

Experimental Control of the Beet Leafhopper on Sugar Beets Grown for Seed¹

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Curly top, the virus disease transmitted by the beet leafhopper (*Circulifer tenellus* (Bak.)), has greatly reduced the yield of monogerm sugar-beet seed in southern Utah and southern Nevada. In some years large numbers of leafhoppers move to fields of sugar beets grown for seed in late September or early October, at the time the plants are in the cotyledon to eight-leaf stages. Curly-top-resistant varieties of multigerm beets and the monogerm male sterile hybrids grown for seed the past three years are damaged while in the early stages of growth (3)³.

Ronney (7) in 1935 found that a pyrethrum-in-oil spray was of value in the control of the beet leafhopper on seed beets, but that the material had no residual effect. Hills et al. (5), Smith (8), and Douglass et al. (2) showed that DDT was effective against the insect for 1 or 2 weeks. Later Douglass et al. (1) showed that susceptible R & G old-type beets could be protected from infection with twelve applications of DDT. Murphy et al. (6) obtained similar results on commercial beets. Hills et al. (4) reported that systemic treatments of beet seed with Thimet would protect the seedlings for at least 2 weeks after their emergence.

At the 1956 meeting of The American Society of Sugar Beet Technologists the writer reported experiments conducted in years of different leafhopper populations and percentages of infective leafhoppers. Two applications of DDT spray on US 22/3 beets gave increases of 0.5 to 5.6 tons per acre when the population varied from 0.7 to 7.0 per square foot and the percentage of viruliferous leafhoppers ranged from 5.0 to 19.5.

Studies were conducted in 1956 and 1957 on the use of insecticides for the control of the beet leafhopper on monogerm male sterile beets grown to produce hybrid seed.

The 1956 experiment included one, two, and three applications of DDT dust and spray at 10-day intervals in four replicates. Three pounds of DDT was applied per acre. Dusts and sprays gave similar results. Two applications, the second of which was in the first week of October when the fall movement

¹This work was carried out in cooperation with the Utah Agricultural Experiment Station.

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³Numbers in parentheses refer to literature cited.

of the leafhopper was at a peak, gave an average of 85 percent reduction of leafhoppers and 95 percent reduction of obvious curly top. Applications made approximately 10 days before or after this peak did not measurably reduce the incidence of curly top. A peak population of one leafhopper per square foot was present while the beets were in the cotyledon to four-leaf stages.

In 1957 tests were made with Thimet seed treatment, and foliage applications of DDT dust and granular formulations of malathion, Thimet, Diazinon, dieldrin, and chlordane. This year the peak of the leafhopper movement to the beets occurred the last week of September. Approximately 30 percent of the leafhoppers collected in beet fields were viruliferous at this time.

Thimet-treated seed was planted in two fields, one of $6\frac{1}{2}$ and the other of $3\frac{1}{2}$ acres, each with an equal adjacent acreage of untreated seed. Eight ounces of Thimet in a 44-percent wettable powder with captan was used per 20 pounds of seed per acre. It reduced the leafhopper population 90 percent through the eight-leaf stage. Obvious curly top was reduced 98 percent. There was an average of 1.5 leafhoppers per square foot of row in the untreated portions of the fields.

In another field a grower made one application of 10-percent DDT dust at 20 pounds per acre with power equipment to sugar beets in the four- to six-leaf stages. It reduced the leafhopper population by 55 percent and decreased the incidence of obvious curly top by 83 percent.

A randomized-block experiment was conducted with the granular insecticides applied to plants in the cotyledon to two-leaf stages. Each plot was 12 rows wide and contained approximately $\frac{1}{4}$ acre. Four replicates were made in one field and three in another. In the untreated plots the leafhopper population at the time of application and shortly thereafter averaged 1.4 per foot of row. As shown in Table I, best results were obtained with malathion and Thimet, but they were only slightly superior to Diazinon. Dieldrin and chlordane were less effective in the kill of leafhoppers and reduced curly top by only 33 percent.

These field experiments indicate that on monogerm beets one application of insecticide, timed to coincide with beet leafhopper movement to this crop, will reduce the incidence of obvious curly top. DDT spray or dust and granular formulations of malathion, Thimet, or Diazinon are similar in effectiveness. Thimet seed treatment is even more effective than the foliage treatments and is more practical.

Table 1.—Control of the Beet Leafhopper and Curly Top with Granular Insecticides on Monogerm Beets Grown for Seed Showing the Rating by Duncan Multiple Range Test. 1957.

Granular Insecticides	Pounds per Acre	Beet Leafhopper Population per Square Foot of Beet Row		Curly Top Reading per 100 Foot Row in 2 Months	
		1 day	6 to 9 days		
Field No. 1					
Malathion	8%	85	0.27	0.5	1
Thimet	2%	70	0.25	0.6	2
Chlordane	10%	75	0.65	0.67	16
Dieldrin	5%	100	0.85	0.78	8
Check			1.3	1.28	24
Field No. 2					
Thimet	2%	70	0.0	0.1	9
Malathion	8%	85	0.0	0.2	5
Diazinon	2.5%	50	0.1	0.4	9
Dieldrin	5%	100	0.37	0.6	24
Chlordane	5%	75	0.37	1.4	32
Check			0.66	1.46	29

Any two means vertical of each other in each field do not differ significantly at 95 per cent level.

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