ECONOMIC TREATMENT LEVEL FOR THE BLUE ALFALFA APHI

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The blue alfalfa aphid, Acyrthosiphon kondoi is firmly established in the Imperial Valley since it arrived here in 1975. During this year it caused severe damage to alfalfa. This aphid is quite easy to kill with most materials used on alfalfa for aphid control. However, its economic treatment levels have not been determined.

In 1976, three field tests were conducted in the Imperial Valley in an attempt to determine an economic treatment level for the blue alfalfa aphid populations. In the first two tests--one by air and the other by ground, insecticidal drift eliminated the aphids in untreated plots, forcing us to abandon these trials.

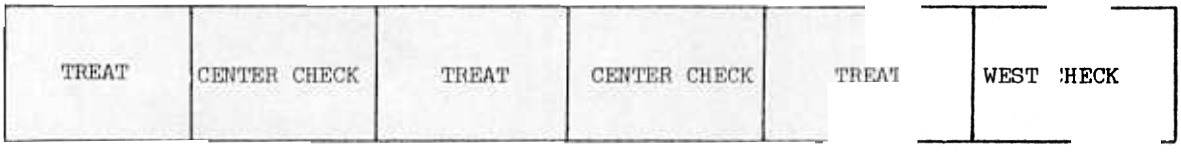
Methods and Results

In the third test, 6 oz of Penncap® M was applied by aircraft on recently cut alfalfa on plots 300' wide by 600' long. The original design consisted of treated plots and three non treated plots. The application was made on February 3, 1976. At this time, the tallest regrowth stems after the bales were removed were about 3 inches tall The population in the plots was essentially 100% blue aphids. The average population was 12-14 aphids per stem.

A very low number of Egyptian Alfalfa Weevil larvae, (1-2 per sweep) appeared in the later part of the est. Thus alfalfa damage was solely due to the blue alfalfa aphid.

Aphid Populations

The first samples were taken by counting a number of aphids on 25 stems per plot o February 8, five days after treatment. At that time, most of the aphids disappeared in the 2 center check plots while all were eliminated in the treated plots. There was no significant difference between the center check plots and the treated plots. However, there was a significant difference in the West check plot (see figure 1). For this reason we separated the field into three types of plots: West check plot, center check plot, and treated plots (see figure 2).



Plot Design (Figure 2)

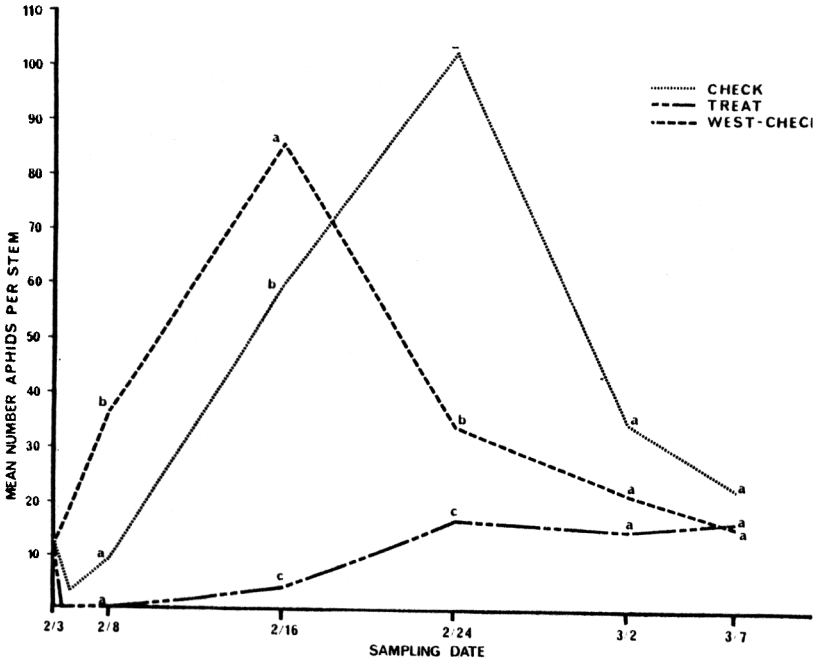


Figure 1. Aphid populations

The second samples were taken on February 16, thirteen days after the application. The West check had 87 aphids per stem. The center check plots had increased to 58 aphids per stem and the treated plots had 4 aphids per stem. The differences were statistically significant (see figure 1). At this time the alfalfa was 10-12 inches tall in the center check plots and the treated plots. However, the alfalfa in the West check was only 6 inches tall. The plants were stunted with short internodes and crinkles yellow leaves. (See Photo).

Alfalfa plants from treated plots (left). Infested plants from West check (right)

The third sample was taken on February 24, twenty-one days after the application At this time there was a significant difference in the aphid population between West check, center check and treated plots. During the next two sampling dates, there was statistical difference in aphid population between the three types of plots. (See figure 1).

Alfalfa Yields

Yield samples were taken by cutting Four - 50 ft. x 2.5 ft. swaths in all 6 plots. There was a significant difference in the green weight of alfalfa in the 3 types of plots The percent water loss was the least in the West check--which we believe was due to the aphid damage and drying of the leaves. The % protein was obtained by analyzing 2 samples from each of the 6 plots and there was no difference between plots.

From the % water loss and mean number of lbs of alfalfa per sample, we calculated the yield in tons/acre. The damage or pounds of alfalfa loss in the West check was nearly 1/2 ton per acre at a loss of $39.44 per acre. It is important to note that while the aphid population in the center checks reached 105 aphids per stem and clearly showed an off color in comparison to the treated plots, yield loss per acre was only 100 lbs per acre or $4.00 per acre.

Table I. Analysis of alfalfa hay yields and loss resulting from various blue alfalfa aphid infestations

Treatment	mean no. lbs green alfalfa per sample[1/]	% water loss	% protein[2/]	yield tons/ac	pounds loss/ac	loss at $80.00/ ton
West - Check	17.28 a	74.5	22.4 a	.77	986	$39.44
Center - Check	28.23 b	75.3	20.8 a	.21	100	4.00
Penncap®-M 6 oz/ac	35.38	79.5	21.3 a	1.26		

1/Four - 50 ft x 2.5 ft samples/replicat
2/Two samples/replication

Conclusions

Clearly recognizing the dangers of drawing conclusions from 1 plot we do sense that the following ideas require much more testing.

Early invasion of aphids on regrowth (first 2 weeks after cutting) are damaging not controlled. Invasion or aphid build-up after this period is far less damaging. Thus the economic treatment level for this aphid will probably be an increasing aphi population along with increasing plant growth.

The decreased aphid reproduction which occurs on older hay will also be an important factor. Our observation in 1975 and again in 1976 strongly indicate that there is a strong toxin secreted by this aphid and the younger more tender shoots show more damage than older shoots even with higher aphid populations. We have no data on lady beetles but an index of numbers of lady beetles per sweep will have to be correlated with aphid populations.

Where there are no or very few lady beetles in the fields--a blue alfalfa aphid population of 10-12 or somewhat even less per stem on the new regrowth following cutting would seem to be heading for marked decreases in yield far above the cost of treatment.

However, until resistant varieties, biological control agents, and possible cultural control practices become available, insecticides appear to be the only method of suppressing the new aphid to avoid damage to alfalfa.