

# Comparison of Clipper and Eureka Cleaning Mills on Sizing of Segmented Beet Seed

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A PRECISION planting job in a beet grower's field is not only dependent on the type of drill used, but also on the size of the processed seed. New beet drills capable of planting beet seed quite uniformly are now available and therefore accurate grading, or sizing, of seed is more important than in earlier years. This paper reports the results of seed-sizing experiments, using two standard cleaners, the Eureka No. 7 and the No. 68D clipper.<sup>2</sup>

## Characteristics of 7/64-10/64-Inch Segmented Seed

In 1945 all segmented seed produced at Rocky Ford, Colorado, was cleaned and sized over a Eureka No. 7 seed cleaner. In 1946, a No. 68D Clipper cleaner was obtained, and segmented seed was cleaned over this mill; and the Eureka No. 7 was used to clean and size whole seed prior to segmentation. Late in 1946 it was observed that the number of seedballs per pound had dropped to approximately 33,000, whereas in 1945 the number of seedballs per pound ranged from 43,000 to 47,000. Since all seed had been sized over mills equipped with 7/64-inch and 10/64-inch round-hole screens, it was first assumed that the reduction in number of seeds per pound was due to unusually well-filled germs in the whole seed being processed. Later, however, it was apparent by ordinary inspection that the seed cleaned by the Clipper cleaner was larger than that formerly obtained from the Eureka. Characteristics of two representative seedlots, one from each cleaning mill, are given in table 1.

Table 1.—Characteristics of segmented seed obtained from the No. 7 Eureka and from the 68D Clipper mills.

| Characteristics                      | Eureka No. 7<br>Mill Lot 3 | 68D Clipper<br>Mill Lot 46 |
|--------------------------------------|----------------------------|----------------------------|
| Seed size                            | 7-10/64"                   | 7-10/64"                   |
| Number of seedballs per pound        | 43,324                     | 34,105                     |
| Percent germination                  | 84.5                       | 95.5                       |
| Number of viable seedballs per pound | 36,608                     | 32,570                     |
| Sprout count per 100 seeds tested:   |                            |                            |
| Singles                              | 44.0                       | 29.0                       |
| Doubles                              | 38.5                       | 54.0                       |
| Triples                              | 2.0                        | 12.5                       |
| Total                                | 127.0                      | 174.5                      |
| Percent recovery                     | 60.5                       | 61.1                       |

Germination percentage was much higher in seed cleaned over the 68D Clipper, indicating that this seed had less barren-seed segments, and therefore would be expected to have fewer segments per pound. Due to a larger number of seed segments per pound there were more viable seeds per pound in seed cleaned over the Eureka No. 7, which was an indication that Eureka-cleaned seed was smaller in size.

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

<sup>2</sup>Eureka seed cleaners are manufactured by S. Howes & Co., Silver Creek, New York; and Clipper cleaners by the A. T. Farrell Co., Saginaw, Michigan.

### Comparison of Seed Cleaning Mills

An adequate quantity of seed was available of Mill Lot No. 46, which had been cleaned and sized over the 68D Clipper, and this seed was used for a comparison of cleaning mills. For a check on Clipper seed sizing, 1,000 pounds was run over the Eureka cleaner. Another 1,000 pounds was rerun over the 68D Clipper. A third run of 1,000 pounds was made over the 68D Clipper, equipped with 7/64-inch and 9/64-inch round-hole screens. The results are given in table 2.

**Table 2.**—Comparison of the 68D Clipper and the No. 7 Eureka in seed sizing, using segmented seed originally sized 7/64 to 10/64 inch by the Clipper.

| Size of Seed         | Proportion in pounds of seed obtained from:              |  |   |
|----------------------|--|--|---|
|                      | 68D Clipper equipped with:<br>7/64 & 10/64<br>RH screens | Eureka No. 7 equipped with:<br>7/64 & 9/64<br>RH screens | Eureka No. 7 equipped with:<br>7/64 & 10/64<br>RH screens |
| 7/64" to 9/64"       | —  | 278  | —   |
| Above 9/64"          | —  | 692  | —   |
| 7/64" to 10/64"      | 968  | —  | 695   |
| Above 10/64"         | 10   | —  | 288   |
| Below 7/64"          | 14   | 21   | 10  |
| Dust (by difference) | 8  | 9  | 7   |
| <b>Total</b>         | <b>1,000</b>   | <b>1,000</b>   | <b>1,000</b>  |

These results indicated that the 68D Clipper had done an accurate job of sizing the seedlot to 7/64-10/64 inch in the original cleaning, since only 10 pounds, or 1 percent, went over the 10/64-inch screen in the rerun. From the use of the 9/64-inch round-hole top screen on the Clipper, it was found that 69.2 percent was in the 9/64 to 10/64-inch size. The 1,000 pounds of 7/64 to 10/64-inch Clipper-sized seed, rerun over the Eureka, produced 288 pounds, or 28.8 percent, above 10/64-inch in size.

In order to determine the cause of the difference in seed size from the two cleaners, size of perforation in both 7/64 and 10/64-inch round-hole screens on both cleaners was inspected. Hundreds of perforations were checked and found to be accurate at 7/64 inch and at 10/64 inch. The pitch on the Clipper cleaner screens was then checked at all four extreme sets, to determine what differences might be obtained in percentage recovery, number of seedballs per pound, and in germination characteristics. The results of the screen-pitch tests are given in table 3.

**Table 3.**—Comparison of screen pitch on 68D Clipper on the characteristics of segmented seed.

| Pitch of screens  | Segmented seed data:      |             |                            |                                   |         |                |       |
|---|---------------------------|-------------|----------------------------|-----------------------------------|---------|----------------|-------|
|   | Weight per bushel, pounds | % recovery* | Number seedballs per pound | Sprout count per 100 seeds tested |         |                |       |
|   |                           |             |                            | % germ.                           | Singles | Multi-<br>ples | Total |
| 1. Both 7/64" & 10/64" screens at maximum pitch (steep slope) | 30                        | 66.25       | 35,000                     | 91.7                              | 22.0    | 69.3           | 171.3 |
| 2. Both 7/64" & 10/64" screens at minimum pitch (flat slope)  | 30                        | 67.27       | 35,558                     | 91.5                              | 25.0    | 66.5           | 177.0 |
| 3. No. 10/64" maximum pitch<br>No. 7/64" minimum pitch        | 31                        | 66.36       | 34,503                     | 91.7                              | 23.7    | 68.0           | 174.0 |
| 4. No. 10/64" minimum pitch<br>No. 7/64" maximum pitch        | 31                        | 68.07       | 35,576                     | 87.7                              | 21.7    | 66.0           | 166.0 |

\*880 pounds whole seed used for each test run.

From these data it appears that there was very little difference in percentage recovery or number of seedballs per pound in any of the four screen sets, and the lower percentage germination obtained from No. 4 is probably not a reliable difference.

### Drill Tests

Since there was some question as to how Clipper-sized seed would work in new precision-type beet drills having planting plate cells of 11/64 inch in diameter, samples of mill lots 3 and 46 (table 1) were sent to the Beet Sugar Development Foundation for a planting test in the John Deere No. 66 Drill. The seed plate used in the planter test was pressed steel .125 ± .001 inch thick, with 72 cells punched 11/64 inch in diameter.<sup>3</sup> The plate speed in the test was 55 feet per minute (3.25 MPH) or 7.80 cells per foot of ground travel.

Planter performance is summarized in table 4, along with seed characteristics.

**Table 1.** Percentage of cell fill, seed damage, along with poundage planted per acre (in 20-inch rows) of viable seeds for lots No. 3 and No. 46.

| Characteristic                              | Mill lot: |         |
|---|-----------|---------|
|   | No. 3     | No. 46  |
| Number seedballs per pound.....             | 43,324    | 34,105  |
| Percent germination.....                    | 84.5      | 95.5    |
| Percent cell fill.....                      | 97.5      | 88.8    |
| Percent planter damage.....                 | 2.69      | 2.06    |
| Pounds planted per acre (20-inch rows)..... | 4,588     | 5,308   |
| Viable seeds per acre (20-inch rows).....   | 168,054   | 172,768 |

### Discussion

It is apparent that larger processed seed was produced by the 68D Clipper than was obtained from the No. 7 Eureka, when both mills were equipped with 7/64-inch and 10/64-inch round-hole screens. The result was not explained by the pitch of the screens on the Clipper.

There are certain differences in these two mills which are likely to account for the differences in seed size. The shake of the Clipper screens is slower than that of the Eureka. The most important difference, however, between these two mills appears to be in action of the screen deck (or shoe). The Eureka is equipped with a Buhler eccentric-less drive, and the 68D Clipper with an eccentric drive. The Buhler drive imparts a vibrating action to the shoe, and eliminates the abrupt jerking motion common to cleaners not so equipped. Because of this difference in drive, beet seed tends to slide down the screens of the Eureka, whereas on the Clipper the seed tends to tumble. Segmented seed is extremely variable in shape, and on this type of material many unround seeds will go through round-hole screens because of the jerking action of the 68D Clipper shoe. With the Eureka, seeds do not drag on the screens, and unusual shapes are commonly recovered in oversize fractions.

<sup>3</sup>Cells in 1947 planter plates of this make of drill are punched .168 inch in diameter.

### Conclusions

The results of these tests indicate that different makes of seed cleaners may grade, or size, segmented beet seed very differently. Therefore, seed sized 7/64 to 10/64 inch may or may not fill all cells of 11/64-inch size in drill planter plates. In order that the best planting be obtained, greater efforts must be made to produce processed seed which will be suitable for each make of drill.

### Summary

Segmented beet seed sized over the 68D Clipper seed cleaner equipped with 7/64 and 10/64-inch round-hole screens, was found to be larger in size than segmented seed sized over a No. 7 Eureka seed cleaner equipped with screens having the same size round-hole perforations.

Changes in pitch of screens in the 68D Clipper shoe made slight but very insignificant changes in segmented-seed characteristics.

It was observed that the shake of the No. 7 Eureka shoe was faster than that of the 68D Clipper; and that the Eureka was equipped with an eccentric-less drive, while the Clipper had an eccentric drive. Both of these differences could affect the size of segmented seed.

Seed sized 7/64 to 10/64 inch obtained from each seed cleaning mill was tested in a John Deere No. 66 precision drill equipped with 11/64-inch planter plate cells. A 97.5-percent cell fill was obtained from Eureka-sized seed, and an 88.8-percent cell fill from Clipper-sized seed.