



The market demand for uniform appearance of sweet potatoes often brings about the use of long and complicated packing lines to allow for grading and sizing of the roots. This unfortunately results in many opportunities for mechanical damage to the roots including skinning, cuts, bruises and breaking of ends that detract from the appearance of the roots and increase the possibility of disease development.

The type and extent of damage depend on the physics of the movement of the roots along the packing line and the nature of the surfaces they come in contact with. A survey of 24 sweet potato packing lines in Louisiana conducted from 2004 through 2006 revealed many similarities among the packing lines in terms of physical layouts and associated trouble spots. That study provided valuable insight into ways to limit damage to sweet potatoes during packing. Among its conclusions were that, in general, significant differences in damage potential exist between various packing line configurations and even within the same line operated at different capacities and speeds.

Other significant findings were that although more than 80 percent of the total impacts occurred from root-to-root contact, most damage occurred from impacts between the sweet potatoes and the various surfaces of the packing line. This is important because it suggests attempts to cushion these surfaces or otherwise reduce impacts may significantly reduce mechanical damage to the roots.

Common "make do" padding materials, such as carpet and upholstery foam, perform poorly when compared to specially engineered padding materials but are, nevertheless, much better than bare metal surfaces. Use a good quality cushioning material on all impact surfaces. The ideal cushioning material is thick and moderately stiff with a tough surface that resists wear and prevents the absorption of water and dirt. Padding material should be easily cleaned during periodic wash-downs. Carpet materials fail in this regard because they are difficult to clean.

Packing lines should be as level as practical. Packing lines that cause the sweet potato roots to rise and fall impart unnecessary potential energy to the roots that eventually results in mechanical damage. For example, when sweet potatoes are elevated by the use of a belted conveyor or other means, potential energy is imparted to the roots in proportion to the height they are raised. When they are subsequently allowed to fall or roll back to the lower level, the potential energy is changed into kinetic energy (motion) that must be absorbed by the roots and/or the impact surface.

When it is necessary to lower sweet potatoes from one level to another, do so gently by using generous quantities of energy-absorbing blankets, strips or padded surfaces. Long, inclined surfaces also offer more opportunities for reducing velocity than near-

Table 1. The average sweet potato packing line.

	Average**	Maximum	Minimum
Number of drops	9	13	5
Number of turns	2	4	0
Cumulative impacts (g)*	87	152	46
Length of line (feet)	80	212	39
Speed of line (feet per minute)	28	59	12

*Cumulative impacts (g) are the sum of all measured drops and turns on a packing line. Values are the average of five runs of the SmartSpud® on each packing line.

**Averages are based on 24 packing lines.

vertical falls. Produce conveyor belts generally have minimal energy-absorbing ability. When sweet potatoes are allowed to drop onto a belt supported by sheet metal or rollers (for example, under a sizer), the amount of bruising is nearly the same as if the belt were not there. If possible, these supports should be removed to allow the belt to be suspended, resulting in an energy-absorbing impact surface.

The synchronization of the packing and grading line components to prevent abrupt changes in velocity or direction of the roots should be considered. Cross conveyors should be carefully engineered to allow a gradual change in direction and velocity by the use of curved and padded transitions. Packing lines should be operated no faster than necessary to reduce sweet potato damage and wear on the components.

Recommendations to reduce damage on packing lines

- Dump sweet potatoes slowly into water and not onto roots already in the dump tank.
- Use high-quality padding on all impact surfaces.
- Reduce the number of drops.
- Reduce drop heights between components through the use of long inclines.
- Reduce the overall length of the packing line.
- Remove belt supports (if feasible) to reduce impact.
- Use deceleration flaps and blankets to reduce the speed before drops.
- Instruct workers to handle sweet potatoes with care.
- Avoid abrupt changes in direction and speed of belts. Add padding if turns are unavoidable.
- Reduce packing line speed.

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Reducing Damage to Sweet Potatoes

on the Sweet Potato Packing Line

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