

EFFECT OF SPACING AND DOUBLES ON YIELD OF SUGAR BEETSA PROGRESS REPORT

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For various reasons, growers contracting with our Company plant in 28-inch rows and block and thin to 10 to 12-inch intervals. It should be emphasized that this experiment was not conducted with any thought in mind of recommending changes in standard field practices; rather, it was instigated to answer certain questions which came up as more growers started to use mechanical means of blocking and thinning beets.

The big question which could not be answered in our areas was: how particular must one be in blocking beets mechanically? Must labor follow the machines and thin meticulously to one beet, and would a few doubles decrease yields to a point where so much expense was warranted?

There have been many experiments conducted to determine the effect of row widths, spacing in rows, etc., on yields. These experiments have shown varying results.

A few years back, 22, 20 or even 18-inch rows were recommended in our area. Growers went to 28-inch rows to facilitate over-all farm operations. There is no indication that beets grown in 28-inch rows yield any less than when grown in 22-inch rows. Of course, soil fertility, moisture and organic matter relationships exert a great influence as does mechanical harvesting.

In general, deviations from 12-inch spacings reduce yields somewhat. One must remember that until recently these experiments were conducted with whole seed. It has been shown many times that the use of segmented seed gives a large percentage of single plants and that the mechanics of blocking and thinning do not disturb the plants as much as with whole seed. Hence, the plants are not set back as far in growth. Therefore, it is possible that results obtained from thinning and spacing tests conducted in the past cannot be applied to the present age of the use of segmented seed.

There has been some work carried on using segmented seed. Bion Tolman of Utah-Idaho Sugar Company has shown that in general, any variations from 12-inch spacings will effect yields regardless of row width. He did not work with doubles.

W. S. McBirney, with the U. S. Department of Agriculture and stationed at Ft. Collins, Colorado, has shown that 50% doubles in a field will not lower yields if stand is maintained. He feels that maintaining a stand, that is, 100 beets per 100 ft. of row within certain limits of distribution, is more important than distribution.

Other workers feel that the pattern of blocks is most important - not the actual presence of single beets in a block.

When a grower blocks mechanically, whether it be down-the-row blocking or cross-blocking, he cannot leave a beet-containing block exactly where he wants to each time. Neither can he leave a single beet each time. Therefore, beet-containing blocks may be 16 to 24 or more inches apart in some cases and percentage of doubles in the block will vary depending on stand and size of block left.

Leaving doubles has been frowned upon for several reasons since beets have been grown. It was believed that two beets grown in one block would not weigh as much as one. This may be true of two beets originating from one seed ball. However, there is evidence, especially from the Red River Valley area in Minnesota, that when segmented seed is used and under their soil conditions and method of rotating crops that not only two but three beets grown in one block will yield as much or more as one beet grown in a block.

Another objection to leaving doubles has been that the increased number of beets per acre resulted in more labor in pulling and topping. The labor would harvest only one, leaving the smaller one, etc. This may still be true; however, our mechanical harvesters cannot distinguish one beet from two or three and this argument would no longer be valid if yields were not reduced.

This experiment was set up in an attempt to determine how yields may be effected by mechanical blocking. Plots were thinned as follows:

16 inch centers with 0%, 10%, 20%, 30% doubles
 12 inch centers with 0%, 10%, 20%, 30% doubles
 10 inch centers with 0%, 10%, 20%, 30% doubles
 8 inch centers with 0%, 10%, 20%, and
 6 inch centers with no doubles

The spacings were accurate and number of beets per 100 ft. were accurate.

The term "doubles" in this experiment constituted two beets in a 3-inch block or less. Relatively very few of the so-called "doubles" originated from one seed piece.

Plots were planted May 8, 1946, using $2\frac{1}{2}$ lbs. segmented seed per acre. Planting was done with Cobbley unit attachments on a John Deere #55 drill. Germination stand was excellent.

All plots were replicated four times. Two replications were thinned June 24th and 25th and two July 5th and 6th. At the June 24th thinning the beets were two to three inches in height with weeds the same height. On July 5th the beets were four to five inches in height while wild mustard was over a foot high and in bloom. The weeds had definitely become competitive with the beets for nutrients and moisture.

Plots were harvested November 9th and 10th. Duplicate samples were taken from each plot for sugar and purity analysis.

Plots were four rows in width. The two center rows were harvested in each plot. Results obtained are for marketable beets only.

Results in general were:

1. Date of thinning was more important than spacings or doubles.
 - a. Yield was lower with later thinning.
 - b. Percent sucrose was lower with late thinning.
2. Purity was unchanged by any treatment.
3. Effect of doubles was not significant on yield of roots or sugar.
4. Effect of spacing was not significant on yield of roots or sugar, except for six-inch spacings which were significantly lower.

CHART I EFFECT OF SPACING ON YIELD OF BEETS AND SUGAR

	<u>Tons beets per acre</u>	<u>Lbs. Sugar per Acre</u>
6"	9.540	3162
8"	12.142	3930
10"	12.525	4098
12"	12.892	4182
16"	12.717	4106

CHART II EFFECT OF DOUBLES ON YIELD OF BEETS AND SUGAR

	Tons beets per acre	Lbs. Sugar per Acre
No doubles	12.473	4028
10%	12.476	4059
20%	12.643	4106
30%	11.886	3887

CHART III EFFECT OF DATE OF THINNING ON YIELD OF SUGAR BEETS

	<u>Thinned 6/24-25</u>	<u>Thinned 7/5-6</u>	<u>Difference</u>
	<u>Tons/Acre</u>	<u>Tons/Acre</u>	<u>Tons/Acre</u>
6"	11.271	7.808	3.463
8"	13.733	10.553	3.180
10"	14.269	10.781	3.488
12"	13.811	11.974	1.837
16"	14.930	10.503	4.427
Avg.	14.032	10.781	3.251

CHART IV

SIGNIFICANT DIFFERENCES

10-12-16" Spacings
 0-10-20-30% Doubles
 2 dates of thinning

	<u>Spacings</u>	<u>Doubles</u>	<u>Date of Thinning</u>
Yield	NS	NS	1%
Sugar Content	NS	NS	1%
Purity	NS	NS	NS
Available Sugar	NS	NS	1%

It is felt that this is a worthwhile study to make in conjunction with mechanical thinning and mechanical harvesting.

Definite conclusions cannot be drawn from results obtained in one year. It is planned to continue this test, using ten, twelve, sixteen and twenty-inch spacings with 0%, 10%, 20% and 30% doubles until some reasonably accurate conclusions may be drawn.