

Determining the Economic Damaging Level of the Egyptian Alfalfa Weevil, *Hypera brunneipennis* (Boheman)

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ABSTRACT

An experiment was conducted to ascertain the population level of Egyptian alfalfa weevil Hypera brunneipennis (EAW) at which chemical control becomes economically justified. Four treatments were established by applying malathion at 1 lb. a.i./acre when an average of 5, 10, 15, or 20 weevil larvae were found per five sweeps; one treatment was sprayed every week (0 larvae) and the controls received no chemical treatment. Five 180-degree sweeps were taken weekly in each plot with a standard 15-inch net and net contents were emptied into a white plate for counting. EAW larvae and adults were counted and insecticide was applied when the larval number reached the designated level. Hay from each plot was cut twice manually, air dried and weighed. Significant yield differences ($P=0.05$) occurred between the 0 larvae treatment and the other treatments for the first cutting but no yield differences occurred for the second cutting.

INTRODUCTION

Alfalfa is a major crop in Arizona, comprising 145,000 acres in 1985. Each year growers make at least one insecticide application to control the Egyptian alfalfa weevil (EAW), Hypera brunneipennis (Boheman) without having a clearly defined guideline for the larval number causing economic damage. Currently, the University of Arizona recommends chemical treatment when an average of five weevil larvae are caught per net sweep (3) while the University of California recommends treatment when an average of twenty weevil larvae are caught per net sweep (1).

This experiment was conducted to determine the weevil population level at which chemical control becomes justified.

MATERIALS AND METHODS

Alfalfa plots (15 x 6 foot) of a first year planting of the cultivar CUF-101 were established on the Yuma Mesa Experimental Farm. Four treatments were established by applying malathion (1 lb a.i./ acre) when an average of 5, 10, 15, or 20 larvae were found per five sweeps. One treatment was sprayed every week regardless of larval number (0 larvae); the controls received no insecticide application. Each plot was surrounded by a three-foot alfalfa plant buffer to reduce the effect of drift from adjacent treatments. The six treatments were replicated six times and arranged in a Latin Square design.

Sampling was conducted in the afternoon, moving from east to west to avoid casting a shadow that might affect weevil behavior. Five 180-degree sweeps were taken weekly in each 15 x 6 foot plot with a standard 15-inch diameter net. The net contents were emptied onto a white plate for counting. Larvae were classified as small (1st and 2nd instar) or large (3rd or 4th instar) and larvae and adult numbers were recorded. When needed, malathion was mixed and applied individually to each plot to insure application of the correct amount to each plot.

Individual plots were harvested manually, and the hay was raked into windrows in the buffer areas for drying. Twenty-four hours after cutting, the hay was turned to aid in drying. Hay from each plot was

weighed individually seventy-two hours after cutting. Two cuttings were taken during the three and one-half month experiment, on February 25 and on April 14, 1986.

Due to a high level of rust infection by *Uromyces striatus*, Bayleton (triadimefon) was applied at 2 oz.a.i./acre on February 5, 1986.

RESULTS AND DISCUSSION

Only ten plots (42%) reached the designated larval density level during the experiment. Of these ten plots, half were in the 5 larvae/sweep group, four were in the 10 larvae/ sweep and one plot was in the 15 larvae /sweep group. The majority (80%) of these ten plots reached the designated level after 692 heat units accumulated (Figure 1). This corresponds to the predicted larval peak occurrence at 600 heat units after January 1st (2). The highest density, an average 20 larvae/sweep, was never reached during the experiment.

For the first two weeks of the experiment, both blue and pea aphid populations (*Acyrtosiphon kondoi* and *A. pisum*) were high in all plots except for the 0 larvae treatment. Alfalfa plants in several plots were severely stunted as a result of this infestation. Also plants in several plots were infected with the rust, *Uromyces striatus*. Both these factors affected yields by reducing growth and causing leaf shed.

Significant yield differences between the 0 larvae treatment and the other treatments occurred in the first cutting (Table 1). However, due to the aphid and disease pressure, yield differences can not be attributed to weevil damage alone. By the second cutting, plants had sufficiently recovered from damage and no significant differences occurred between the 0 larvae treatment and the other treatments (Table 1). This result also reflect the decline in weevil larvae number after the first cutting.

Yield loss was due in part to alfalfa weevil larvae feeding, but the aphids and rust also contributed to this loss. It is not possible to determine how much of this loss can be attributed to weevil damage alone.

Table 1. Average yield from six replicates expressed in pounds dry hay

Treatment		Mean Yield +/- std.dev.*	
		First Cutting 2/25/86 (768 HU)**	Second Cutting 4-14-86 (1791 HU)**
(Ave. larvae/ five sweeps)	Number Replicates	-----lbs dry hay/plot-----	
Controls	6	4.71 +/- 0.94 a	8.2 +/- 0.44 a
5 larvae	6	4.24 +/- 0.40 a	8.5 +/- 1.20 a
10 larvae	6	4.61 +/- 0.78 a	8.18 +/- 1.17 a
15 larvae	6	4.56 +/- 1.0 a	8.28 +/- 1.5 a
20 larvae	6	4.38 +/- 0.72 a	7.37 +/- 1.39 a
0 larvae	6	7.18 +/- 0.73 b	8.65 +/- 0.82 a

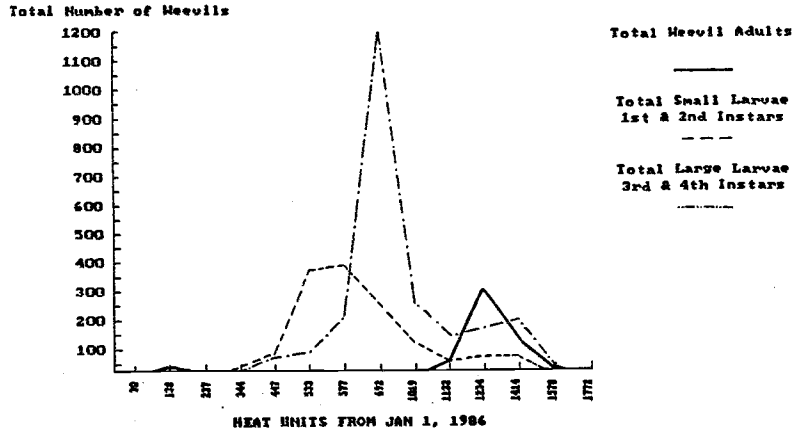
* Treatments compared vertically having the same letters are not significantly different (P= 0.05).

** Heat units accumulated from January 1, 1986; (45-86 degree thresholds).

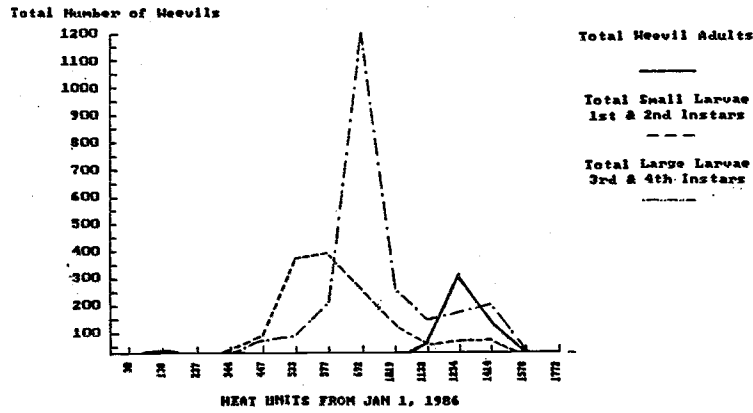
REFERENCES

1. Anonymous. 1981. Integrated Pest Management for Alfalfa Hay. University of California. Publication 4104.
2. Huber, R.T. 1984. Alfalfa Weevil Phenology. Cooperative Extension Publication.
3. Moore, L., B. Barstow, S. Cotty, and M. Lame. 1986. Alfalfa Insect Control - 1986-1987. Arizona Cooperative Service Publication # 8614.

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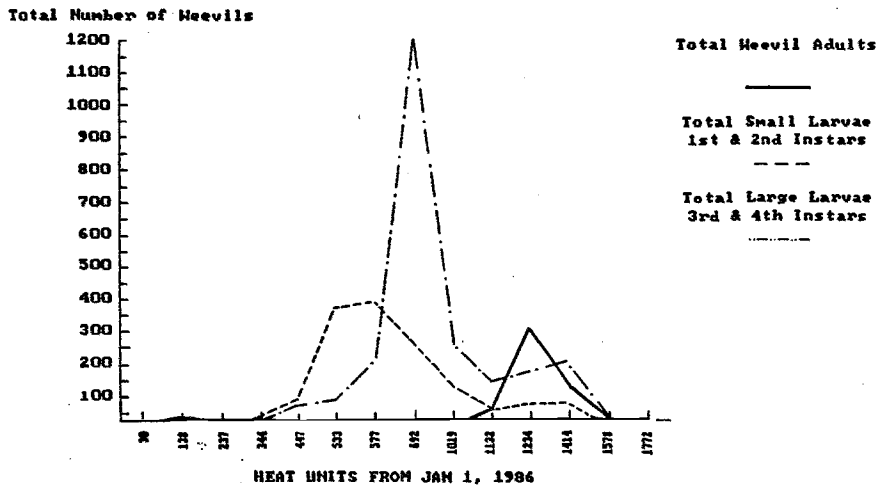


FIGURE 1. Total number of Egyptian alfalfa weevil adults and larvae from weekly sweep net sampling from all experimental plots except those receiving weekly insecticide applications (0 Larvae) from January 2 through April 13, 1986.