Results In 1945 From Hand-Singled and Hand-Blocked Sugar Beets as Grown From Sheared Seed

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Hand thinning of sugar beets to leave single plants approximately 12 inches from the neighboring plants in the row is the common practice of almost all sugar beet growers in the United States. Hand singling of the sugar beets has been thought necessary in order to obtain maximum yields. This operation is known as one of the most expensive, time-consuming, and tedious operations connected with the growing of sugar beets. Under present conditions, when labor is difficult to obtain, it has become advisable to conduct some tests to assess the value of this universal practice in relation to alternative practices requiring less labor.

Tn 1924 the author of this paper began a series of experiments to find if two beets at a place in the row (commonly called doubles) produce as great a yield as is produced when only single beet is left for each 12-inch space. These experiments were continued for 7 years and the results indicated that there was no significant difference between the yields of one beet or two beets in a hill. No formal publication of these tests was made but the information was widely discussed at some of the meetings of sugar beet agriculturists and growers. When two beets were grown as doubles, approximately half of the hills had one beet of normal size and the other beet was too small for commercial use. When there were two beets of commercial size in a place, each root was smaller than normal and often the two roots were twisted around each other. Because of the greater number of roots produced per acre the yields of commercial sized beets were maintained if doubles were left at thinning time. In these same tests, three and four beets per hill were left in some plots and very small beets were produced in many of the hills. Tt was found that leaving more than two beets in a space reduced the acre yield of commercial roots. The author of this paper was not considering the mechanization of sugar beet thinning when conducting these earlier experiments but later investigators have had mechanization of thinning in mind when conducting experiments in which one, two, three, four or more beets were left in a hill *(1, 2)*.[2] Some of these

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[2]Italic numbers in parentheses refer to literature cited.

tests have been conducted by hand blocking and some with mechanical blocking. In general the results in other areas from hand or mechanical blocking with omission of hand singling have not. shown serious effects upon the acre yields of commercial roots. There is a need for studies of this character in a. number of locations over a series of years to establish a safe practice.

In 1945 at Torringtou, Wyo., in cooperation with the Goshen County Experiment Station of the Wyoming Agricultural Experiment Station, a field was planted with sheared sugar beet, seed. A replicated series of plots was set up to determine the effects on yield if hand singling was omitted. It was sought to determine the effects on yield because the saving in labor from omission of hand singling would in part counterbalance any reduction in gross returns per acre. In these tests all plots were blocked by means of 7-inch, long-handled hoes. Later one-half of each of the plots (split-plot design) were hand singled. Each main plot was 16 rows of beets wide and 50 feet long. There were 10 replicates of each treatment. The field selected was a sandy loam and had received a heavy application of manure before plowing. Sheared sugar beet seed was planted at the rate of 31/2 pounds per acre on March 26 but no plants emerged until April 25. Blocking was done May 30 when the plants had four to six leaves. The hand singling of beets was done June 1.

Ten days after thinning the plots were all cultivated by the use of a bean weeder to remove small grass and weeds. This use of the bean weeder did not injure the small sugar beets but destroyed many of the small weeds and grass and greatly reduced the labor normally required for hand labor of hoeing sugar beets. Hand hoeing is usually considered a greater task on blocked sugar beets than on singled sugar beets. This use of the bean weeder is a relatively new and not common practice in the weeding of sugar beets and is perhaps one of the important factors in the outcome of this test.

An attempt was made to space the beets in this test 12 inches apart, and at harvest there was an average of 78 hills per 100 feet of row of the hand-singled plots. Where the plots were blocked there was an average of 89 hills and 106 beets per 100 feet bf row. This indicated that some of the hills were destroyed during the operation of hand singling. At harvest 4 percent of the hills where the beets were blocked had three or more beets per hill, 27 percent had two beets per hill, and 69 percent had only one beet. This distribution of beets among the hills leaves 96 percent of the blocked hills such that a normal yield can be expected and the 4 percent.of hills with three or more beets per hill; this 4 percent should have been

chopped at the first hoeing either to reduce the stand or eliminate all beets in the hill.

All the hills containing two or more beets were harvested separately from the single beets and weighed separately. The single beets produced an average of 1.78 pounds of commercial roots from each hill, while the hills consisting of more than one beet produced an average of 1.68 pounds of commercial roots per hill. There was an average Joss of 5.1 percent in weight of commercial roots where more than one beet was left per hill and there were 1.56 beets produced per hill where more than one beet was left. Since there was a loss of stand by the process of hand singling there was a compensation for the lesser yields from the hills where more than one beet was left. The mean yield per acre from the blocked beets was 16.11 tons per acre. From the hand-singled plots 15.76 tons of roots per acre were produced. The difference in tons of roots per acre is not significant nor was there any significant difference between sucrose content of roots or gross sugar per acre produced from the two types of sugar-beet plots (table 1).

Table 1.—Comparison of stands, acre-yields of roots, sucrose percentages, and gross sugar production on sugar-beet plots in which the plants were (l) hand-singled and (2) blocked but not hand-singled. Torrington, Wyo., 1945. (Data given as 10-plot averages.)

Treatment	Stand[1] at harvest	Acre-yield of roots	Sucrose	Acre-yield of gross sugar
	Percent	Tons	Percent	Tons
Blocked and hand singled	78	15.76	17.11	2.768
Blocked but not hand singled	89	16.11	17.56	2.842
Difference required for significance. odds 19:1	8.77	1.01	.64	.483

[1]Number of hills per 100 feet of row.

The results obtained from this single experiment cannot be taken as indicating that similar results necessarily will be obtained from subsequent tests of this type. Too much depends upon the stand of beets that is obtained from planting sheared seed. When the quantity of sheared seed planted per acre is kept small in order to obtain an initial stand that can be easily blocked by the use of a long-handled hoe so as to leave prevailing, a single beet in a place, there are certain to be stands so sparse that replanting will be necessary/ On the other hand some stands may be too thick for good results from blocking only. In other fields weed control may be so great a factor at hoeing time that little labor is saved over the conventional blocking and singling. In this particular instance an acceptable stand was obtained and weed control was good.

The evidence is insufficient for positive recommendations for

general practice. The tests are to be continued on a larger scale and more widely distributed in the sugar beet districts of the Northern Great Plains area. However, these results, taken in conjunction with reports from similar tests conducted elsewhere, do indicate definite promise that if initial stands are suitable, and if proper steps for weed control are taken, hand singling may in many cases be omitted without loss in yield of commercial beet roots per acre.

Literature Cited

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Insects As a Minor Factor in Cross Pollination of Sugar Beets

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It is a common observation that numerous insects visit flowering sugar beets. The relative importance of insects and wind as agents of cross-pollination of sugar beets has not been determined. Tests were conducted in 1938 and 1940 at Arlington Farm, Va., to evaluate these two agencies of pollen transport.

Sugar beet plants were enclosed in 30-mesh wire cloth cages except for one or more flowering branches per plant that were left outside. The branches outside the cages were exposed to visitation of insects, whereas the plant inside was protected from large insects. It is thought that the screen wire offered little impediment to wind-borne pollen so that the portions of the plant inside a cage and the branches outside had equal exposures to wind-borne pollen. The plants were grown each year in a seed field approximately one-third acre in size. The relative percentages of cross pollinations for the two types of exposure were determined by means of the inheritance of the factors conditioning anthocyanin color. The general population of plants in the seed field were pink-hypocotyl type (R-) except for a small percentage of plants that were homozygous recessive. Green hypocotyl plants or the recessive phenotype were caged. The pinkr hypocotyl seedlings in the progenies of these caged plants were identified crosses.

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