

## SCALPED VS. NON-SCALPED SUGARBEETS

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### **Abstract:**

Defoliating sugarbeets without removing the crown can increase storage quality. Because the crown has lower sucrose and more impurities than the body of the sugarbeet, removing the crown with knives (scalping) can result in higher sucrose per delivered ton for the producer, but can increase spoilage in the pile. The objective of this study was to compare quality and sucrose yield of scalped and non-scalped sugarbeets. In this four year study, sugarbeets were defoliated using flails but not knives. Sugarbeets were dug from the field and each beet was split in half with a saw. One half was scalped to the last leaf scar using a machete, and the other half was not scalped. The two halves were put into paired bags, with one bag having all the scalped halves and the other having all the non-scalped halves. Fifteen to eighteen sugarbeets were used for each pair of bags. Twelve pairs of bags were evaluated each year. Sugarbeet weight, sucrose and impurities were compared using a paired-t test. Across years, scalped beets had a 7.7% yield loss to scalping and had 0.14% increase in sucrose content. Non-scalped sugarbeets had significantly greater sodium and amino-N contents, resulting in greater sucrose loss to molasses.

### **Introduction:**

Defoliating sugarbeets (*Beta vulgaris* L) without removing the crown can increase storage quality. Non-topped beets reportedly lost 12.6% less sucrose in storage than topped beets due to respiration, while mechanical damage, such as topping, increased respiration and pathogen damage (2). Akeson (1) reported that flailed but non-topped sugarbeets had lower sucrose content (0.25-0.38%) than beets topped to the lowest leaf scar, but that enough of the beet was lost to topping that 5-10% more sucrose was harvested per acre with non-topped beets.

Halvorson et al. (3) reported that crown tissue has lower sucrose and greater impurities than root tissue. Because the crown has lower sucrose and more impurities than the body of the sugarbeet, removing the crown resulted in higher sucrose per delivered ton for the producer, but increased spoilage in the pile. The crown in today's sugarbeet varieties is a smaller proportion of the total beet weight but the distribution of sucrose and impurities has not changed (4). The objective of this study was to compare quality and sucrose yield of scalped and non-scalped sugarbeets.

### **Materials and methods:**

In this four-year study, sugarbeets were defoliated using flails but not knives. Sugarbeets were dug from the field and each beet was split in half with a saw. One half was scalped to the last leaf scar using a machete and the other half was not scalped. The two halves were put into paired bags, with one bag having all the scalped halves and the other having all the non-scalped halves. Fifteen to eighteen sugarbeets were used for each pair of bags. Twelve pairs of bags were evaluated each year. Sugarbeet weight, sucrose and impurities were compared using a paired-t test.



Figure 1. The photo on the left shows a sugarbeet that has been cut in half and had one half scalped and one half not scalped. The photo on the right shows the method of scalping.

### Results:

Table 1. Yield and quality of scalped and nonscalped sugarbeets across years.

Treatment	bag wt, lb/bag <sup>1</sup>	percent sucrose <sup>1</sup>	Na, ppm <sup>2</sup>	K, ppm <sup>2</sup>	amino- N, ppm <sup>2</sup>	SLM <sup>2</sup>	sucrose yield, lb/bag <sup>1</sup>	extractable sucrose, lb/bag <sup>2</sup>
nonscalped	18.46	18.89	315	1654	140	0.985	3.49	3.25
scalped	17.03	19.03	281	1614	130	0.939	3.24	2.98
t-value	8.34	2.84	2.90	1.16	1.98	2.03	7.23	7.51
probability	<0.001	0.006	0.006	0.252	0.054	0.048	<0.001	<0.001

<sup>1</sup>four years of data, df = 59

<sup>2</sup>three years of data, df = 47

Across years, scalped beets had a 7.7% yield loss to scalping and had 0.14% increase in sucrose content. Non-scalped sugarbeets had significantly greater sodium and amino-N contents, resulting in greater sucrose loss to molasses. Sucrose yield and extractable sucrose of sugarbeets in paired bags were significantly greater in nonscalped beets.

### Literature cited:

1. Akeson, W.R., S.D. Fox and E.L. Stout. 1974. Effect of topping procedure on beet quality and storage loss. *J. Am. Soc. Sugar Beet Technol.* 18:125-135.
2. Cole, D.F. 1977. Effect of cultivar and mechanical damage on respiration and storability of sugarbeet roots. *J. Am. Soc. Sugar Beet Technol.* 19:240-245.
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4. Jaggard, K.W., C.J.A. Clark, and A.P. Draycott. 1999. The weight and processing quality of components of storage roots of sugar beet (*Beta vulgaris* L). *J Sci Food Agric* 79:1389-1398.