HortScience 23(2):405. 1988.

Effect of Mechanical Injury on Storability of 'Georgia Jet' Sweet Potatoes

Melvin R. Hall[1]
Department of Horticulture, University of Georgia Coastal Plain Experiment Station, Tifton, GA 31793

Additional index words. *Ipomoea batatas*, harvest injury, washing, cracking, weight loss

Poor cosmetic appearance of fresh-market sweet potatoes [*Ipomoea batatas* (L.) Lam.] associated with harvesting injuries has led to the abandonment of mechanical sweet potato harvesters in some areas. There has been increased concern that damage associated with mechanical harvesting could be magnified during storage in cultivars such as 'Georgia Jet' (1), which are not suited for long-term storage even when properly cured. An additional concern is that mechanical harvesting may reduce the propagation potential of the bedded storage roots. This note describes the influence of dropping and washing on abrasion, cracking, percent weight loss during storage, and formation of sprouts on storage roots of 'Georgia Jet' sweet potato.

'Georgia Jet' sweet potatoes grown in Tifton loamy sand (fine-loamy, siliceous, thermic Plinthic Paleudults) were harvested with a PTO-driven mechanical potato harvester (H. S. Shoemaker & Son, Inc., Rayville, La.). Average soil temperature was 31°C at a 10-cm depth. Soil moisture content was not measured, but the soil was neither excessively wet nor dry. Roots traveled 170 cm along the steel conveyer chain before falling 45 cm to the soil surface. Roots (5.0–9.0 cm in diameter, 15.0–20.0 cm in length), selected for minimal abrasion and absence of cracks, were dropped individually from a height of 150 cm 0, 1, or 2 times into the bottom of a wooden crate. An attempt was made to drop roots so a side contacted the crate. Roots were then either not washed or washed with low-pressure jets of water over nylon brushes in a commercial vegetable washer (TEW Manufacturing, Penfield, N.Y.). Unwashed roots were carefully rubbed by hand to remove loose soil. Ten random roots from each combination of drop and wash treatments were placed into paper bags, weighed, and cured for 5 days at 32° ± 1°C and 85% ± 5% RH. After curing, each lot was weighed and stored at 16° ± 1° and 85% ± 5% RH. Samples also were weighed after 30, 63, and 134 days of storage. Roots from each lot were examined individually for abrasions and cracks after the last weighing. A root was classified as abraded if >20% of its epidermal surface had been removed before curing. A root was classified as cracked if one or more cracks of any size penetrated the flesh. Sprouts were counted on unwashed roots from each drop treatment and consisted of buds not exceeding 0.5 cm in length.

The increased cosmetic damage of dropped roots (Table 1) was consistent with previous results (2). Washed roots appeared more abraded before curing, but differences were not detectable when evaluated after storing. Increased abrasion and cracking from dropping were not associated with weight loss in storage, consistent with a previous report (2). Increased weight loss with increased storage duration (Table 1) followed other reported trends (3). For unknown reasons, washed 'Georgia Jet' roots lost less weight during storage than unwashed roots. A similar response also was shown by 'Red Jewel' sweet potato roots subjected to similar treatments (data not shown). Visual inspection of internal quality revealed no differences in appearance regardless of drop and wash treatments. No storage rots were observed in this study. Although these roots were not bedded, difference in number of sprouts (Table 1) demonstrates the potential importance of careful handling of roots used for propagation.

Lack of significant interactions indicated the effects of dropping were additive on abrasion and cracking and the effects of washing and storage time were additive on percent weight loss. Increased cosmetic damage associated with mechanical harvesting is well-known, but, in many production areas sweet potato producers will continue to use mechanical harvesters. These results do not indicate that the cosmetic damage from dropping and washing contributed to reduced storage life of 'Georgia Jet' sweet potatoes subjected to recommended curing and storage conditions.

Literature Cited

1. Harmon, S.A. 1974. 'Georgia Jet' an early, high yielding high quality sweet potato cultivar for Georgia. Univ. of Georgia Res. Rpt. 193.
2. Kushman, L.J. 1975. Effect of injury and relative humidity during curing on weight and volume loss of sweet potatoes during curing and storage. HortScience 10:275–277.
3. Picha, D.H. 1986. Weight loss in sweet potatoes during curing and storage: contribution of transpiration and respiration. J. Amer. Soc. Hort. Sci. 111:889–892.

Table 1. Influence of dropping and washing on weight loss, abrasion, cracking, and sprout development during storage of 'Georgia Jet' sweet potatoes.

	Weight loss (% fresh wt)[z,y]	No. abraded roots[x,w]	No. cracked roots[x,w]	No. sprouts[w,v]
Dropped (no. times)				
0	8.9 a[u]	5 b	0 b	21
1	7.7 a	5 b	1 b	18
2	9.5 a	10 a	3 a	6
Washed				
No	9.7 a	7 a	1 a	---
Yes	7.7 b	6 a	2 a	---
Storage duration (days)				
0	4.6 d	---	---	---
30	7.7 c	---	---	---
63	9.9 b	---	---	---
134	13.7 a	---	---	---
Significance	L**Q**[t]			

[z]Experimental design was a split-split plot. Dropped = main plots, washed = subplots, and storage duration = sub-subplots, with four replications.
[y]Back-transformed means. Arcsin transformation for analysis.
[x]Experimental design was a split plot. Dropped = main plots and washed = subplots, with four replications.
[w]Back-transformed means. $\sqrt{x + 0.5}$ transformation for analysis.
[v]Sprouts were counted on 40 roots of each unwashed drop treatment. Transformed means were 4.6 ± 0.3, 4.3 ± 0.3, and 2.6 ± 0.3 for 0, 1, and 2 times dropped, respectively.
[u]Mean separation within main effects within columns by Duncan's multiple range test, 5% level.
[t]L = linear; Q = quadratic, ** = significant at the 1% level of probability.

Recieved for publication 15 June 1987. Use of trade names does not imply endorsement by the Georgia Agr. Expt. Sta. of the products named nor criticism of similar products not mentioned. This research was supported by state and Hatch Act funds allocated to the Georgia Agr. Expt. Sta. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.
[1]Assistant Professor.