

Spud Topics

VOLUME XXXV, Number 11

December 6, 1989

Thumbnail Cracking of Potatoes

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Thumbnail cracking or air checks of potatoes occur during harvesting operation. The cracks or checks are described as semicircular cracks on the surface of the tuber, usually penetrating through the skin but not usually into the flesh. It has been suggested that these cracks are a result of physical damage and/or tubers being rapidly moved from a moist soil environment. After being unable to identify any research reports that tested these hypotheses, this research was initiated.

In order to determine the role of impacts on thumbnail cracking of potatoes, three separate experiments were performed.

The first test was to collect potatoes from five locations within the potato harvesting and handling systems at the Agri Northwest Eureka Farm. Potatoes of random size were collected by hand from several locations within the equipment and carefully placed in plastic buckets for transporting and subsequent analysis. The following day the tubers were washed and inspected for cracks. The number of cracks per tuber and percentage of tubers with cracks were determined at 48 hours and 7 days after harvest. The same tubers were then peeled and evaluated for blackspot bruise. Any black discoloration was recorded as a bruise.

Table 1. Tuber damage caused by harvesting and handling equipment.

<u>Sampling Location</u>	<u>48 hr reading % of tubers with cracks</u>	<u>7 day reading number of cracks/tuber</u>	<u>Change in % of tubers having blackspots</u>
Harvester Boom	66%	2.2	--
End Dump Conveyor	55%	2.4	6
After Cleaning Rolls	76%	4.0	7
Front of Piler	90%	7.3	5
Face of Pile	96%	9.3	8

Table 2. Thumbnail cracks at two locations in harvesting and handling equipment.

<u>Sampling Location</u>	<u>Number of Cracks/Tuber</u>
Harvester (Farm 1)	2.2
Face of Pile (Farm 1)	4.3
Harvester (Farm 2)	2.3
Face of Pile (Farm 2)	5.9
Harvester (Farm 3)	2.7
Face of Pile (Farm 3)	5.4

The percentage of tubers having cracks was high by the time they had traveled through the harvester and approached 100% by the time they were placed on the face of the pile in the storage. It is apparent that in locations where shorter tuber drops occurred, such as onto the end dump conveyer, little increase in damage occurs. It was surprising to find significant increases in the number of cracks along the conveying system to the front of the piler (increase of 3.3 cracks).

Wherever increases in the number of thumbnail cracks occurred, the percent of tubers with blackspots also increased (Table 1). This correlation ($r^2 = .82$) between the occurrence of blackspot damage and cracks was expected. What is interesting is that the increases in percent of blackspot bruises increases uniformly throughout the system. It should be noted here that most of these bruises would not have been recorded in a normal bruise evaluation. They were generally spots less than 1/8 inch in diameter.

The second test was conducted from handling equipment at three other locations on Agri Northwest Farms (Table 2). Although the values differed between locations, the number of cracks per tuber increased in the harvesting and handling equipment similarly in all tests.

It has been suggested that thumbnail cracks result from rapid dehydration of turgid tubers when removed from the soil. To test this hypothesis tubers were harvested by hand and carefully placed in plastic buckets for transporting and testing. For this test 40-50 hand dug tubers were placed in the handling system at various locations and allowed to traverse one drop, conveyer connection or direction change. Tubers that were hand dug, placed in buckets and evaluated without passing over any handling equipment had no thumbnail cracks (data not shown). The results indicate that approximately 0.4 cracks per tuber occur at minor drops or direction changes in the handling equipment. A higher number of cracks, 1.0 per tuber, occurs at large drops such as into the piler crow's nest and that 2.0 cracks per tuber may occur through the harvester (tests 1 and 2).

Conclusions

Russet Burbank potatoes grown in the southern Columbia Basin are subject to surface cracking. These cracks are referred to as "thumbnail cracks or air checks." These tests demonstrated that the cracks only occur following some sort of contact with another object and not by exposure to atmospheric conditions. The same factors that cause blackspot bruise in these systems result in the surface cracks studied in this research.

Recommendations

Reduce damage by eliminating or reducing the size of drops in harvesting and handling equipment. Harvesting while tubers are warm may reduce cracking.