the basic cause of blackspot rather than describe the after-effects. The idea fell on unreceptive ears and everyone kept on talking about blackspot. Since I've been asked not to mention the derogatory word, I'll try again. Maybe the habit can be changed after all.

After reading what has been written in the proceedings of these conferences during the past two years, I believe that most of the fundamental factors affecting STIB have been described and talked about. They can be listed as follows:

1. A bruising force hard enough to rupture cells. Force has been defined as pressure per unit area. Because of the relationship between pressure and area it is possible for small pressures when applied to small areas to exert tremendous forces. It doesn't take much pressure to force a needle through a piece of leather, but it takes a tremendous pressure to force the blunt end of a pencil through the same leather. This also applies to potatoes. A 10-ounce potato falling on its side lands with less force per unit area than if the same potato falls on its end. The momentum of falling is the same but the area over which the pressure is distributed is vastly different and therefore the forces of contact are different. This is why careful handling and padding of surfaces are of utmost importance when it comes to harvesting and handling potatoes to keep bruising to a minimum.
2. The level of potash in the soil also is directly related to STIB. The exact function of potash in the plant is uncertain, but studies show a bigger root system on potato plants well supplied with potash than on plants grown where potash was deficient. The larger root system would enable the plant to obtain more water and nutrients from the soil. Potash in the plant enables the cells to resist dehydration. Leaves on potato plants growing in soil deficient in potash showed interveinal wilting on a hot day. The following day the wilted areas were dead. The leaves on potato plants growing on soil well supplied with potash showed no wilting or death of tissue during the same hot period. The increased root growth and the decreased transpiration should result in potatoes of higher turgidity and hence greater mechanical strength. Many studies have shown that potatoes grown on soil well supplied with potash darken less when bruised than those grown on soil deficient in potash.

Last summer potatoes were taken from cut spots in the field where the plants were dead or dying and from around the edges of the cut areas where the plants were green. The potatoes taken from the cut spots were always more STIB than those tested from green plants around the edge. Soil analyses showed the soil in the cut areas to be lower in potash than the soil

in the border area where the plants were green. Many of these soil spots were so small it would be hopeless to try to treat them separately. If there are many such spots in a field, and there frequently are, it could account for many of the potatoes which are STIB.

3. Whether or not degree of hydration is the primary factor responsible for making potatoes "STIB" may be argued by some, but the evidence accumulated indicates that it is at least one of the primary factors. STIB potatoes can be hydrated in the laboratory and made 100% resistant. Highly resistant potatoes become STIB while attached to the plant if some of the roots are cut off. STIB potatoes on a plant become resistant if the tops are cut off, if good roots and moisture are present. Resistant potatoes become STIB if stored at room temperature for a period of time. The weight losses can be measured. The tendency is for such potatoes to become STIB slowly and then with continued water loss the tubers eventually became soft and resistant. It may require a month or longer to complete the cycle, depending on condition.

4. Temperature can be a contributing factor in causing potatoes to be STIB. Cold potatoes are generally more STIB than potatoes which are at or near 70°F. Too low a tuber temperature is not likely to be a factor of great importance under Washington conditions except when artificial refrigeration is used, late in the fall after freezing temperatures have occurred, and when potatoes are taken out of storage during winter and early spring.

Although potatoes are generally less STIB when at about 70°F it is no guarantee that the potatoes will not be STIB. Many growers who ship potatoes during the summer months know this to be a fact. Extremely high temperatures are detrimental for reasons other than the direct effect on STIB. The high temperature effect can be minimized if the soil is kept moist as recommended to reduce STIB.

---

Potatoes which are STIB appear to be decreasing in Washington. In 1962, 2.96% of the cars of potatoes which were reinspected were STIB. This decreased to 2.59% in 1963 and to 1.36% in 1964. The data indicate a slight but consistent trend downward over the past three years. Some shippers sent almost no STIB potatoes to market in 1963 or in 1964. Some shippers had troubles in 1963 with STIB potatoes but very little trouble in 1964. A very few shippers had more STIB potatoes in 1964 than in 1963. A total of 295 cars of potatoes, for 2.59%, lost grade because of STIB in 1963 up to November 12. A total of 194 cars of potatoes, for 1.36% lost grade because of STIB in 1964 up to November 12, (Table 1). Table 1 also shows that a higher percentage of cars with STIB potatoes was shipped early in the marketing season both years, and that as the marketing season progressed the percentage of cars filled with STIB potatoes became less. Of particular interest is the difference in the number of cars of potatoes which were STIB during the period of August 1 to 10 in 1963 compared to August 1 to 10 in 1964. Does this difference reflect market strength? Potato prices were high at about this time both years. Do the STIB potatoes which are sent to

market early in the season kill the market from then on? Of the 194 cars which lost grade due to blackspot, 41 cars or 21%, of those which lost grade for blackspot could also have lost grade because of decay.

### Summary

To reduce STIB to a minimum, the following practices are suggested:

1. During the off season, repair and pad all equipment so potatoes can be handled gently from the field to the railroad car. Beware of long drops, sharp edges and protruding bolts.
2. Make sure that potash has been adequately supplied in all parts of the field.
3. Fertilize according to the needs of the soil and according to the expected time of harvest.
4. Keep the soil moist, not wet, right up to digging time.
5. Beat off the vines before they have died from natural causes; allow tubers to rehydrate for several days before digging. To bring about skin set in the quickest possible time, try irrigating, beating and undercutting. (A good undercutter made from a straight blade and equipped with colters to cut vines, and guage wheels to regulate depth will expose very few tubers but it does make digging more difficult.)