method of analysis used in 1935 could not be employed.

In addition to other data reported in 1937 the estimated damage was secured. With this as a basis a study was made of the effect of previous crops upon the damage caused by Rhizoctonia. In this part of the 1937 study sugar beets, potatoes, alfalfa, sweet clover, beans, and garden truck are considered host crops. Small grain and corn are considered non-host crops.

The following indicates some interesting relations.

Damage	all	cases	beets	following	host crops regardless of number	12.70%
"	"	"	"	"	non-host crops	6.40%
"	"	"	"	"	2 or more host crops	13.83%
"	"	"	"	"	1 only host crop	10.07%
"	"	"	"	"	1 only non-host crop	7.36%
"	"	"	"	"	2 or more non-host crops	4.40%

EFFECT OF DOWNY MILDEW ON SIZE, SUCROSE PERCENTAGE, AND PURITY OF SUGAR BEETS

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For many years downy mildew has been recognized as a serious disease of sugar beets in the coastal regions of California during seasons when climatic conditions favored the development of the fungus. Prior to 1935 this disease was considered of minor importance in the interior valleys. During the past three seasons (1935-1937), however, serious infestations have occurred over wide areas in the lower Sacramento Valley.

Growers and sugar company officials frequently report that the yield of beets is strikingly reduced by downy mildew infestations, and some have observed that the sucrose percentage and apparent purity of beets from mildewed fields is lower than from disease-free fields --a condition that would interfere seriously with sugar extraction.

Previous to this year (1937) two attempts have been made to determine the effect of downy mildew on the size and yield of sugar beets. The results reported in table 1 show that both at Salinas in 1930 and at Davis in 1935 the indicated available sugar from infected beets was from 30 to 40 percent less than from healthy beets in the same field. In both cases the average root weight, sucrose percentage, and apparent purity were significantly lower in diseased than in healthy beets.

Table 1.--Effect of Downy Mildew on Yield of Sugar Beets

	Healthy	Diseased	Difference	Odds
A. Salinas, California, 1930				
Average Root weight, pounds	3.13	2.43	0.70	768:1
Sucrose percentage	13.5	11.5	2.0	4999:1
Purity percentage	83.8	77.3	6.5	1666:1
Relative Yield: Ind. available sugar*	100.0	61.0	39.0	
Tonnage	100.0	77.6	22.4	

Table 1, Continued.

	Healthy	Diseased	Difference	Odds
B. Davis, California, 1935				
Average root weight, pounds	2.27	1.72	0.55	62:1
Sucrose percentage	15.7	14.3	1.4	28:1
Purity percentage	87.5	85.7	1.8	33:1
Relative Yield:				
Ind. available sugar*	100.0	67.6	32.4	
Tonnage	100.0	75.8	24.2	

*Assuming 100 percent extraction

During the spring of 1937, a planting of sugar beets was made at Santa Maria, California, in cooperation with the Union Sugar Company for the purpose of determining:

(1) The effect of downy mildew on the yield of sugar beets.
(2) The relative susceptibility of some commercial varieties of sugar beets.

Ten varieties were planted in 4-row plots, 100 feet long, and replicated five times in randomized blocks.

Table 2.---Infection Rate of Downy Mildew and the Relation of Time of Infection to Average Root Weight. Planted March 5, 1937, Santa Maria, California.

Date	Days after Planting	Percentage Infection		Average root weight
		Increase	Total	Pounds
Apr. 26	52	0.42	0.42	0.72
May 11	67	0.61	1.03	0.42
May 28	84	6.02	7.05	0.51
June 11	98	6.37	13.42	0.76
June 25	112	7.60	21.02	1.10
July 10	127	2.42	23.44	1.59
July 26	143	1.51	24.95	1.83
Non-infected beets				1.35

To determine the effect of early downy mildew infection on the sucrose percentage, purity, and yield of sugar beets, samples were collected in each variety from those beets observed to be infected within 100 days after planting. In the same way, samples were taken from beets showing infection after that date and from the non-mildewed beets to represent, respectively, the late infected and healthy groups of beets.

The results, presented in table 3, show that early infected beets were less than half as large as healthy beets, whereas late infected beets were nearly normal in size. The sucrose percentage of both early and late infected beets was over 2 percent lower than that of the non-infected beets.

Table 3.--Effect of Early and Late Downy Mildew Infections on the Yield of Sugar Beets, Santa Maria, California, 1937

	Infection Observed		Average of all Beets	
	Prior to 100 days of age	Between 100 and 150 days of age	Infected	Non-Infected
Average root weight Pounds	0.647	1.316	0.98	1.348
Sucrose percentage	15.12	15.58	15.42	17.77
Purity percentage	75.65	76.29	76.10	81.92
Tare percentage	7.79	5.68	6.73	5.25
Relative Yield: Tonnage, Percent	48.0	97.6	72.6	100.0
Percent Ind.available sugar*	37.6	79.4	58.2	100.0

*Based on 100 percent extraction. Obtained by multiplying yield by sucrose percentage by purity percentage.

These results indicate that downy mildew interferes with normal production of sugar beets by reducing the average root weight and the sucrose percentage. The death of a considerable number of infected beets is still another factor that reduces productivity. The extraction of sugar is also interfered with because of the reduced percentage of purity. Infections that occur early in the life of the sugar beet appear to be considerably more serious in relation to all of these than are late infections.

The 1937 trials at Santa Maria provided an opportunity to compare the susceptibility of nine varieties of sugar beets under a moderately severe natural epidemic of downy mildew. The percentages of infection shown in table 4 indicate that Hartmann and Eagle Hill are significantly less susceptible than the other varieties tested:

Table 4.--Relative Susceptibility of Sugar Beet Varieties to Downy Mildew, Santa Maria, California. Planted March 5, 1937.

Variety	Percentage of Infection
Hartmann	15.1
Eagle Hill Brand	16.9
Hilleshog	21.5
U. S. 33	22.5
R. & G. Normal	25.6
R. & G. Old Type	26.3
U. S. 12	26.4
A-600	30.6
U. S. 14	36.3
Difference required for significance.....	2.81