Changing the Beet Root Shape to Conform to Mechanical Harvesting

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FOR SOME TIME people in the industry have been considering the necessity of developing a new type root particularly adapted to mechanical beet harvesting. A test was conducted this past fall at Fort Collins, Colorado, with two types of roots, harvested with a Marbeet "Midget" harvester. All of those who witnessed the test were very optimistic as to the possibilities of changing the shape of the beet and its place in our mechanization of the beet crop.

The two varieties compared were one which included the present standard commercial root type, which has a long tapering root form, with a new, more blunt-shaped beet. As many farmers and agriculturists all over the country have remarked, this shape does not conform to fast pulling of beets as the tap roots break off in unfavorable soil conditions, particularly when the roots are brittle. Very little has been done about

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finding out how much of the root is left in the soil with mechanical harvesting as compared with ordinary beet pullers. The second variety compared has a root that is heart shaped, has a small crown but carries the weight up closer to the surface of the soil. The variety used in the test was a four-generation selection from a cross between a red garden beet and a leaf spot-resistant sugar beet U. S. 200 x 215. This development required 8 years to reach the hybrid beet in the comparison. Because of the hybrid character, the beet was also very uniform as to the size and shape with practically all of the beets having the appearance of being turned out of a single mold.

The beets were in 16-row plots 250 feet long and were adjacent in the same field so that the soil type and character of other conditions were as similar as it was possible to obtain. The accompanying photographs show in No. 1, the type of root compared as a check with that in photograph No. 2 as the new variety of root for mechanical harvesting. It is not important that this particular variety be the one used in mechanical harvesting. We are merely stressing the importance or need of changing our present standards of root selection to conform to more modern equipment. Incidentally, in the test the hybrid beet averaged 15.47 tons as compared with the conventional of 12.3 tons.

Actual comparisons on a percentage basis are given in table 1:

Table 1.

	Standard conventional	Machine hybrid
Percent weight of beets lost from machine	3.6	2.5
Percent weight of total beets left in ground	5.0	0.0
Percent weight of beet tissue on tops (loss)	0.5	1.7
Percent top tare of harvested beets	6.1	3.4

If you translate the figures reported in the table with actual tonnages the differences are much more significant in favor of the new type root. Assuming an average crop of 13 tons per acre, the losses represented with the conventional type root, including losses from the machine and in the ground, amounted to 1.18 tons per acre. Comparing this with the losses on the same acreage yield with the mechanical root of .54 ton, we have only 46 percent as much lost root. This does not include the amount of top tare. We feel that it is very important also that the nature of receiving beets, with the more vigorous screening now employed at receiving stations and the subsequent rather rough handling in rock separation wheels, beet washers at the factory and other mechanical devices, that the new type root, being more round in character, will not sustain the tailings losses which at some factories now runs as high as 5 to 10 percent. These losses have been too much ignored in the past, but mechanical operations, including Athey loaders, clam shells and other devices lay stress on the importance that plant breeders are going to play in developing a better shaped root.

Conclusions

Even though the results reported were entirely inadequate from a statistical standpoint, they are so outstanding in this first initial test that we are insisting that considerable additional work be done to compare all phases surrounding the development of the new shaped root for mechanical production. As compared with the conventional tapered roots, the new type has the following advantages:

1. Because of its shorter tap root, there is much less draft on the tractor as the beets grow shallower and it is not necessary to set puller points as deep.

2. Less root breakage in the ground.

3. Less losses of roots in machine harvesting.

4. Less total top tare due to greater uniformity of beets in the manner in which they grow out of the ground, having a smaller whorl of leaves.

5. Less breakage in screening devices on harvesters.

6. Because of their round shape less losses due to the mechanical handling in receiving stations, wet hoppers, rock separation wheels, mechanical reloading and beet washers and elevators.

7. Because of shallower puller point operation, less clods are lifted than with standard type roots.

8. With spiked wheel operations, such as the Marbeet "Midget" used in this test, the beets come straight off of the periphery of the wheel making for uniform flat topping. Conventional beets too often grow in a "peaked" crown shape that goes up the wheel in an oblique direction.