# 2005
IPM Mini-Grant Report
## 'Evaluation of Preventative Alfalfa Weevil Control'

**Project Leaders:**
Michael Pace, Craig Poulson, Mark Nelson, Clark Israelsen and James Barnhill

**Situation:**
Many alfalfa producers have incorporated the practice of applying the insecticide 'Furadan' (*carbofuran*) as a preventative alfalfa weevil control. This application is made early in the season before an alfalfa weevil infestation has been identified.

In 2004, trials conducted in fields in Box Elder and Weber Counties showed that early applications of Furadan were effective in reducing weevil numbers. However, the weevil populations never reached levels high enough to warrant control, so no evalution of the economic value of the practice in preventing an infestation could be made. The yield weights taken showed no difference between treated and untreated plots.

There is interest in knowing whether an early season evaluation of adult weevil numbers would be a good predicter of weevil infestations that will occur in the season.

**Objective:**
1) Verify the 2004 results which showed that the early application of Furadan was effective in reducing alfalfa weevil populations.
2) Determine whether preventative alfalfa weevil treatments provide an economic advantage.

**Procedures:**
Trials were established in five Utah Counties; Beaver, Box Elder, Cache, Millard and Weber. The trials consisted of alfalfa fields which had been treated early with Furadan compared to alfalfa fields, in close proximity, which had not been treated. Due to wet spring weather and altered spray schedules some trials were dropped from the evaluation. Final fields evaluated consisted of three comparisons in Beaver, three in Millard, two in Box Elder, and two in Weber.

Treatment
Furadan was applied approximately 60 days prior to first harvest.

Sampling
Fields were generally sampled twice before the first cutting and twice before the second cutting. Sampling consisted of counting the alfalfa weevil adults, early larval instars and late larval instars found in five sub-samples from each field. Each sub-sample consisted of one to ten 180 degree sweeps with a 15 inch sweep net.

Yield Evaluation in Weber County
Yield weights were taken from three side by side treated and untreated plots in Weber County. These weights were taken by hand harvesting a square yard area

from each plot. The samples from the first harvest were air dried and those from the second harvest were dried using a Vortex Dryer.

An evaluation of early season adult weevil numbers was conducted at the Randall farm in Weber County. The evaluations took place on March 29, 2004 and April 4, 2005. Four minutes were spent observing a two foot by two foot plot area, at ten different locations throughout the field.

**Results:**

The early Furadan treatment was effective in reducing the alfalfa weevil larvae and adult populations. The percent reduction of alfalfa larvae due to early treatment varied from 50 to 98 percent, with an average reduction of 85.6 percent. The average reduction in adult weevil was 74.3 percent. Twenty larvae per sweep is accepted as the economic threshold to justify treatment. Of the twenty six control field evaluations completed, eight had twenty or more larvae per sweep. All of the twenty five treated field evaluations had less than 20 larvae per sweep.

Yield weights were only collected on the Weber 1 trial site. This site had a very high weevil population with a May 26 average of 170 larvae per sweep in the control plots. Since the weevil infestation increased rapidly just before harvest very little yield was lost in the first cutting, 0.08 tons per acre. However return growth after fist cutting was held back in the control plots and a yield loss of 0.24 tons per acre was measured in the second harvest. Thus a total yield advantage of 0.32 tons per acre was attributable to treating early with Furadan. Assuming a market value for alfalfa hay of $100 per ton, gives an additional return of $32 per acre to the treated plots. This would easily cover the $17.03 cost of the Furadan. However if an application cost of $4.75 per acre, a baling cost of $11.00 per ton ($3.52/.32 tons) and a hauling cost of $5 per ton ($1.60/.32 tons) is added, a total cost of $26.90 per acre in additional expense could be allocated to the treated field. Subtracting the total expense of $26.90 from the income of $32 still gives a net profit of $5.10 per acre. So when serious weevil populations occur, a preventative treatment is a good investment. However, alfalfa weevil are not a serious problem every year. The results of this trial indicate that the annual application of an early Furadan treatment are only economical if weevil populations are expected to reach threshold levels two out of three years. Along with this conclusion, it should be stated that the possible effect of the treatment on weevil populations in future years has not been accounted for.

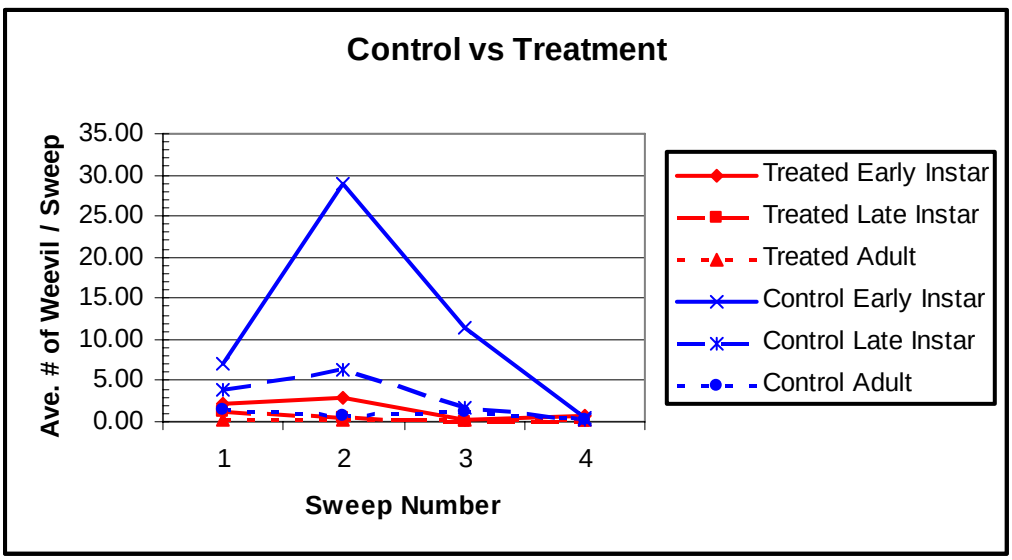
Results of the March/April weevil evaluations showed that it was not an effective way to predict the level of alfalfa weevil infestation that would occur in June. In early 2004 the average weevil count per plot was one and the weevil infestation in the growing season was very low, peaking at 10.7 larvae per sweep. In 2005 the early weevil count averaged only one tenth of a weevil per plot, yet the weevil infestation during the growing season was very high, peaking at 170 larvae per sweep. Thus there was no correlation between early spring adult numbers and what could be expected during the growing season.

This was an exceptionally wet spring. Some growers feel that wet springs are a predictor of increased alfalfa weevil problems. This may be something to consider monitoring in future studies

# Summary of Collections per Sweep 2005

(Averaged by collection period)

| | Date | Furadan Treatment Early Instar | Late Instar | Adults | Total Larva | Control Early Ins. | Late Ins. | Adults | Total Larva |
|---|---|---|---|---|---|---|---|---|---|
| Weber 1 | 4-May | 0.15 | 0.00 | 0.07 | **0.15** | 1.43 | 0.06 | 0.85 | **1.49** |
| Weber 2 | 16-May | 9.40 | 1.40 | 0.60 | **10.80** | 15.40 | 6.20 | 9.20 | **21.60** |
| Box Elder 1 | 16-May | 0.08 | 0.00 | 0.08 | **0.08** | 0.46 | 0.00 | 1.18 | **0.46** |
| Box Elder 2 | 16-May | | | | | 0.22 | 0.00 | 1.64 | **0.22** |
| Box Elder 3 | 16-May | 0.00 | 0.00 | 0.34 | **0.00** | 0.00 | 0.00 | 3.00 | **0.00** |
| Beaver 1 | 24-May | 0.28 | 0.04 | 0.04 | **0.32** | 4.00 | 3.54 | 0.42 | **7.54** |
| Beaver 2 | 24-May | 0.34 | 0.04 | 0.50 | **0.38** | 0.54 | 0.46 | 0.20 | **1.00** |
| Beaver 3 | 24-May | 0.60 | 0.80 | 0.80 | **1.40** | 2.32 | 2.26 | 0.36 | **4.58** |
| Millard 1 | 23-May | 3.68 | 4.04 | 0.02 | **7.72** | 25.14 | 13.26 | 0.14 | **38.40** |
| Millard 2 | 23-May | 3.76 | 4.46 | 0.02 | **8.22** | 14.60 | 9.62 | 0.16 | **24.22** |
| Millard 3 | 23-May | 2.46 | 1.98 | 0.00 | **4.44** | 12.88 | 8.04 | 0.14 | **20.92** |
| **Sweep 1** | **Average** | **2.08** | **1.28** | **0.25** | **3.35** | **7.00** | **3.95** | **1.57** | **10.95** |
| Weber 1 | 26-May | 14.82 | 1.82 | 0.53 | **16.64** | 156.40 | 13.93 | 1.07 | **170.33** |
| Box Elder | 27-May | 5.76 | 0.24 | 0.48 | **6.00** | 16.96 | 0.12 | 0.54 | **17.08** |
| Box Elder 2 | 27-May | | | | | 53.08 | 3.94 | 0.86 | **57.02** |
| Box Elder 3 | 27-May | 5.30 | 0.26 | 0.22 | **5.56** | 12.28 | 0.86 | 1.28 | **13.14** |
| Beaver 1 | 2-Jun | 0.16 | 0.12 | 0.12 | **0.28** | 2.24 | 2.62 | 0.50 | **4.86** |
| Beaver 2 | 2-Jun | 0.08 | 0.28 | 0.20 | **0.36** | 1.66 | 2.14 | 0.38 | **3.80** |
| Beaver 3 | 2-Jun | 0.12 | 0.20 | 0.02 | **0.32** | 2.62 | 4.66 | 0.52 | **7.28** |
| Millard 1 | 1-Jun | 0.14 | 0.26 | 0.60 | **0.40** | 17.72 | 15.56 | 0.32 | **33.28** |
| Millard 2 | 1-Jun | 0.08 | 0.08 | 0.08 | **0.16** | 12.08 | 7.72 | 0.16 | **19.80** |
| Millard 3 | 1-Jun | 0.00 | 0.08 | 0.08 | **0.08** | 14.16 | 11.60 | 0.44 | **25.76** |
| **Sweep 2** | **Average** | **2.94** | **0.37** | **0.26** | **3.31** | **28.92** | **6.32** | **0.61** | **35.24** |
| Weber 2 | 20-Jun | 0.24 | 0.02 | 0.22 | **0.26** | 11.42 | 1.70 | 1.24 | **13.12** |
| **Sweep 3** | **Average** | **0.24** | **0.02** | **0.22** | **0.26** | **11.42** | **1.70** | **1.24** | **13.12** |
| Box Elder | 7-Jul | 2.22 | 0.26 | 0.24 | **2.48** | 2.12 | 0.56 | 0.18 | **2.68** |
| Box Elder 2 | 7-Jul | 1.32 | 0.04 | 0.00 | **1.36** | | | | |
| Beaver 1 | 1-Jul | 0.00 | 0.04 | 0.40 | **0.04** | 0.00 | 0.04 | 0.72 | **0.04** |
| Beaver 2 | 1-Jul | 0.00 | 0.06 | 0.62 | **0.06** | 0.00 | 0.04 | 0.12 | **0.04** |
| Beaver 3 | 6-Jul | 0.04 | 0.08 | 0.14 | **0.12** | 0.00 | 0.24 | 0.36 | **0.24** |
| **Sweep 4** | **Average** | **0.72** | **0.10** | **0.28** | **0.81** | **0.53** | **0.22** | **0.35** | **0.75** |



# ALFALFA YIELD RESULTS

## 2005 FIRST CUTTING - MAY 26

| | Tons/Acre Air Dried | |
|---|---|---|
| **Plot Number** | **Treated Furadan 4F** | **Control** |
| 1 | 1.61 | 1.58 |
| 2 | 1.84 | 1.72 |
| 3 | 1.84 | 1.75 |
| **Average** | **1.76** | **1.68** |

## 2005 SECOND CUTTING - JULY 6

| | Tons/Acre Air Dried | | |
|---|---|---|---|
| **Plot Number** | **Treated Furadan 4F** | **Control** | **Malathion Treated 6/18/05** |
| 1 | 1.19 | 0.87 | 0.84 |
| 2 | 1.05 | 0.91 | 0.69 |
| 3 | 1.25 | 0.99 | 0.59 |
| **Average** | **1.16** | **0.92** | **0.71** |

| **EARLY SPRING EVALUATIONS of ALFAFA WEEVIL**<br>Observation of 2x2 foot Area for 4 Minutes | | |
|---|---|---|
| **Field Location** | **Number of Adult Weevil** | |
| | **March 29, 2004** | **April 4, 2005** |
| 1 | 3 | 1 |
| 2 | 2 | 0 |
| 3 | 1 | 0 |
| 4 | 1 | 0 |
| 5 | 0 | 0 |
| 6 | 1 | 0 |
| 7 | 0 | 0 |
| 8 | 0 | 0 |
| 9 | 0 | 0 |
| 10 | 2 | 0 |
| **TOTAL** | **10** | **1** |
| **Average** | **1** | **1/10** |