PREPARING SEGMENTED SEED

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The methods and means of preparing segmented seed are far from perfect. The preparation of segmented seed will, no doubt, undergo many and varied changes during the course of the next few years before a procedure is developed which will approach the perfect.

During this transition period, the exchange of ideas and experiences resulting from the use of varied types of equipment in numerous tests should be of benefit to all engaged in the preparation of segmented seed and may be an incentive for new ideas.

It is with this thought in mind that the following data are presented. The data were collected during a series of tests at Sheridan, Wyoming, using one of the original small California (Bainer) types of shearing machines having a cutting surface of only two inches in width. The whole seed used in the tests had been stored for 2 years or more.

Shear Bar Set

With the California type of shearing machine used in these tests, it has been found that the percentage of recovery of segmented seed increases as the opening between the shearing bar and the grinding stone is widened. The total germination for the 7/64 to 10/64 inch size increases slightly and the percentage of singles decreases slightly while the doubles and multiples increase with the wider spacings. In operating this particular shearing machine, the most practical spacing was approximately .080 inch.

Table 1.- Effect of shear bar set on recovery and germination (summary using two varieties).

Type	Shear bar set	% Recovery (a)	Percentage Germinating			
			Singles	Doubles	Multiples	Totals
		Seed Graded 7/64 to 10/64				
Whole	-	--	32	26	13	71
Sheared	.070	52	50	26	4	80
Sheared	.078	56	50	28	5	83
Sheared	.086	58	43	32	7	82
		Seed Graded 7/64 to 9/64				
Whole	--	--	32	26	13	71
Sheared	.070	46	49	23	1	73
Sheared	.078	51	46	28	1	75
Sheared	.086	49	55	25	3	83

(a) By weight

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Sizing Whole Seed Before Shearing

The seedball sizes in most varieties of sugar-beet seed vary from 7/64 to 22/64 inch in diameter. By dividing seed of this wide range of sizes into two or more parts and shearing each fraction separately and then recombining in the same proportions, it was thought that the final product might be somewhat better and recovery greater than when the ungraded seed was sheared as such. Seed of a variety representative of those on hand was used for the test. This variety contained 29,731 seed units per pound of whole seed. The whole seed was screened to divide the sample at 10/64 inch, another sample at 12/64 inch and a third at 14/64 inch. The fractions were then sheared and screened to a 7/64 inch to 10/64 inch size. Three spacings of the shearing bar were used for each size seed. The results are combined for comparison in table 2.

Table 2.- Effect of sizing before shearing.

Size Range	% of sample this size	% germ. whole seed	% recovery after shearing (7/64-10/64)	% germ.	Combining Segmented Fractions	
					% recovery (a)	% germ.
Ungraded (check)	100	83	60	72	60	72
7-10	15.65	74	81	74)	65	74
+10	84.35	86	62	74)		
7-12	65.0	81	70	66)	63	69
+12	35.0	96	50	75)		
7-14	81.28	86	64	66)	61	68
+14	18.72	97	48	76)		

(a) By weight

Results on the average showed about a 3 percent gain in recovery for sizing prior to shearing, but a loss of about 2 percent in germination. The larger size suffered more in germination loss than did the smaller fractions. While the data in table 2 show only minor effects on the final product from pregrading the seed, separating of the smaller whole seeds up to 10/64 may be worthwhile.

Polishing Segmented Seed

Three types of polishers were used: (1) A disc type patterned after the Kudzu polisher used by North Carolina Agriculture Experiment Station and improved by the Farmers and Manufacturers Beet Sugar Association; (2) a commercial type with a horizontal cylinder with horizontal agitator bars; and (3) a vertical cylinder type with a vertical metal agitator with side arms. A brief survey of the results is shown in table 3.

Table 3.- Effect of polishing after cleaning on weight per bushel and germination of segmented seed.

Polisher	% Recovery (a)	Weight per bu.	Germinations			
			Singles	Doubles	Multiples	Total
Unpolished (b)	100	26.5	43	28	5	76
Recleaned (c)	94	26.5	34	32	5	69
Disc	87	30.0	50	17	3	70
Horizontal	90	29.0	42	34	4	80
Vertical	91	29.0	44	23	5	72
Polisher Ave.	89	29.3	45	25	4	74

(a) By weight.
(b) Unpolished segmented seed, size 7/64 to 10/64.
(c) Unpolished segmented seed, recleaned and recovered size 7/64 to 10/64.

Polishing increased weight per bushel in all cases. Recoveries for the adjustments used for each polisher were practically the same. The weight per bushel was slightly higher for the disc polished seed than for the others.

Comparisons of total germinations show an average decrease of about 2 percent for the polished seed as compared to the original segmented seed, but an increase over the recleaned of 5 percent, with 7 percent necessary for significance. Polishing losses averaged 11 percent, which was only 5 percent more than for recleaning only.

Polishing Before vs. After Cleaning Segmented Seed

This study was designed to determine if it were practical or advisable to polish the seed as it came from the shearing machine instead of the usual method of polishing after seed was cleaned and graded.

Table 4.- Polishing before and after cleaning.

Type of polisher	% recovery of whole seed wt.(b)	Weight per bu.	Germinations			
			Singles	Doubles	Multiples	Total
Unpolished (a)	61	27	44	29	6	79
			Before			
Disc	62	33	42	30	7	79
Horizontal	63	30	42	32	8	82
Vertical	65	29	44	28	7	79
Average	63	31	43	30	7	80
			After			
Disc	52	33	44	30	10	84
Horizontal	53	30	51	26	10	87
Vertical	54	30	50	29	8	87
Average	53	31	48	28	9	86

(a) Unpolished sheared seed, size 7/64 to 10/64 inch.
(b) Size 7/64 to 10/64 inch.

For the seed polished before cleaning, recoveries are greater, germinations lower, and the percentage of singles a little less than for seed polished after cleaning. The mass coming directly from the shearing machine probably acts as a cushion during the polishing process and reduces the severity of the polishing. It has yet to be determined if the extra recovery from polishing before cleaning will offset the higher germinations, mostly singles, from seed polished after cleaning.

Effect of Drilling on Segmented Seed

A study was made to determine how the polished seed handled in the beet drill. It was thought that less chaff and dust would be produced by the polished than the unpolished seed. Three pound samples of seed from each of the polishing treatments shown in table 3 were used. These were actually drilled through a John Deere No. 11 Beet Drill operating at 2-1/2 miles per hour, the drill being mounted on blocks and driven by a motor. The seed, after passing through the drill plates---holes 12/64 inch in diameter---was re-screened over a 7/64 inch round hole screen.

Table 5.- Handling test through John Deere No. 11 drill. (losses resulting from drilling).

Polisher	Size of segmented seed	% loss	Minutes to drill 3 lb.	Size of segmented seed	% loss	Minutes to drill 3 lb.
Unpolished	7-10	6	93	7-9	6	88
Disc	7-10	4	93	7-9	6	91
Horizontal	7-10	6	87	7-9	6	85
Vertical	7-10	6	97	7-9	6	95

With the exception of the 7/64 to 10/64 seed polished with the disc polisher, all other polishing treatments were the same and were identical to unpolished seed in amounts of loss and recoveries. The smaller sized seed (7/64 - 9/64) flowed through the drill faster by weight than the larger size (7/64 - 10/64).

These laboratory tests on polishing have shown nothing outstanding to date in favor of polishing. It is quite possible that polishing may have benefits for regulating and adjusting the planting mechanism in the field.

Use of Gravity Table on Segmented Seed

The grading of segmented sugar-beet seed by the use of the gravity table is a very recent development. Because of the many and varied adjustments possible with this equipment, it should be given careful consideration where regrading segmented seed is desirable.

Table 6.- Gravity table separations on old segmented seed.

Fraction	Weight per bu.	% recovery 7/64 - 10/64 (a)	Total germination (b)
Check (c)	28.0	100	74
Light	20.5	6.5	17
Medium light	23.0	18.8	50
Medium	28.5	35.7	74
Medium heavy	34.0	31.3	88
Heavy	38.0	7.7	91

(a) By weight.
(b) A detailed breakdown on germination into singles, doubles, and multiples is not yet available on these tests.
(c) Original sample before passing over gravity table.

By discarding the two light fractions, or one-fourth of the sample, the remaining portions blended together had an average germination of 82.6 percent. A cleaning loss of 25 percent by weight resulted in a germination increase of 8.6 percent for the remainder of the sample. In actual practice the medium light fraction, or 18.8 percent would probably have been re-run over the mill. It is thus possible to materially increase the germination of the final product by discarding all seed below any given point or fraction in the recovered product.

Table 7.- Gravity table separation on newly sheared seed.

Fraction	Weight per bu.	% recovery 7/64-10/64	Germination (b)			
			Crack test	Singles	Doubles	Multi-ples	Totals
		Variety "A"				
Check (a)	26.0	100				89
Light	19.5	13				13
Medium light	21.5	4				29
Medium	25.5	43				59
Medium heavy	29.0	21				88
Heavy	32.5	19				91
		Variety "B"				
Check (a)	28.5	100				92
Light	22.0	13				53
Medium light	24.0	4				60
Medium	28.0	36				85
Medium heavy	30.5	25				91
Heavy	33.0	23				95

(a) Original sample before passing over gravity table.
(b) Germinations not yet available.

The data in table 7 follows the general pattern of that in table 6 and various improved combinations can be made by discarding lower-germinating fractions.

For seed of low germination or for securing a product of extremely high total germination, the gravity table should be useful.