## FERTILIZER PLACEMENT, RIDGE PLANTING, DISK VERSUS SHOE OPENER, MECHANICAL THINNING

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Disk furrow openers give better stands of beets than shoe furrow openers. They justify the greater initial cost. The results are measured by germination stands as percent of inches per row containing seedlings. This year the disk furrow opener gave a 35% stand as compared to a 26% stand for the shoe opener, a 43% increase for the disk over the shoe. The average for five years' results show the stands in the disk planter to be 58.6 as compared to 50.52 for the shoe, an increase of 16%.

Machinery trials of ridge planting equipment showed incidentally that there was no significant difference in the tonnage of ridge planted vs. flat planted beets, a slight trend in favor of the flat planted. Many measurements were taken on the relative sizes of beets grown by the two methods, and a significant difference was found in that the length of the ridge planted beet was 8.488" as compared to flat planted beets, 8.17". The diameters of the ridge planted beet was smaller, 4.133", as compared to 4.283" for the flat planted beet. While these differences are significant, they are comparatively small. Germination stands by both methods are identical.

Studies this year gave results somewhat similar to those of previous years. One outstanding result was that for the first time we have some experimental data showing the definite kill of small seedlings when the fertilizer had been placed in direct contact with the seed. The results show that where phosphate had been placed at a distance from the seed, the germination stand was 51.0 and where the phosphate was placed with the seed, the stand was 25.7. In general, the indication is that better results are obtained when the phosphate is placed lower than the seed and rather close to the row. Apparently when plenty of moisture is available, there is no harm in putting the phosphate with the seed, as indicated by one test where yield was somewhat greater by this method.

Tests of experimental single seed planting equipment lead to the conclusion that it is mechanically practical to expect a rather uniform placing of the seeds in the furrow at an expected distance of one seed per inch of row. Tests have been made in field speeds ranging from .8 of a mile to 2.9 which show more misses at the higher speed but not sufficient misses to make it undesirable. In general, with ungraded seed, more small seeds are planted than the large ones which could be expected to give approximately the same number of seedlings per foot irrespective of size of seed.

# SINGLE SEED SUGAR BEET PLANTING

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Research by the Bureau of Agricultural Engineering and the Agricultural Experiment Stations of California and Colorado on the mechanical blocking and thinning of sugar beets brought to our attention a few years ago the desirability of a more uniform distribution of seedlings in the row. An ideal stand for mechanization would be one with single seedlings regularly spaced every inch or two. However, such stands are not possible because of the multiple germed nature of sugar beet seed balls and the bunching of seedlings has been more or less attributed to multiple-germed balls.

Experimental plantings were put in very carefully by hand with one seed ball per inch of row and resulted in germination stands which were much more uniform than stands obtained with commercial planters. That is, the seedlings obtained on the hand planted plots were spread into a greater percent of the inches of the row, a condition favorable to mechanization of the thinning of the crop. Germination tests made in a seed laboratory where conditions were kept ideal showed an average of slightly less than two sprouts per seed ball on large sized, viable seed. The same seed in the field under favorable germination conditions produced an average of approximately 1.3 sprouts per seed ball. Evidently the bunching of seedlings obtained with commercial planters is largely due to the bunching of seed balls.

Following preliminary research a single row planter was built to drop single seed balls at regular intervals.

Several sets of experimental plots were put in with this small planter unit. One set of plots using a seed ball spacing of one inch which, with the seed used, gave a seeding rate of 14 to 15 pounds per acre was used for a thinning-method experiment. Others were planted at seeding rates varying from 5 to 20 pounds per acre and were used to make germination stand counts comparing the single seed planter with a commercial planter and to compare the after-thinning stands produced with the two planters. The plots were carried through the season and harvest data was taken on them.

The germination stand data on the plots with the 14 to 15 pound per acre seeding rate from all of the plantings were averaged and the results are shown in the following table where the single seed planter is compared with conventional planter and with hand planted beets.

Planter	Seedlings per 100*	% of inches with beets	Singles per 100"	
Conventional	121.7 ± 4.9	54.7 ± 1.3	14.0 ± .6	
Single Seed	127.0 ± 3.3	67.2 ± 1.3	21.3 ± .8	
Planted by hand	131.6 ± 7.4	72.8 ± 3.4	23.9 ± 1.2	

## GERMINATION STANDS (14 to 15 pounds of seed per acre)

The different plantings at the different seeding rates all showed higher percentage germination stands for the single seed planter than for the conventional planter. The average differences for each planting were significant.

The percentage stands with the single seed planter increased from 30% with the five pound seeding rate to 73% with the twenty pound seeding rate while with the conventional planter the corresponding percentages increased from 26% to 59%.

The number of singles per hundred inches was also significantly

greater with the single seed planter. The number increased from 15 singles per hundred inches at the 5 pound seeding rate to 21 for the 15 pound rate and then decreased with further increases in seeding rate. This decrease beyond the 15 pound rate is to be expected because the average number of seed balls is greater than one per inch with seeding rates over 15 pounds per acre. The maximum number of singles per hundred inches obtained with the conventional planter averaged approximately 15 at the 15 pound seeding rate. Not only did the single seed planter produce a greater number of singles but the percentage of beet-containing inches which were singles was also higher.

After-thinning stand counts showed that reasonably satisfactory stands were obtained with seeding rates as low as 5 pounds per acre with the single seed planter while the after-thinning stands obtained with the conventional planter at that seeding rate were not satisfactory.

### TEN YEARS RESULTS OF FERTILIZER EXPERIMENTS ON SUGAR BEETS NEAR LOGAN, UTAH

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Ten years results of using various combinations of nitrogen, phosphorus and potash fertilizer and manure on sugar beets at the Greenville Experiment Farm near Logan, Utah have shown that manure and superphosphate separately or together have given marked increases in the yield of sugar beets.

#### The average, yields were:

No	fertilizer	10.39	tons	per	acre
Nitrogen	Es.	11.50	11	11	
Phosphate	11	14.46	11	tt	
Nitrogen & Phosphate	11	15.38	11	11	
Manure	11	17.04	11	11	
Manure & Phosphate	11	18.74	11	11	

There has been no significant differences in the sugar content or the purity of the juice. The continued use of the manure has slightly increased the organic content of the soil and both the manure and the superphosphate has increased the available phosphate in the soil.