

Experiences with Spring Mechanization

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During 1951 the Holly Sugar Corporation carried out a series of mechanization demonstrations on plots in each of its Rocky Mountain plant districts. This program served two purposes: first, to stimulate further acceptance of spring mechanization by the grower; and, second, to provide an opportunity to study the adaptability of various thinning practices by identical tests under varying conditions in the widely separated areas of the intermountain area. The plots were located at Sidney and Hardin, Montana; Sheridan, Worland and Torrington, Wyoming; Grand Junction and Swink, Colorado.

Methods were chosen which have been used successfully *in* many of our districts since the introduction of the small knife principle in 1948. We and other sugar companies as well have been obtaining excellent results with the gear-driven Silver G. W. or a similar machine converted to use the two-inch eight spoke Silver knife. In addition to this, we incorporated a ground-driven thinner which had gained wide acceptance in one particular area in 1950 as a labor saver. This machine is known as the B & P weeder wheel, and is a twenty-spoke one inch knife ground-driven device.

Each demonstration comprised four methods of mechanical stand reduction compared to conventional hand thinning *on* plots averaging five acres. Each treatment was replicated four times or twenty-eight one-quarter acre plots per demonstration.

These tests embraced the following treatments:

Treatment 1 (or check). Conventional short handled hoe thinned.

Treatment 2. Once over with Silver Thinner—two-inch eight-spoke knives followed by long handled hoe trimming.

Treatment 3. Same as number two plus one-inch B&P weeder twenty-spoke wheel plus long handled hoe trimming.

Treatment 4. Twice over with B&P weeder plus long handled hoe trimming.

Treatment 5. B&P weeder for final stand reduction requiring no trimming by long handled hoe.

Processed seed was planted with precision planters at the rate of eight to twelve seeds per foot of row with an average germination stand of thirty-three percent or thirty-three beet-containing inches per one hundred inches of row. Thinning was done as soon as the beets had attained the four-leaf stage. Conventional short hoe thinning was performed at the regular piece work contract rate while long-handled hoe trimming was worked on an hourly basis. The laborers used for the latter work were those who worked treatment number one or the short-handled hoe and had had no previous experience with this method of working beets, but despite their lack of experience were able to effect a considerable saving in man hours. The average man hours required for thinning the short-handled hoe plots were 24.4 hours per acre. Bearing in mind that treatments two, three and four were the long-handled trimmed plots the following man hours were required:

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Treatment 2.	17.3
Treatment 3.	14.8
Treatment 4.	13.9
Treatment 5.	None

Stand counts from all thinning operations whether requiring labor or not were as follows:

Treatment 1.	95.2
Treatment 2.	87.
Treatment 3.	85.
Treatment 4.	87.5
Treatment 5.	116.5

These figures represent a total number of beet hills per hundred feet of row.

The results were surprisingly consistent despite the wide variance in conditions throughout the area in which these tests were conducted. The returns to the grower, which are of primary importance, were satisfactory in that these returns after deducting labor and harvest costs showed little difference between treatments.

For example, the returns were as follows:

Treatment 1.	\$139.45
Treatments 2, 3 and 4.	A range of \$132.45 to \$136.65
Treatment 5 (no hoe thinning).	\$130.47

Yield in tons per acre ranged from 13.8 to 14.4 on the hoe-trimmed plots while the cherk exceeded these figures by only 3/10 of a ton. In a typical test at Worland, Wyoming, the returns per acre were as follows:

Treatment 1.	\$130.20
Treatment 2.	132.79
Treatment 3.	125.45
Treatment 4.	124.82
Treatment 5 (or the plots requiring no hand work).	\$122.00.

In summarizing it might be well to give some pertinent observations regarding the mechanical phase of the operations on which exhaustive studies were made on every aspect of the work. It was definitely proven that the action of the gear-driven thinner established a more definite pattern than that of a ground-driven wheel and that the resulting population showed a direct correlation to the original stand and therefore enabled us to determine what percent of the remaining stand was to be removed, and that the incorporation of the weeder wheel used in conjunction with the two-inch knife even though it did further reduce the stand was not dependable mathematically, in that its action is more or less erratic tending to slide by or avoid reducing clumps containing multiples, this being of no particular benefit to the reduction of the long-handled hoe work used in trimming. Also, in treatment five it was shown that this was definitely the case in that this method is limited to two operations, either with two units mounted on the tool bars of the tractor, each unit working in opposition to the others, or a single unit twice over the same row, simply because once the cuts have been made a definite track or pattern has been established and therefore the wheel follows the guide in much the same manner as water follows a depression in the land.

Results of the stand counts made following the mechanical operations on treatment five showed that the ground-driven one-inch cut wheel removed forty-six percent the first time over. The second time over showed a reduction of beet hills of six and one-half percent while each succeeding operation removed only from one to five percent of the beet hills. After the first operation fifty-three percent beet hills contained single beets, twenty-nine percent contained doubles, eighteen percent contained multiples. Counts following each operation up to six times over showed that the above percentages of reduction of singles, doubles and multiples remained constant. In other words, the action of a ground-driven thinner is definitely limited and cannot be utilized as a tool to be used for complete mechanical thinning practices. However, had the gear-driven machine been used a definite diamond pattern would have resulted, one which could have been depended upon to provide a final stand containing a maximum of single beets and a minimum of doubles and few if any multiples.