

POST-THINNING LOSSES AND THEIR CAUSES

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The causes and magnitude of post-thinning losses in stand were studied by Harry B. Shaw^{2/}. In summarizing his work Shaw makes this statement, -"those (losses) occurring between thinning and harvest range from 2.54 to 12.85 per cent, with an average of 7.26 percent among the 18 plats from which these data are obtained."

Little attention seems to have been given this phase of sugar beet culture since Shaw did this work in Utah in 1910-11 and 12.

In discussing his studies Shaw does not mention diseases in connection with post-thinning losses.

Observations over a number of years indicate that losses in stand between thinning and harvest, in Great Western Sugar Company territories, have resulted in serious losses to the industry by reducing returns to both grower and processor.

If these losses are to be reduced or prevented their causes must be known. In order to secure this information studies were begun in 1938 designed to determine the nature of the causes and to learn the relative importance of each.

The plan followed in this study was as follows: Each fieldman was required to study at least one field. In this field 3 one hundred foot strips, each consisting of 3 rows, were staked immediately after thinning and the number of beets left in each row by the labor recorded.

The beets were recounted at stated periods during the entire season. The first count was made 3 days after thinning, the second 7 days after thinning, the third 2 weeks after the second, and all subsequent counts at 2 weeks periods.

Each time a count was made the number of beets lost was reported and the cause of the loss given.

Losses were found to be due to a wide range of causes including, diseases, insects, work animals, other animals, cultivating, exposure, hoeing, storms and other weather conditions, irrigation and unknown.

The heading "disease" covered black-root, Girdle scorf, Rhizoctonia root rot, Fusarium root rot, and other diseases. "Work animals" refers to losses caused by work animals in cultivating, ditching, spraying, etc. "Other animals" includes stray animals, rabbits, pheasants, gophers, etc. "Exposure" covers losses due to removing soil from around roots of small beets in thinning.

The 1938 and 1939 studies cover all Great Western factory districts. Eighty-three fields were studied in 1938. The total area was 2.85 acres

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carrying 75573 beets. In 1939 the study covered 78 fields, 2.61 acres and 67530 beets as left by the labor.

In 1938 a total of 4960 beets were lost and in 1939, 6539 were destroyed between thinning and harvest. These figures represent 6.45% and 9.68% loss, respectively, for the two years. The mean loss for the two years was 8.63%.

The losses for 1938 and 1939 are compared in the following tabulation:

Cause of Loss	Percent lost	
	1938	1939
Disease	3.14	3.38
Insects	0.40	0.85
Work animals	0.25	0.21
Other animals	0.48	0.50
Cultivator	0.70	0.79
Exposure	0.55	1.96
Hoeing	0.43	0.39
Storms	0.22	1.31
Irrigation	0.04	0.27
Unknown	0.24	0.02
Total	6.45	9.68

Insects were more active in 1939 than in 1938. Grasshoppers and blister beetles were responsible for most of the increased damage in 1939.

The loss from exposure was much higher in 1939 than in 1938. Differences in weather conditions during the thinning period are largely responsible for this increase.

May 1939 was 11.1° warmer than May 1938 and the precipitation was less than one-half that of May 1938. During May 1939 there were 6 periods of precipitation and 13 in May 1938. The month of June did not differ as widely the two years as May. June 1939 was slightly cooler and dryer than June 1938.

Storms and other weather conditions caused heavier losses in 1939 than in 1938. This loss was augmented by drouth and the general shortage of irrigation water in 1939.

The date of thinning had an influence upon the losses as is indicated by the following:

All cases thinned	May 18 to 31,	Loss 7.47%
" " "	June 5 to 10, "	10.19%
" " "	June 16 to 29, "	11.19%

The dates between May 31 and June 5 and June 10 and 16 were excluded so as to make a more clean cut separation between date groups.

The losses due to rabbits, pheasants, and insects were much higher in the late thinned beets than in those thinned early. Losses caused by Fusarium root rot were also higher in the late thinned fields.

There is a very marked decrease in Girdle scorf and black-root and a

slight decrease in Rhizoctonia in the late thinned fields as compared with those thinned early.

Disease was responsible for 47.97% of all losses in 1938 and 36.25% in 1939. The relation of the loss caused by each disease recorded to the total loss caused by disease in 1938 and 1939 is shown below:

Year	Disease				
	<u>Rhizoctonia</u>	<u>Black-root</u>	<u>Girdle scorf</u>	<u>Fusarium</u>	<u>Unknown</u>
1938	37.41	31.22	19.34	7.01	5.01
1939	34.19	27.43	26.83	10.69	0.86

The principal differences between the two years are found in an increase of Girdle scorf and Fusarium and a decrease in Rhizoctonia and black-root in 1939.

The several counts during the season divided the growing season into 11 periods. The heaviest daily loss took place during the first 3 periods, i.e., 3 days after thinning, the 4th to 7th days after thinning, and the 8th to 14th days after thinning. The total loss for the 21 days covered by these periods was 65.98% of the season's loss. The daily losses expressed in terms of the total loss for the season were 5.73, 5.51, and 1.9, respectively, for the 3 periods under consideration.

Losses due to insects, work animals, cultivating, exposure, hoeing, and irrigation are partly, at least, controllable. These constitute 36.7% of the total loss in 1938 and 46.1% in 1939.

Better care, more attention to the handling of tools and work animals and closer supervision of labor should materially reduce these post-thinning losses.

The effect of post-thinning losses is not proportionate to losses in number of beets. Much of the loss, especially that caused by disease, occurs so late in the season that the remaining beets have no opportunity to make up for this loss by increased growth as a result of the wider spacing the loss brings about. Therefore, these late season losses are more serious than those occurring earlier in the growing season.

A STUDY OF SUGAR BEET GROWTH AT JEROME, IDAHO

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In an effort to determine the amount of growth made by sugar beets from week to week under conditions such as prevailed at Jerome, Idaho, during 1938 and 1939, representative growing beets were measured and a record of increase in circumference recorded. At the end of the growing season these beets were weighed.

To convert this weekly growth into pounds per acre, the following

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