Simulated Hail Damage to Sugar Beets 1948-49[1]

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The object of this investigation, begun in 1946 at the Huntley Branch station, Huntley, Montana, was to determine the effect of simulated hail damage on sugar beets. The results of this study for 1946-1947 were published in the Proceeding of American Association of Sugar Beet Technologists for 1948. This report includes the 1948-1949 results, and summarizes the data for the four years.

Table 1.—Simulated Hail Damage 1948

Fertilized Land				
	Nitrogen added		No Nitrogen added	
Injury	Yield Tons	*Increase or Decrease Tons	Yield Tons	Increase or Decrease Tons
		Defoliated 6-29-48		
0	16.1	.....	16.1	.....
25	15.7	—0.4	16.2	+0.1
50	14.3	—1.8	14.7	—1.4
100	10.9	—5.2	11.4	—4.7
		Defoliated 7-28-48		
0	16.2	.....	15.4	.....
25	13.3	—2.8	15.6	+0.2
50	15.8	—0.4	14.5	—0.9
100	9.5	—6.7	7.7	—7.7
		Defoliated 8-25-48		
0	16.7	.....	16.7	.....
25	15.8	—0.9	14.2	—2.5
50	15.2	—1.5	14.2	—2.5
100	14.7	—2.0	12.0	—4.7

*In relation to the check.

In conducting this work the simulated hail injury to sugar beets was produced three times each year on the triplicate plots at approximately monthly intervals beginning June 26. On each date 100, 50, 25, and 0 per cent of the leaf area of the beet was destroyed. A plot consisted of four rows of beets, 26.2 feet long, of which the two center rows equal to one-five hundredth of an acre were harvested. The injury was produced by whipping the plants with a flexible wooden whip.

Fertilized land, which received an application of 16 loads of manure and 200 pounds of treble superphosphate per acre the previous fall, and unfertilized land were used. On one series on both fertilized and unfertilized land, an application of nitrogen (150 pounds of ammonium sulphate and 150 pounds of sodium nitrate per acre) was made on each date following

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the injury. The land was fall-plowed and in the spring and summer received the recommended cultural practices, similar to those used on the other beet acreage at the Station. In 1948 and 1949 a mixture of U. S. 22 and G. W. 268 sugar beet seed was planted at the rate of 4 pounds per acre. The beets were planted April 22, and harvested September 30 (150 days after planting) each year.

The loss of yield on the fertilized land for the 100, 50, and 25 per cent defoliation on June 29, July 28, and August 29, 1948 is shown in Table 1.

The nitrogen application in June was not very effective, in July there was a slight effect, and the August application showed the most pronounced effect.

Table 2.—Simulated Hail Damage 1948

	Unfertilized land			
	Nitrogen added		No Nitrogen added	
Injury	Yield Tons	*Increase or Decrease Tons	Yield Tons	Increase or Decrease Tons
		Defoliated 6-24-48		
0	13.5	.....	13.5	.....
25	13.7	+0.2	13.5	.....
50	13.3	—0.2	12.0	—1.5
100	10.1	—3.4	8.4	—5.1
		Defoliated 7-26-48		
0	12.0	.....	13.4	.....
25	10.0	—2.0	10.3	—3.1
50	11.4	—0.6	8.7	—4.7
100	5.0	—7.0	5.5	—7.9
		Defoliated 8-25-48		
0	16.6	.....	17.9	.....
25	16.5	—0.1	16.1	—1.8
50	14.1	—2.5	14.6	—3.3
100	11.8	—4.8	12.8	—5.1

*In relation to the Check.

The loss of yield on the unfertilized land for the 100, 50, and 25 per cent defoliation on June 29, July 28, and August 29, 1948, is shown in Table 2.

Nitrogen applied after injury in June, July, and August showed a beneficial effect in practically all cases on the unfertilized land.

The results of the simulated hail injury experiments in 1949 were erratic, due to an epidemic of rhizoctonia root rot which proved serious. The method of procedure was identical to that described for 1948. The 100 per cent defoliation on June 24, July 31, and August 26, 1949, resulted in a loss of yield as indicated in Table 3. The 50 and 25 per cent defoliation was erratic, sometimes the 25 per cent injury resulting in more damage than the 50 and vice-versa. The presence of the disease materially reduced the stand, and the beets which survived grew larger due to an enlarged feeding area. Since the tonnage-yield is calculated on weight per harvested beet times stand, errors probably resulted in the interpretation of the yield per acre.

The experiment will be continued in 1950 on land which has not been planted to beets for several years.

Table 3.—Simulated Hail Injury 1949

	Fertilized Land				Unfertilized Land			
	Nitrogen Added		No Nitrogen Added		Nitrogen Added		No Nitrogen Added	
Injury	Yield Tons	*Increase or Decrease Tons	Yield Tons	Increase or Decrease Tons	Yield Tons	Increase or Decrease Tons	Yield Tons	Increase or Decrease Tons
				Defoliated June 24				
0	18.2		18.2		17.2		13.3	
100	13.4	—4.8	13.6	—4.6	13.9	—3.3	10.9	—2.4
				Defoliated July 31				
0	14.9		15.8		16.7		12.9	
100	10.6	—4.3	13.4	—2.4	9.4	—7.3	8.6	—4.3
				Defoliated Aug. 26				
0	13.8		15.9		13.2		13.5	
100	12.8	—1.0	9.6	—6.0	11.3	—1.9	11.8	—1.7

*In Relation to the Check.

Summary

The results of this study for four years, 1946-1949 inclusive, show that complete defoliation (100 per cent) or partial defoliation (50 per cent) during the latter part of June or July causes an average loss of approximately one-fourth of the crop for complete defoliation (100 per cent) and one-sixth for partial defoliation (50 per cent) .

The 25 per cent defoliation usually causes a loss of less than 10 per cent, and in some cases no loss.

Complete defoliation (100 per cent) in August causes less loss of tonnage but decreases the sugar content of the beet 2-4 per cent. Partial defoliation (50 and 25 per cent) causes little loss in tonnage or percentage of sugar.

In general, an application of a nitrogen fertilization was beneficial. It apparently aided in a more rapid recovery of the beets.