

## HOW TO REDUCE BRUISING AT HARVEST TIME

Walter C. Sparks

Horticulturist, Aberdeen Branch Experiment Station

You have just listened to Dr. Sawyer explain the physiology of black spot in storage and I believe this has been very enlightening regarding the formation of this condition which is the scourge of the potato grower in the Pacific Northwest. There is one factor which almost all workers agree upon with relation to black spot. In order for black spot to occur, the protoplasm within the cells of the potato tuber must be disorganized. For all practical purposes in our area this means that the tuber must receive a bruise before black spot can occur. Then, at the possible expense of over-simplification of the problem preventing bruising at harvest time will eliminate black spot. It is really that simple!

The amount of injury and black spot caused to farmers' potatoes during the harvesting and handling and shipping operations is tremendous. Most farmers lose at least 15 percent of the U.S. No. 1's they raise because of injury caused during the various handling operations. These large losses, which the farmer suffers are NOT necessary and can be eliminated or markedly reduced.

The way you plow, the way you prepare the seed-bed, plant, irrigate and manage the field during the growing season, has a great deal to do with the amount of injury caused during the harvesting and handling operations. Most of our potatoes are harvested by the mechanical bulker-combine machines. In order for these harvesters to do a good job and reduce bruising to a minimum, the soil must be loose and friable with very few clods. Some of the clod problems during the harvesting season are actually encountered the day we take our plow into the field and begin preparing the land for the planting of our potato crop. Whether we plow in the fall or whether we plow in the spring, the moisture content of the soil at the time we work it has a great deal to do with the number of clods we have at harvest. This is especially true if we spring plow and then disc and work down our soil if it is quite moist. It has been shown that if the soil is moist, compaction from the tractor and other equipment occur at each pass over the field. The more times we go across the field the more compaction takes place, thus resulting in more hard clods at harvest time.

During the growing season, the more times we cultivate, spray, hill or ridge potatoes, the more likely we are to have clods at harvest time because generally these operations are done immediately after irrigation or sprinkling rather than just before irrigating. Any furrowing, hilling or cultivating, either for weed control or irrigation purposes, should be done only when the soil is dry enough so compaction will not result. A mechanical harvester should not be expected to overcome problems created by the poor cultural practices and improper

management of soil during the growing season.

The proper and timely application of irrigation water, the timeliness of the cultural operations, and the proper management of the land in preparation for harvesting are all very important factors in the number of clods which will be turned up by the harvester. The time of harvest and whether or not your potatoes are going to be stored may influence the management practice you use in order to reduce injury at harvest. For instance, if you are harvesting in the early fall and planning on shipping your potatoes directly from the field to the consuming market, Dr. Kunkel recommends that the potatoes be kept moist to reduce the amount of black spot which will occur during the harvesting operation.

For storage of potatoes in Idaho, we must prepare the tubers for storage and harvest by having the tubers mature and the skins set in order to reduce bruising during harvesting and handling. We have found the least black spot and injury to occur when we stop our irrigation in the fall by approximately 10 days to two weeks before the date of a killing frost. The date to stop irrigating in the fall will vary as to area and as to the type of soil, but the purpose of it is to allow the potatoes to mature and the skins to set before we attempt to harvest them. Then just a few days before harvest, depending upon the type of soil, irrigate the field to moisten any clods which might be present so they can be easily broken by the digger chain or rollers, or easily picked off by the pickers on the back picking chain. Thus, by allowing the potatoes to be completely mature and applying a very light irrigation just before harvest, many of the ill-effects of a cloddy harvest situation can be avoided.

That the date of last irrigation has a very definite effect upon maturity and reduction of injury is shown in results obtained at the Aberdeen Branch Experiment Station. When the first killing frost was between September 10 and September 12, potatoes receiving the last irrigation on August 10 had an injury index of 388.6, those that were irrigated for the last time on August 22, showed an injury index of 618.2, and those that were irrigated on September 2 had an injury index of 716.0. These data showed a highly significant reduction in injury to those potatoes which had been matured or on which the irrigation was stopped early in comparison to those where the irrigation was continued till harvest.

Most potatoes are bruised during harvest because the equipment runs too rapidly. Therefore, to reduce bruising slow down the equipment! The equipment should not run faster than one and one-half miles per hour forward speed and the digger chain not faster than 150 feet per minute.

Suppose you have a larger acreage than you can harvest when you run at these speeds. The proper solution to the problem is not to run the equipment faster, but to obtain another harvester. The proper

speed should be accompanied by adequately padding the truck beds and properly regulating the fall from the harvester elevator to the bed of the truck and the pile of potatoes in the truck. Tubers should never drop over six inches from the harvester to the truck or pile of potatoes and should never drop over six inches from the truck to the piler in a storage bin.

When the potatoes are unloaded into the piler in the cellar it should be remembered that the piler hopper and the chain should be padded with soft sponge rubber. It should also be remembered that the unloading chain and piler chain should not run faster than 70 feet per minute to reduce bruising to a minimum.

In preparation for the storage of potatoes, the cellar should be wet down each fall before the storage season begins, so that the cellar at harvest time is moist but not muddy. This is especially important in a new unused cellar. Potatoes should never be placed in a warm dry storage and it is good handling practice to remove all tubers having cuts, serious bruises, water rot or field frost. Even though we will touch upon it in the next paper on storage management, it is good to remember that potatoes will heal only under conditions of high humidity. Temperatures between 45 and 50°F have been found to allow Russet Burbank potatoes to heal as rapidly as temperatures higher than this and still are low enough that they do not allow the rapid invasion of rot organisms.

Studies at the Aberdeen Branch Experiment Station have shown that uninjured tubers store well without much trouble; whereas, injured tubers require special attention. Proper cultural practices and careful management of the harvesting and storing equipment are the most important factors in reducing injury to potatoes.