

# Beet Seed Processing Problems at Rocky Ford, Colorado

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For the past five years all processed beet seed used in American Crystal Sugar Company factories east of California has been processed at the Rocky Ford, Colorado, seed processing plant. This plant is equipped with two decorticators and one segmenting machine, two seed cleaners and an automatic sacking out scale. All elevation of seed is by air suction, and dust from processing operations is settled in dust cyclones with the lightest fraction being drawn into a wet process disposal unit and exhausted as sludge.

During the past 3 years much attention has been given to the size of processed seed, with the object of obtaining 100 percent cell fill at the higher seeding rates (over 9 seeds per foot of row) in the presently used precision beet drills. As late as 1946 the size of processed beet seed was not a particular problem with the older drills and their "conversion units." During 1946 and 1947, the average seed size within the 7/64" to 10/64" size range was allowed to increase. This was accomplished by gradual reduction of the seed ball size in the processing operation. In 1917, 80 percent of the seed run over cleaners equipped with 7/64" and 10/64" round hole screens was found to be between 9 and 10/64" in size.

In 1947 some difficulty in obtaining adequate seeding rates per acre with precision drills was found, and many farmers enlarged cells in drill plates so that adequate seeding rates could be obtained. In 1947 experiments were conducted on seed sizes, and it was decided to use the Eureka No. 7 cleaner for the final cleaning, rather than on the 68 D Clipper, in order to reduce seed size slightly (1)<sup>2</sup>, for 1948 seed issue.

## 1948 Experiments

Despite the average smaller seed size of 1948 issue seed, maximum cell fill was not obtained, particularly in the Red River valley of Minnesota and North Dakota, where the planting rate desired is 12 seeds per foot of beet row. During 1948, further experiments were conducted to determine all factors affecting cell fill in the seed plates. Processed seed of 7-8/64", 8-9/64", 9-10/64" and 10-11/64" sizes was sent to the Beet Sugar Development Foundation at Fort Collins, Colorado, for tests on the John Deere No. 66 and the International No. 40 drill units. Tests were made on the above four seed sizes and also on the following mixtures of sizes as follows:

- |              |                              |
|--------------|------------------------------|
| (1) 7-10/64" | 1947 issue                   |
| (2) 7-10/64" | (7-8:15%, 8-9:45%, 9-10:40%) |
| (3) 7- 9/64" | (7-8:25%, 8-9:75%)           |
| (4) 9-11/64" | (9-10:50%, 10-11:50%)        |

<sup>1</sup> Plant Breeder, Beet Seed Operations, American Crystal Sugar Company, Rocky Ford, Colorado.

<sup>2</sup> Numbers in parentheses refer to literature cited.

Samples of processed seed of various mill runs of sizes 7-9/64", 7-10/64", and 9-11/64" were also sent to the American Crystal sugar factory at East Grand Forks where drill tests were made on these same drills. The results of these tests, aiming at 100 percent cell fill, were as follows:

- (1) For light seeding rates, drill plate cells should be at least 1/64" larger in diameter than the largest size seed.
- (2) For seeding rates of 10 to 12 seeds per foot of row, cell diameter should be 3/128" to 2/64" larger than the largest size seed.
- (3) Worn drill plates can reduce cell fill by as much as 15 percent.
- (1) John Deere drill plates having cells of .168" diameter, when drilled to 11/64" (.172") , planted as high as 23 percent more seed.
- (5) All new plates should be checked for cell size and "smoothed" before use.

Since cells in drill plates in use in most eastern beet growing areas were .168" and .172" in diameter it was decided to reduce the seed size to 7-9/64" for 1949.

#### 1949 Experiments

Early in 1949 units of 4 of the more commonly used beet drills were set up in the seed processing plant at Rocky Ford for testing daily mill runs of processed seed. Comparisons were made with new and worn plates, and also of cell sizes .168" and .172" for cell fill. The results substantiated the findings of the 1948 tests conducted by the Beet Sugar Development Foundation and the East Grand Forks factory of the Company.

Tests were also made, using 7-9/64" seed, of the effect on planting rate of different amounts of seed in the seed cans. In both the JD No. 66 and the International No. 40 drill units the seeding rate dropped as the amount of seed in the cans lowered. When the cans were kept 2/3 full, cell fill was computed to be 103 percent; at 1/2 full, cell fill had dropped to 98 percent, and when nearly empty, to 90 percent.

#### Cleaning Plant Changes

Both the Eureka No. 7 and the 68D Clipper seed cleaners are located on the second floor in the Rocky Ford seed processing plant. The Eureka No. 7, being equipped with a Buhler drive, absorbs the shake of the screen deck, but the 68D Clipper, having an eccentric drive, imparts great vibration to the entire building. To correct this condition a Buhler drive of the proper size, traveling the same rate as that on the Eureka, was installed on the Clipper in 1949.

This change eliminated vibration completely. However, the first seed processing tests with this modified cleaner showed a 20 percent lower plant capacity, as well as a smaller seed size than had previously been obtained. In Table 1 are given the results of seed sizing tests conducted with the two cleaners.

Table 1.—Effect of Buhler drive on sizing of processed beet seed on two seed cleaners.

Seed sizes <sup>1</sup> recovered	Percent recovery in rescreening from:		
	Eureka No. 7 (with Buhler)	68D Clipper (eccentric shake)	68D Clipper (with Buhler)
Below 7/64"	.7	.9	1.0
7-9/64"	79.6	96.4	82.8
Above 9/64"	18.8	1.6	14.3
dust (by difference)	.9	1.1	19
Total	100.0	100.0	100.0

<sup>1</sup> Tests conducted on 1,000-pound lots of seed originally screened over the 68 D Clipper with eccentric drive in 1948.

In order to increase seed size from the modified Clipper to approximately the same as that produced by the Clipper in 1948, various changes were made. The stroke of the drive was reduced by one-half the length normally used, and the r.p.m. of the drive reduced from 514 to 411. These changes increased seed ball size to nearly that obtained from the eccentric shake as well as improving plant capacity. Further improvements in capacity were obtained by adjusting the pitch of both the 7 and 9 screens downward.

### Summary

Processing of beet seed in the Rocky Ford plant has been greatly changed during the past four years. Seed size has been reduced every year since 1947 in an effort to obtain better cell fill in drills set for high seeding rates. Cells having at least 2/64" "clearance" over the largest sized seed appear necessary for adequate cell fill. Minor changes in seed cleaners have been found to affect greatly the average size of seed in the 7/64 to 9/64" processed seed size range.

### Literature Cited

- (1) DOXTATOR, C. W.  
1948. Comparison of Clipper and Eureka cleaning mills on sizing of segmented beet seed. Proc. Am. Soc. Sug. Beet Tec, p. 125-28.