Effects of Beet Armyworm Feeding on Sugarbeet Root Yields

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Summary

Previous research in the area of economic thresholds and damage assessments has not been successful in establishing economic levels for beet armyworms. Even though population levels have been maintained, treatment intervals adherred to and damage regimes followed, root yield differences have not been produced in any of these experiments. It then becomes important to determine if foliar feeding by beet armyworms actually causes root yield losses and if it does, when does it occur and how great are those losses.

In 1979-80, an experiment was conducted at the Mesa Experiment Farm to determine the effects of beet armyworm feeding on subsequent root yields. Two treatments were utilized; a check or untreated treatment and an insecticide treated treatment where beet armyworms were kept at minimum numbers. Yields were taken at monthly intervals beginning in December to determine if a weight loss was present after beet armyworm infestations, and if so, was the plant able to compensate for that loss during the remainder of the growing season.

Table 1 indicates the percent of plants infested at various sampling dates during the period of beet armyworm infestations. Methomyl at 0.45 lbs./acre was applied on Oct. 2, 5, 10 and 16 to the plots requiring protection. In the untreated plots 76.5 percent of the plants were infested on Oct. 16 compared to 5.5 percent in the treated plots. This would indicate that beet armyworms were much higher in number in the unprotected plots.

The number of larvae per plant also indicated a significant difference between untreated and treated plots as shown in Table 2. On Oct. 16, the untreated plants averaged 1.36 larvae compared to 0.06 on treated plants. More significant is the length of time that higher numbers were present in the untreated plots. The time period between Oct. 5 and Oct. 20 represents a two week period when more foliar feeding occurred in untreated plots than in treated plots.

Table 1. Percent of Plants Infested by Beet Armyworms per 20 Plant Sample

	Date of Sample				
Treatment	10/2	10/5	10/9	10/16	10/20
Treated:* Methomyl 0.45#	17.0	4.0	3.0	5.5	5.0
Untreated:	37.0	44.5	54.0	76.5	65.5

*Treated on Oct. 2, 5, 10 and 16.

Table 2. Mean Number of Beet Armyworms per Plant in a 20 Plant Sample

	Date of Sample				
Treatment	10/2	10/5	10/9	10/16	10/20
Treated:* Methomyl 0.45#	0.45	0.05	0.03	0.06	0.05
Untreated:	0.45	0.86	1.32	1.36	1.24

*Treated on Oct. 2, 5, 10 and 16.

Root yields are shown in Table 3 and indicate that no significant weight loss was apparent in any of the yield samples. A non significant difference existed in the Dec. 3 yield but by Mar. 10 the yields were nearly identical. Yield samples were discontinued after the March harvest.

The difference in root yields on Dec. 3 may indicate that earlier yields would have shown significant weight losses in the untreated plots from early plant stunting by beet armyworm feeding. If earlier weight loss occurred, then it would tend to indicate the ability of the plant to compensate for those losses.

Beet armyworm populations were considered to be moderate, rather than heavy, in this experiment. No significant plant stand loss was detected from the amount of plant damage that occurred. A heavier population might reduce the plant stand to the point where yield differences would be significant.

Results indicated that feeding on sugarbeet foliage by beet armyworms did not result in a root yield reduction. Variable factors such as plant stand losses, heavier and more persistent infestations and secondary infections could alter these results.

Table 3. Mean Root Yields from Monthly Yield Samples

Treatment	Date of Yield Sample* Dec. 3 lbs/root	Dec. 3 T/A	Jan. 7 lbs/root	Jan. 7 T/A	Feb. 12 lbs/root	Feb. 12 T/A	Mar. 10 lbs/root	Mar. 10 T/A
Treated	0.266	2.93	0.458	5.04	0.734	8.07	1.21	13.31
Untreated	0.228	2.51	0.442	4.86	0.728	8.01	1.22	13.40

*No significant statistical differences occurred at any of the 4 yield dates.

Greenhouse Evaluation of Plant Mortality from Feeding of Beet Armyworms

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Economic thresholds of beet armyworms in sugarbeets has not been clearly defined. This is due, in part, to the lack of adequate information on the amount of damage done to seedling beets by this insect.

To aid in evaluating the degree of beet armyworm damage, a greenhouse experiment was conducted to determine the number of larvae required on a single plant to cause mortality of that plant. It was hoped the results could be a tool in assessing field populations that would result in determining more precise economic population levels.

Fifty pots were set up in the greenhouse for each test. The test was repeated five times. When seedlings emerged in the pots, they were thinned to one plant per pot. Four days after emergence, 10 plants were selected to be infested with a given number of first instar larvae. Each 10 plant group was infested with either 1, 2, 3, 4 or 5 larvae per plant.

Larvae were allowed to remain and develop on the plants until their larval development was completed, approximately two weeks. The plants were then held to determine if recovery would occur. Each larva was counted daily and those missing or dead were replaced with one of the same age.

Table 1 shows the percent plant mortality for each of the five separate tests and the mean percent mortality for the total tests. Only one plant died in the 1 larvae/plant treatment and the remaining 49 plants appeared healthy although feeding signs were visible. In the 2 larvae/plant treatment, a total of 4 plants died, but again, the surviving plants did not appear to be stunted to any degree. Surviving plants in the 3 larvae/plant treatment did show stunting of the leaf foliage but recovered rapidly when the larvae were removed. In the 4 and 5 larvae/plant treatments, the surviving plants were badly stunted and slow to recover.

It is important to remember that this test was conducted in a controlled greenhouse environment. Larvae were not exposed to predation or adverse climatic changes. On the other hand, the greenhouse conditions were ideal for rapid recovery of damaged plants. However, these results can be used as a very broad threshold in the field to aid in assessing field populations and damage estimates.

Table 1. Percent Plant Mortality

Treatments Larvae/plant	Test 1	Test 2	Test 3	Test 4	Test 5	Mean %
1/plant	10.0	0.0	0.0	0.0	0.0	2.0
2/plant	10.0	0.0	20.0	0.0	10.0	8.0
3/plant	20.0	10.0	10.0	20.0	30.0	18.0
4/plant	40.0	50.0	30.0	40.0	50.0	42.0
5/plant	70.0	60.0	30.0	70.0	80.0	62.0