2008 IPM and Sustainable Ag Mini-Grant
Final Report

"Examining Traditional Economic Thresholds for Alfalfa Weevil in Established Alfalfa"

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Background: One multi-county research project USU Extension was involved with during the 2008 growing season had to do with developing a dynamic economic threshold for alfalfa weevil. In general, economic thresholds for insects are not intended to be static, but are highly dependent on production costs and crop values. Data results are quite different from what we expected.

Many alfalfa producers in Utah have incorporated the practice of applying an insecticide as an early treatment for alfalfa weevil control. This preventative application is often made in combination with a herbicide, and before an alfalfa weevil infestation has been identified. Some growers actually sample for alfalfa weevil larvae and adults and make an insecticide application only when they can justify the treatment.

Three years of Utah data (2004-2006) show that weevil numbers, collected per 180 degree sweep with a 15-inch net, are often below the generally accepted economic threshold of 20 larvae per sweep. Crop consultants and entomologists have used the 20 larvae threshold as the minimum alfalfa weevil population to economically justify an insecticide treatment. Hay growers and crop consultants are questioning the validity of this threshold, given the increased value of alfalfa hay.

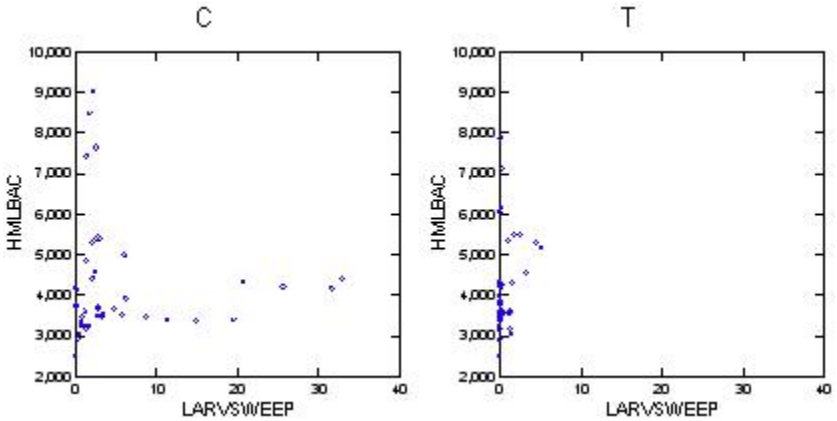
Anecdotal evidence suggests that non-treated fields, especially after the harvest of first crop, are extremely slow to recover. As such, yields and net returns appear to be lower than what is observed in treated alfalfa fields. The demand for quality alfalfa hay for dairy cows, horses and other specialty niches have been increasing regionally and worldwide. Additionally, new insecticidal chemistries are becoming more expensive and frequently the only registered products available.

Procedures: In an effort to better understand economic thresholds and to safeguard environmental quality, USU Agents established 2008 trials in Box Elder, Beaver, Weber and Cache counties. Fields were selected for sampling and monitoring that had an alfalfa stand that had been established for a minimum of two years and a maximum of five years. Portions of each field received an insecticidal application to control alfalfa weevil (i.e., Treated). The remaining portion of the field did not receive an insecticidal treatment regardless of alfalfa weevil populations (i.e., Untreated Control). Replications were repeated four times.

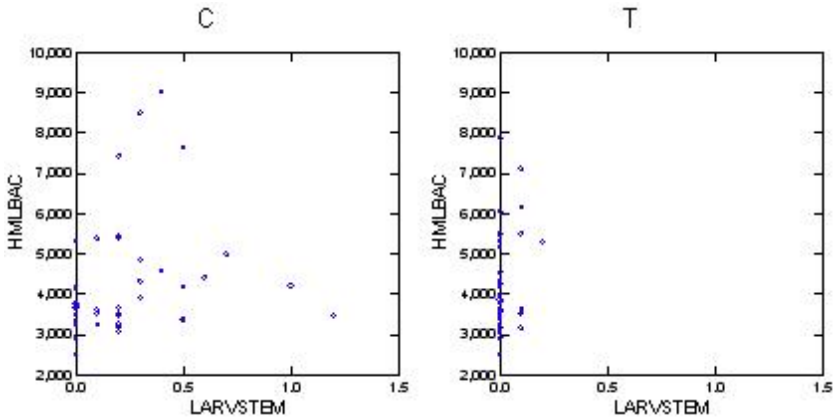
The selected fields were sampled for weevil at least twice before the first cutting and twice again before the second cutting. The first crop sampling took place approximately 3 weeks before anticipated harvest and again just days before the hay was actually swathed. Second crop sampling was done approximately 10-14 days after the first crop was harvested and again just days before the hay was swathed for second crop. Each monitoring session consisted of counting alfalfa weevil larvae found in three sub-samples from each field replication. The sub-

samples were collected by taking ten 180º sweeps with a 15 inch sweep net through the top of the foliage (similar to the data collected from 2004-2006). Researchers also did larvae counts by shaking 10 alfalfa stems in a container. In addition to weevil larvae counts, each field was assessed for dry matter tonnage per acre using Electronic Rising Plate Meters (www.jenquip.co.nz/pasturem.htm) and by taking replicated quadrant clippings from the control and treated plots that were oven dried to determine forage mass.

Results: Researchers anticipated significant differences between the treated and control plots, especially during the initial re-growth of second crop hay. Blended data from all four counties, however, showed no significant difference in forage yield between the treated and control plots. We did find an increase of alfalfa weevil larvae in the control plots, but saw no statistically significant differences in forage mass yields between the control and treated sites (Table 1). Insect numbers were not high enough in any of the four Utah counties to warrant an insecticidal treatment.



Herbage mass (pounds per acre) in control and treatment plots from sweep nets.



Herbage mass (pounds per acre) in control and treatment plots from stem counts.

Forage mass was measured by using electronic Rising Plate Meters, forage sticks and oven dried forage samples obtained from the use of quadrants and clippers. The Rising Plate Meters (RPM) typically used to measure forage in pastures, were calibrated for use in Utah alfalfa fields. Some measurements had to be discarded because taller alfalfa hay would lodge when the RPM's were used. The following formula seems to be relatively accurate for predicting forage mass when using the RPM's.

Lbs Dry Matter Per Acre = RPM ht * 54.3 + 1318

Final assessment was that growers who did not spray insecticides in 2008 usually had yields comparable to those who did spray. 2008 may have been an unusual year because of cooler temperatures during the early growing season. Data from the Utah Climate Center, however, does not show much difference in temperatures from April 15 to July 15, the time period when alfalfa weevil are usually most active. Regardless of the reason for lower weevil numbers this season, regular insect monitoring with a 15 inch sweep net proves again to make economic and environmental sense for producers of alfalfa hay.

Table 1. Treatment effects on alfalfa herbage mass, larvae/sweep, and larvae/stem for study locations by dates.

			Pre- or	Source	Herbage mass, lb DM/ac			Larvae/sweep			Larvae/stem		
County	Date	Growth	at harv.[a]	of HM[b]	Control	Treated	P[c]	Control	Treated	P[c]	Control	Treated	P[c]
Beaver	5/28			Stick1	3214	3214	1.00	1.32	0.00	0.01	0.12	0.00	0.08
	6/10			RPM1	3729	3707	0.63	4.20	0.08	0.01	0.12	0.00	0.19
	6/30							0.20	0.00	0.02	0.00	0.00	[d]
	7/10			RPM1	3935	3949	0.94	0.15	0.12	0.81	0.00	0.00	[d]
Box Elder	5/19			Stick2	2595	2698	0.39	0.08	0.00	0.39	0.00	0.00	[d]
	6/12			Clips	8133	6787	0.12	2.02	0.18	0.01	0.35	0.05	0.02
	7/1							0.22	0.20	0.64	0.02	0.02	1.00
Cache	5/31							0.28	0.02	0.13	0.00	0.00	[d]
	6/14			RPM1	4693	4828	0.33	3.02	2.80	0.91	0.50	0.00	0.01
	7/10							0.15	0.42	0.15	0.00	0.00	[d]
	7/23			RPM1	3357	3332	0.81	0.85	1.38	0.06	0.08	0.05	0.39
Weber	5/13							0.00	0.00	[d]	0.00	0.00	[d]
	5/20							3.88	0.05	0.01	0.48	0.00	0.06
	5/27			Stick1	3392	3408	0.18	13.70	0.05	0.01	0.68	0.00	0.03
	6/2			RPM1	4266	4272	0.88	27.78	0.12	0.01	0.60	0.00	0.03
	6/30			Stick1	3491	3558	0.14	3.82	0.35	0.01	0.12	0.05	0.32
	7/10			RPM1	5374	5431	0.43	2.62	2.88	0.72	0.12	0.08	0.50

[a]Approximately 2 weeks prior to hay harvest, or immediately prior to hay harvest.

[b]Herbage mass (HM) was predicted by canopy height in inches (stick), compressed canopy height (clicks) beneath a rising plate meter (RPM), or by clipped quadrants. For Stick1, HM= (stick height*84.7) +2049; for Stick2 (lodged canopy), HM= (stick height*414.8)-1657; and for RPM1, HM= (RPM clicks*54.3) +1318.

[c]Significance (P-value) of F test of Control vs. Treated from analysis of variance.

[d]No test, due to no variation among data.

Mark Nelson using 15 inch sweep net to find alfalfa weevil in Beaver County.

Lots of beneficial insects were collected when sweeping for alfalfa weevil larvae.

Forage clippings to be oven dried for forage mass determination.

Measuring forage mass with electronic Rising Plate Meter.

Spraying control plots in early May 2008.

Measuring forage mass with Rising Plate Meter and calibration stick.