

Decorticated Seed—One Year's Experience

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A SUGAR BEET seed decorticator was purchased in the spring of 1947 by The Great Western Sugar Company and installed at the Sterling, Colorado, factory seed-processing plant. As this machine was late in arriving, there was no opportunity for any primary experimenting in its operation and testing of the finished product. After planting season, a series of tests were decided upon and conducted. The results will be brought out later in this paper.

In order to keep abreast with new developments in seed processing, the management authorized the production of a quantity of decorticated seed for field experience in this type of seed.

Decorticated seed was issued to 12 Colorado factory districts, 6 in Nebraska, 2 in Wyoming and the Billings, Montana, area. In all, seed was furnished to 21 factory districts located in 4 states. Seventy-two planting trials were carried to conclusion, 43 in Colorado, 23 in Nebraska, and 6 in Montana.

In making these comparative plantings, decorticated seed with segmented seed, the standard segmented seed issued to growers was used as the check against the decorticated seed processed at Sterling. In these comparative plantings, three methods were used—strip planting, alternate rows of decorticated and segmented, or 2 rows of decorticated and 2 of segmented. Seeding was done with various standard makes of drills. Some flute-feed drills were used, but the majority of the plantings were with plate drills.

Decorticated seed was prepared from two types of Great Western seed: GW-85, a leafspot-resistant variety, and GW-268, a curly-top-resistant variety. The GW-85 decorticated seed was issued to all Colorado and Nebraska factories, and the GW-268 decorticated to the Billings, Montana, and Lovell, Wyoming, areas. All seed, both segmented and decorticated, processed for planting, was sized 7/64 inch to 10/64 inch. The GW-85 decorticated seed had a seedball count of 45,120 per pound, with 89 percent germination and 51 percent singles. The GW-268 decorticated seed had a seedball count of 49,640 per pound with 90 percent germination and 52 percent singles.

On the average the standard segmented seed used in the plantings carried about the same seedball count per pound as the decorticated seed.

As for germination and singles, the decorticated seed averaged about 5 percent higher in germination than the segmented, while the percentage

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of singles was about 10 percent higher in the segmented seed. The average of the results of these plantings are shown in tables 1 and 2.

Table 1. Average field results of the 72 comparative plantings:

Rate of seeding in pounds	Percent germination stand	Decorticated Seed			Longest skip in inches
		Singles	Percent Doubles	Multiples	
4.25	31.5	59.2	29.5	11.4	17
Segmented Seed					
4.17	24.0	66.5	26.0	7.5	24.5

Table 2. Analysis of table 1 segmented seed as the check

Rate of seeding in pounds	Percent germination stand	Numerical Difference			Longest skip in inches
		Singles	Percent Doubles	Multiples	
+ .08	+ 7.5	7.3	- 3.5	3.9	7.5
Percentage Difference					
+ 2.0	+ 31.2	-11.0	-13.4	53.0	30.0

From the results shown in tables 1 and 2, decorticated seed produced a 31.2 percent greater emergence or germination stand. As for blanks or skips in rows, the decorticated seed averaged $7\frac{1}{2}$ inches less in length than the check. The segmented seed gave a higher percentage of single plants and fewer doubles and multiples.

Two errors in these comparative plantings are evident in the planting procedure followed. First: the same variety of seed was used in only a few plantings, and second: the rates of seeding of the two types of processed seed were recorded in only a few plantings, as it was not foreseen at the time of planting that a possible difference in seeding rates was involved with a drill set for a particular rate of planting of segmented seed. Decorticated seed with certain drill setting planted somewhat heavier than the segmented.

However, seven plantings were made where actual seeding rates were recorded, and five known plantings where the same variety of seed was used. Tables 3 and 4 indicate the results of such trials.

Table 3.—Average field results of seven comparative plantings actual seed rate recorded

Rate of seeding in pounds	Percent germination stand	Decorticated Seed			Longest skip in inches
		Singles	Percent Doubles	Multiples	
5.0	29.3	56.3	31.7	12.5	17
Segmented Seed					
4.3	21.2	64.0	27.6	8.4	28

Table 4.—Average of field results of five comparative plantings using the same variety of seed GW-85

Rate of seeding in pounds	Percent germination stand	Decorticated Seed			Longest skip in inches
		Singles	Percent Doubles	Multiples	
4.1	23.9	67.6	26.4	5.8	24
Segmented Seed					
4.1	19.3	75.5	19.8	4.6	30

Although there were but few plantings involved in obtaining the results tabulated in tables 3 and 4, they indicate a trend in favor of decorticated seed as far as germination stand and length of skips in the row, both of which are important factors relative to the total plant population after thinning.

Further evidence of the trend in favor of decorticated seed is shown in table 5, which is a summary of seven plantings in the Sterling factory district. Table 5 also includes the seed-testing laboratory evaluation of the seed used with respect to germination, singles and seedballs per pound.

Table 5.—Planting comparison with seed-testing laboratory evaluation of seed involved

Laboratory record of seed used:			Decorticated Seed					Longest skip	Seed rate
Germination	Singles	Seedballs per pound	— Emergence Count—Percentage —						
			Germination	Singles	Doubles	Multiples			
89.0	51.0	45,120	33.8	61.3	27.8	9.4	19	4.14	
Segmented Seed									
82.3	62.3	48,111	21.5	65.3	26.6	8.1	29	4.14	

Results from controlled test plantings at the Longmont, Colorado, experimental station of The Great Western Sugar Company were not as favorable to the decorticated seed as the field plantings in the various factory districts.

Further field plantings are recommended with greater control of seeding rate and using the same variety of seed in the comparative plantings.

Many comments and observations from the various factory districts in reporting their results are interesting. A summary of these observations are:

1. Plants from decorticated seed were outstanding in appearance. Emergence appeared ahead of the standard seed.

2. Plants were larger and could be thinned several days ahead of segmented seed.

3. On any field it was easy to locate the decorticated seed plantings.

Early in this paper reference was made to a series of tests conducted with the decorticating unit. These tests were set up and conducted for the purpose of determining the proper setting of the decorticator that would give the best general results relative to recovery, germination and singleness, machine capacity and the mechanical operation of the equipment.

Operation of the unit previous to the running of the tests had indicated that from two different varieties of seed with the same unit setting, general results varied considerably. With this advance information, three types of seed were selected for testing, and each variety run through the test in an identical manner.

Characteristics of each variety of the whole-seed tested were determined beforehand. Seed was sized from plus 7/64 inch through plus 10/64

inch to determine the percentage of seed for each 64th inch. This divided the composite samples into four sized lots: + 7/64, + 8/64, + 9/64 and + 10/64. The characteristics of each group was then determined which covered germination, singles, seedballs per pound, and germinating seedballs per pound.

Because of the delicacy of adjustment of the unit, various settings of the burr mill and the polishing unit were decided upon before the testing began. These settings number 10 in all, which varied from .10 inch to .175 inch for the burr mill and .125 inch to .175 inch for the polishing or decortivating unit.

After dividing the composite sample of whole seed into the four sized lots mentioned, a study of their characteristics indicated that pre-screening before processing might be advantageous. This was tried, but proved the opposite and is not recommended. The resulting germinations and singles compared favorably, while the recoveries dropped off considerably.

Complete records were kept on all tests for each variety of seed tested, and tabulated for study.

In evaluating these tabulations, it was readily noted the maximum percentages of recovery, germination, and percentage singles, are not accomplished on the same burr mill and decorticator pad clearance. A graphical analysis of the various settings on the burr mill and decorticator pad clearances indicate that for the most inclusive results, a setting of .125 inch for each is desirable.

A summary of the noteworthy points of the tests are: 1. The specific gravity of decorticated seed is approximately 10 percent greater than segmented seed of the same variety.

2. No two types of seed react the same in processing.

3. If over 45 percent singles are desired, the recovery will drop proportionately. When high recovery or germination is desired, the percentage of singles must drop.

4. Decorticated seed germinates somewhat faster than segmented seed.

5. The capacity of the unit is approximately 500 pounds per hour at the .125-inch clearance setting for the burr mill and decortivating pad.

6. The machine should be re-designed for easier and more accurate setting of the burr mill and decortivating pad. Also a method or means should be devised to insure an even distribution of seed leaving the burr mill over the whole decortivating pad.

7. Pre-screening of the whole seed before decortivating is not recommended.

I herewith wish to credit Don Latta, assistant chemist at the Sterling factory, for the efficient and comprehensive manner in which he conducted the experiments with the decortivating machine.