IPM Mini-Grant Final Report on

Evaluation of Preventative Alfalfa Weevil Control 2004

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Situation:
A number of farmers in the state of Utah have incorporated the practice of including an alfalfa weevil insecticide with their dormant herbicide application in late February or mid March. The primary insecticide currently being used for this early insecticide application is Furadan 4F (*carbofuran*). During the dormant season when the application is applied to the field, it is often unknown if there will be a problem with the weevil larvae in the field. Many of the producers are going off of the notion that I had the problem last year so I will have it again this year or they might be going with a chemical dealer's recommendation to save an application expense by putting it on in one application.

Objectives:
1) Determine whether the preventative alfalfa weevil treatment provides an economic advantage over the conventional method of scouting for weevil during the season and treating on an as needed basis.

2) Determine the impact of preventative and conventional alfalfa weevil control methods on non-target insect populations.

Procedures:
The trial consisted of 3 one-acre treated and 3 one-acre control plots at one location in Weber and Box Elder Counties. In Box Elder County, the trial was evaluated on the Fred Baker Farm. The control field was a 5 acre field of 6 year old hay and the treated one was across the road and consisted of 5 acres of 3 year old alfalfa hay. The Weber County trial was located on the Jim Randle Farm. It consisted of a 4 year old, 10 acre field. The three one acre plots and three control plots were located next to each other in the same field.

The treatment of Furadan 4F was applied at the rate of 0.83 lbs of active ingredient per acre (The labeled rate is listed at 0.25-1.0 lbs of active ingredient per acre). The cost of the pesticide was $17.03 per acre for the material. Both of the sites were treated with an application of Velpar at the same time as the insecticide. The plots in Box Elder County were treated on March 31 and those in Weber County were treated on April 1.

Monitoring sessions consisted of collecting five sub-samples from each plot within a few days of each cutting. Each sub-sample was the accumulation of ten 180-degree sweeps with a 15 inch sweep net. The arthropods identified in each sub-sample were; early instar, late instar and adult weevil, pea aphid, lygus bugs, grasshoppers, leafhoppers, thrips and spider mites. The beneficial insects monitored included; minute pirate bugs, damsel

bugs, big-eyed bugs, lady bird beetles, parasitic wasps and spiders. There were 4 collections or samplings in Box Elder County and 3 in Weber County during the growing season.

To assist in making a determination of whether the treatment provides an economic advantage over the conventional method, alfalfa yields at the Weber County site were estimated by hand harvesting a square meter area of hay in each of the plots just prior to the harvest on first and second crops. Wet and air-dried weights were taken and used to find the difference in yields between treatments. Because of the difference in fields and the age of the alfalfa stands in Box Elder County, no yield data was taken.

Results:
Alfalfa weevil larvae populations in untreated plots, in Weber and Box Elder Counties peaked at 10.7 and 7.2 larvae per sweep, respectively during the growing season. Neither of these numbers was close to the 20 larvae per sweep that is generally accepted as the economic threshold level for recommending an insecticide application. Due to the relatively low number of larvae at the Weber location, the alfalfa yield data showed no economic benefit to treating with an insecticide (see Table 1).

Table 1. Weber County Alfalfa Yields

	Air Dried (Tons/Acre)	
Plot #	**Furadan 4F**	**Control**
1	2.3	2.2
2	2.1	2.3
3	2.3	2.6
Total	**6.7**	**7.1**

This year's data indicates that the Furadan 4F treatments were effective in reducing alfalfa weevil numbers significantly. The results from the study showed a 46% reduction in Weber and an 87% reduction in Box Elder County in the alfalfa weevil larvae (early and late instar added together) in the first sampling when comparing the control to the treated plots (see graphs below). They showed an 85% reduction in Weber and a 71% reduction in Box Elder County in adult alfalfa weevil in the first sampling when comparing the control to the treated plots. The results from the study indicated no larvae or adults in the Weber County second sampling of the treated and control plots. While Box Elder County showed an 87% reduction in larvae and adults in the second sampling when comparing the control to the treated plots.

An item of interest in the first sampling was that the pea aphid numbers were 89% lower in the Furadan treated plots in Weber. There were 0.5 per sweep in the treated plots and 4.4 per sweep in the control plots. The treated and control plot pea aphid numbers were nearly the same in the first sampling at Box Elder. However, by the second sampling the pea aphid numbers had really increased in both the treated and the control plots with the larger number of aphids was found in the treated plots, just opposite of the Weber location.

At the first sampling the treated plots had a lot fewer parasitic wasps then the control plots at both Weber and Box Elder, the reduction was 77% and 90% respectively. Spider numbers were also lower in the treated plots in the first sampling in both locations.

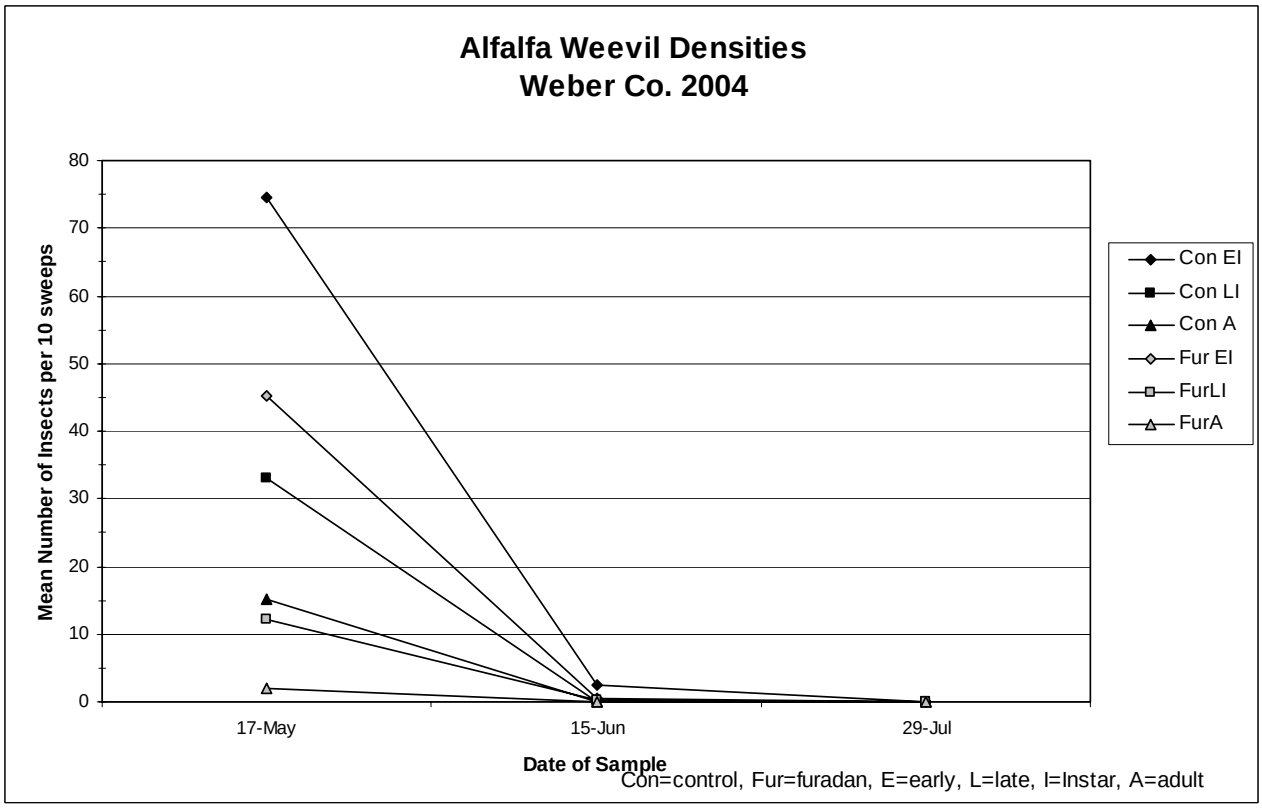
In the third sample period at Weber, the thrip population in the treated plots dramatically increased from 0.2 per sweep to 21.5 per sweep. In Box Elder it increased from 0.7 to 1.7 per sweep.

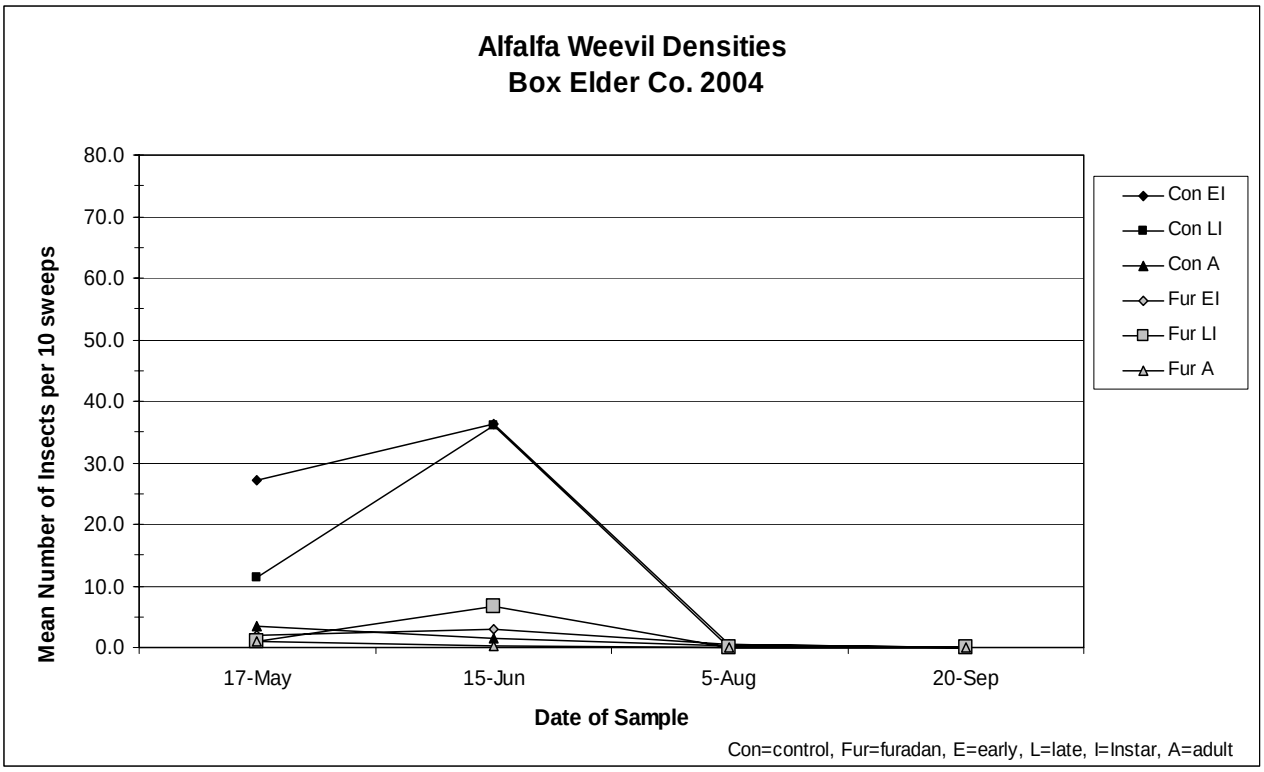
The effect on beneficial insects was inconsistent as there were fewer damsel bugs, but more minute pirate bugs in the treated plots during the third sampling at the Weber plot At the Box Elder site, the damsel bugs in control plot were 5 times higher than the treated plot at second sampling. The big-eyed bugs were double at the third sampling in the control plot in Box Elder and nearly equal at the Weber site.

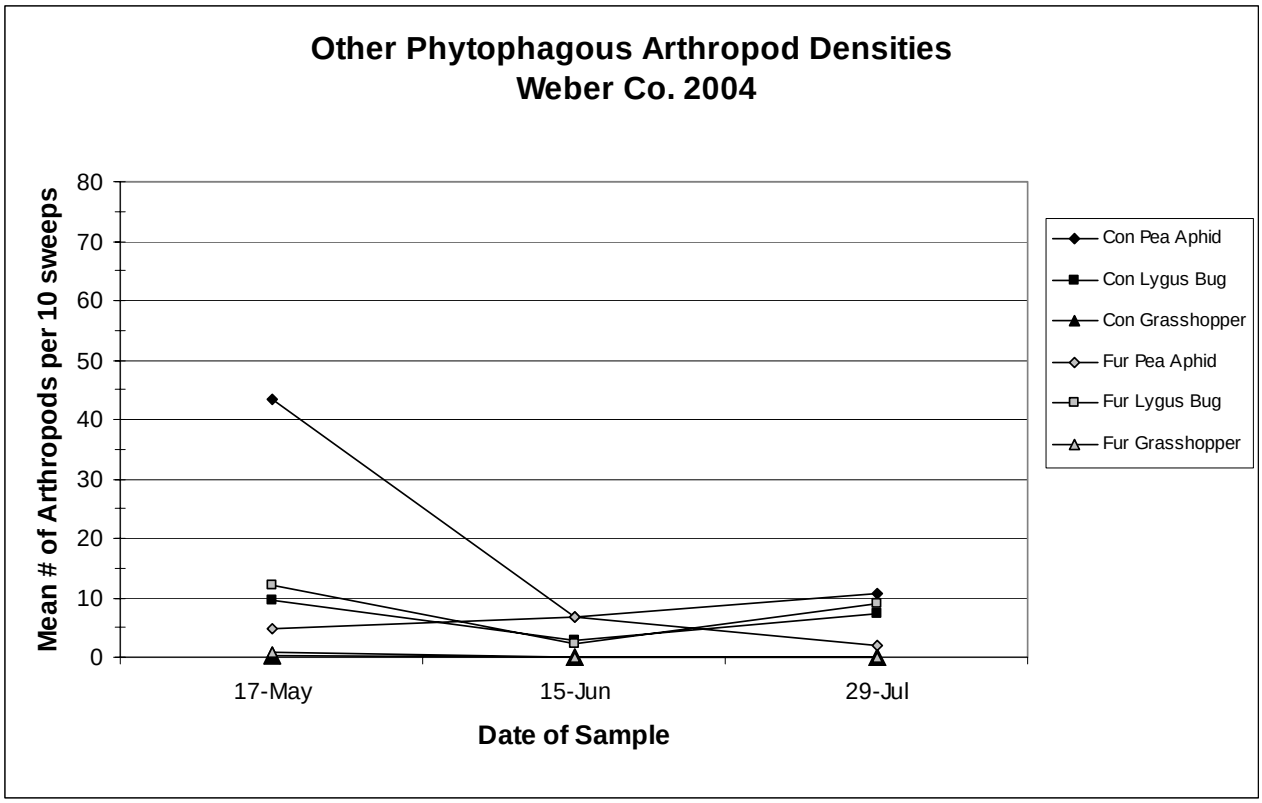
The spider mite population in the third sample period showed an increase of 50% in the Furadan treated plots at Weber, but no real difference at Box Elder.

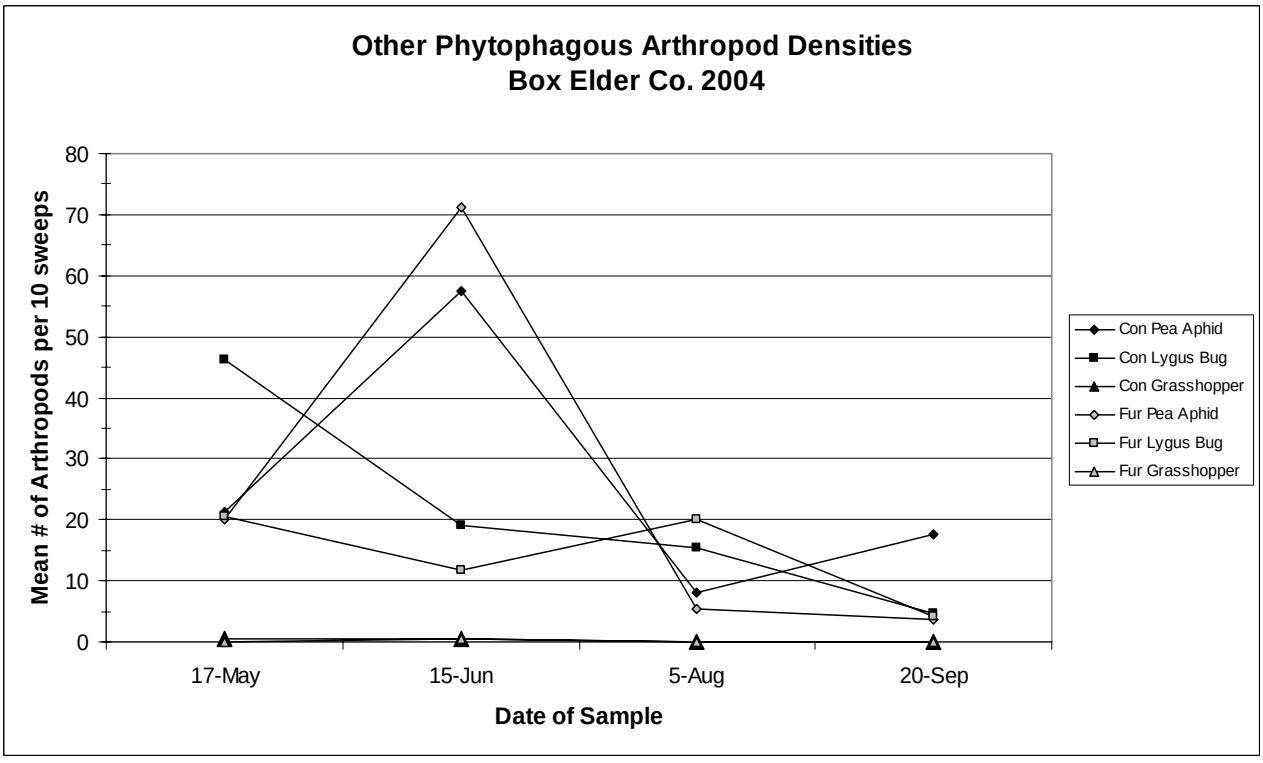
Conclusions:

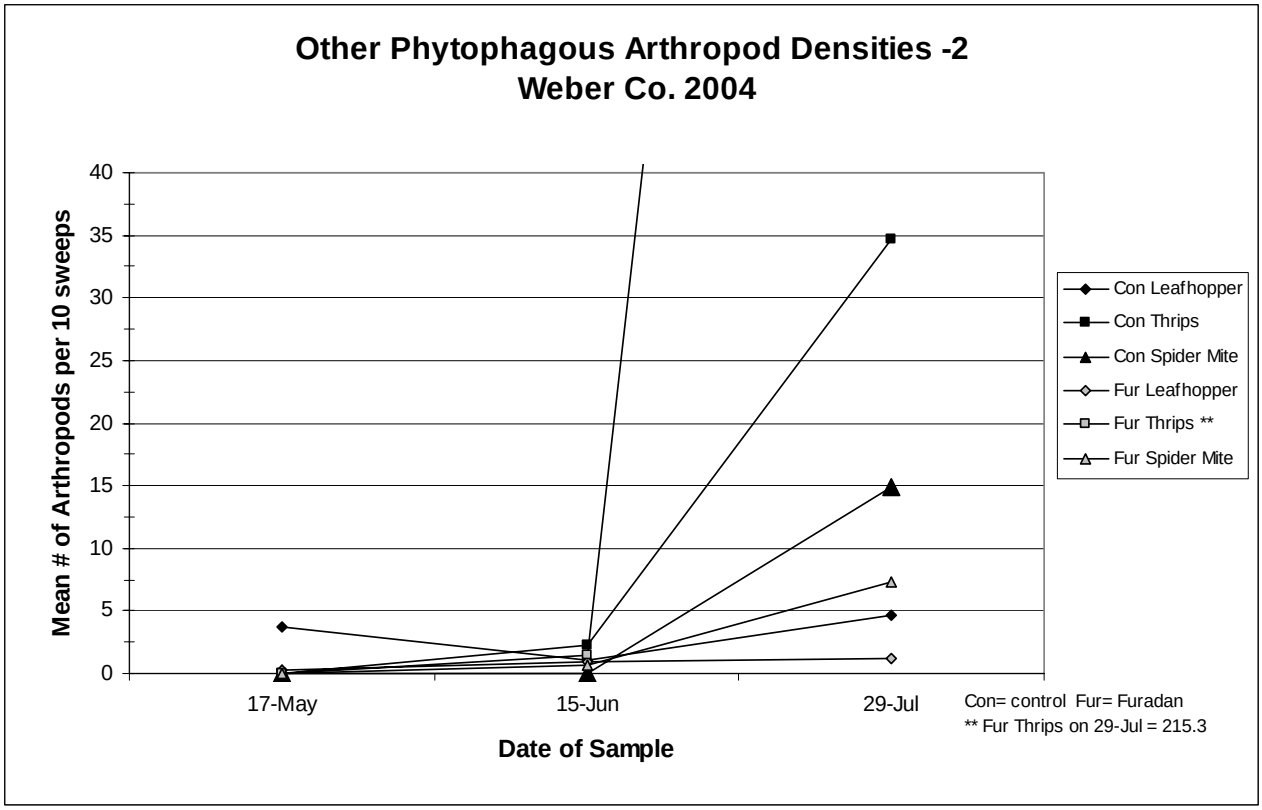
- Furadan 4F did reduce the number of alfalfa weevil larvae and adults at both locations.
- Alfalfa weevil larva at the number we experienced this year did not warrant applying an early application of insecticide or an application during the growing season.
- The conventional method of scouting for weevil during the season and treating on an as needed basis would have saved the growers $17.03 per acre this year. This is because the economic threshold level did not warrant treating with an insecticide.
- We did observe some reductions in beneficial insects in the plots treated with Furadan 4F.
- Because of the mixed results of the trial on beneficial insects at both locations, the impact of a dormant applied insecticide like Furadan 4F on non-target insect populations warrants additional studying.

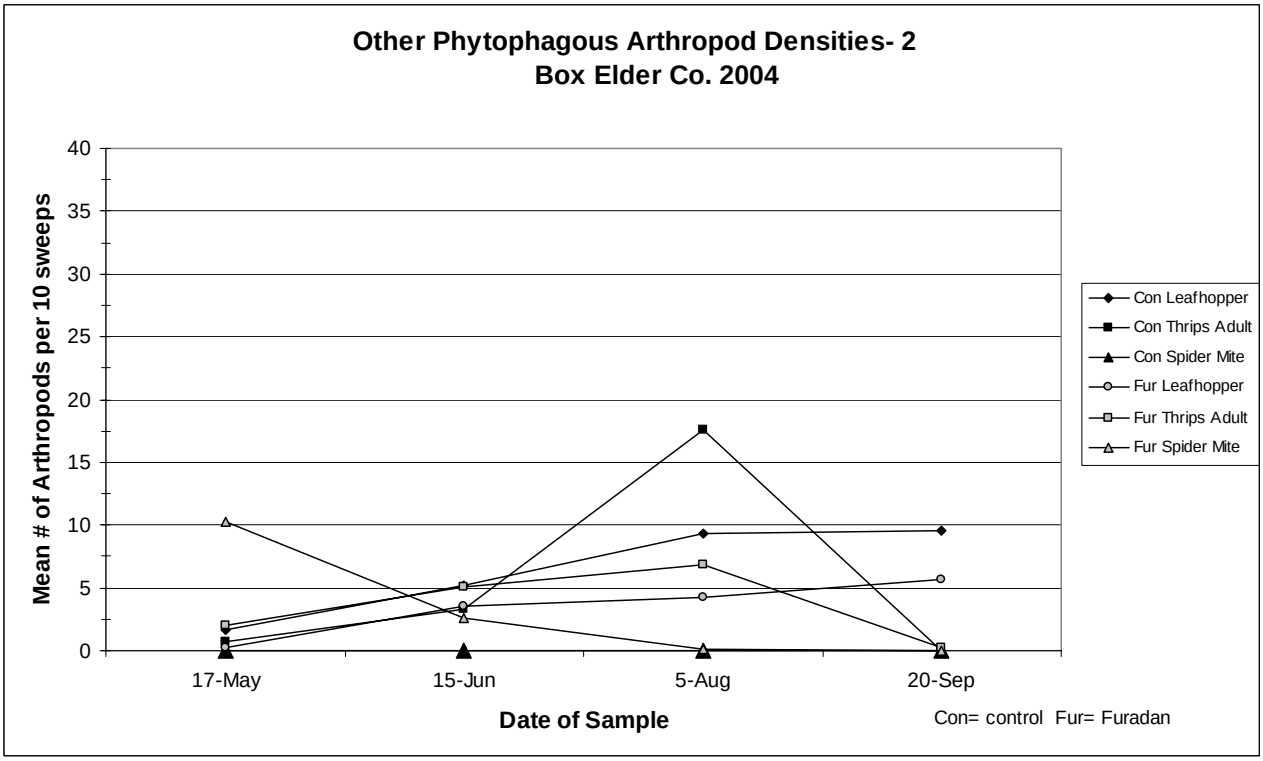

Alfalfa Weevil Densities
Weber Co. 2004
Mean Number of Insects per 10 sweeps
80
70
60
50
40
30
20
10
0
17-May
15-Jun
29-Jul
Date of Sample
Con EI
Con LI
Con A
Fur EI
FurLI
FurA
Con=control, Fur=furadan, E=early, L=late, I=Instar, A=adult

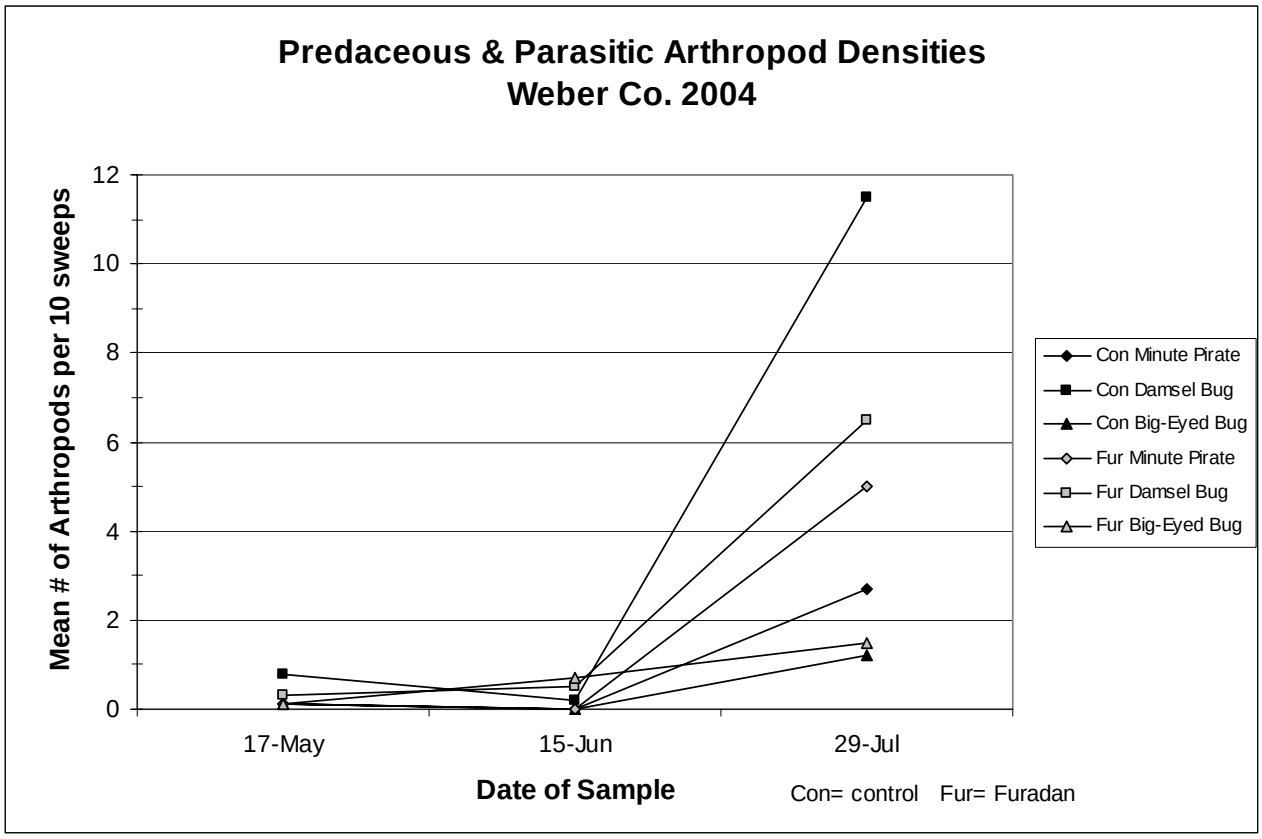

Alfalfa Weevil Densities
Box Elder Co. 2004
Mean Number of Insects per 10 sweeps
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
17-May
15-Jun
5-Aug
20-Sep
Date of Sample
Con EI
Con LI
Con A
Fur EI
Fur LI
Fur A
Con=control, Fur=furadan, E=early, L=late, I=Instar, A=adult

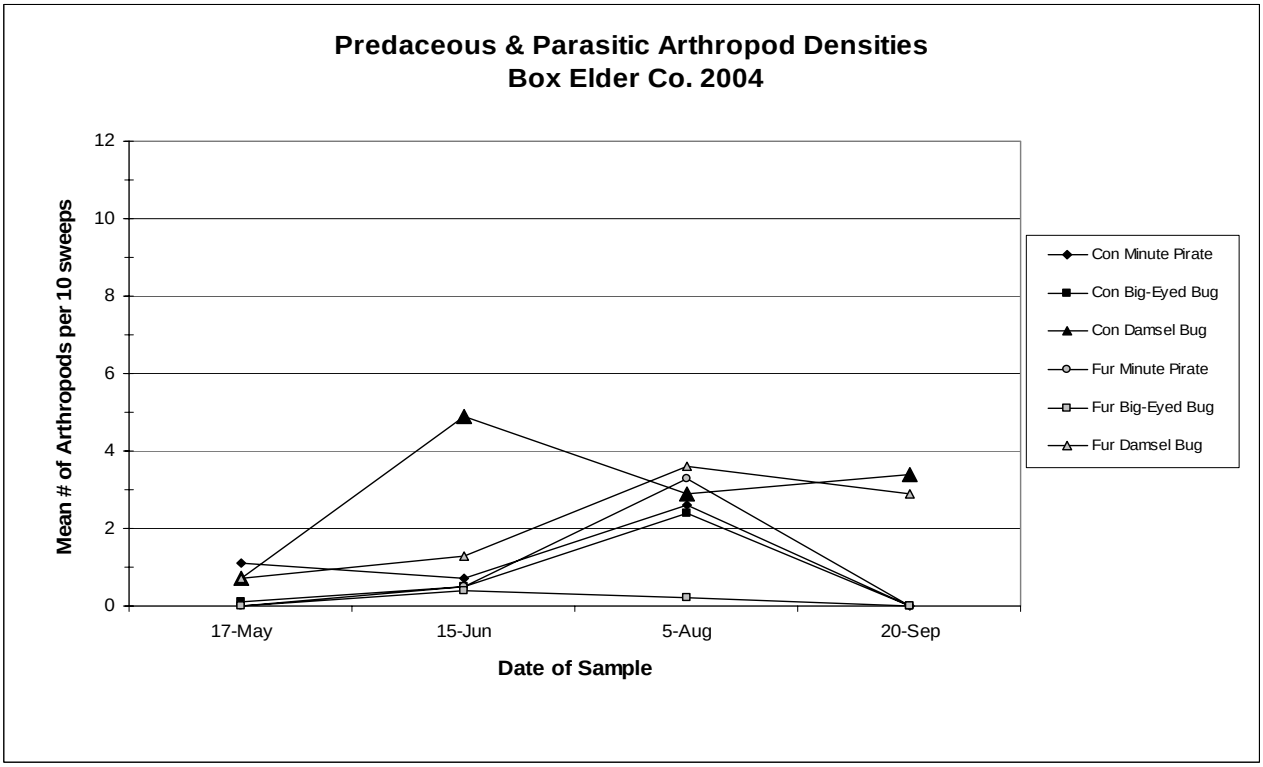

Other Phytophagous Arthropod Densities
Weber Co. 2004
Mean # of Arthropods per 10 sweeps
80
70
60
50
40
30
20
10
0
17-May
15-Jun
29-Jul
Date of Sample
Con Pea Aphid
Con Lygus Bug
Con Grasshopper
Fur Pea Aphid
Fur Lygus Bug
Fur Grasshopper

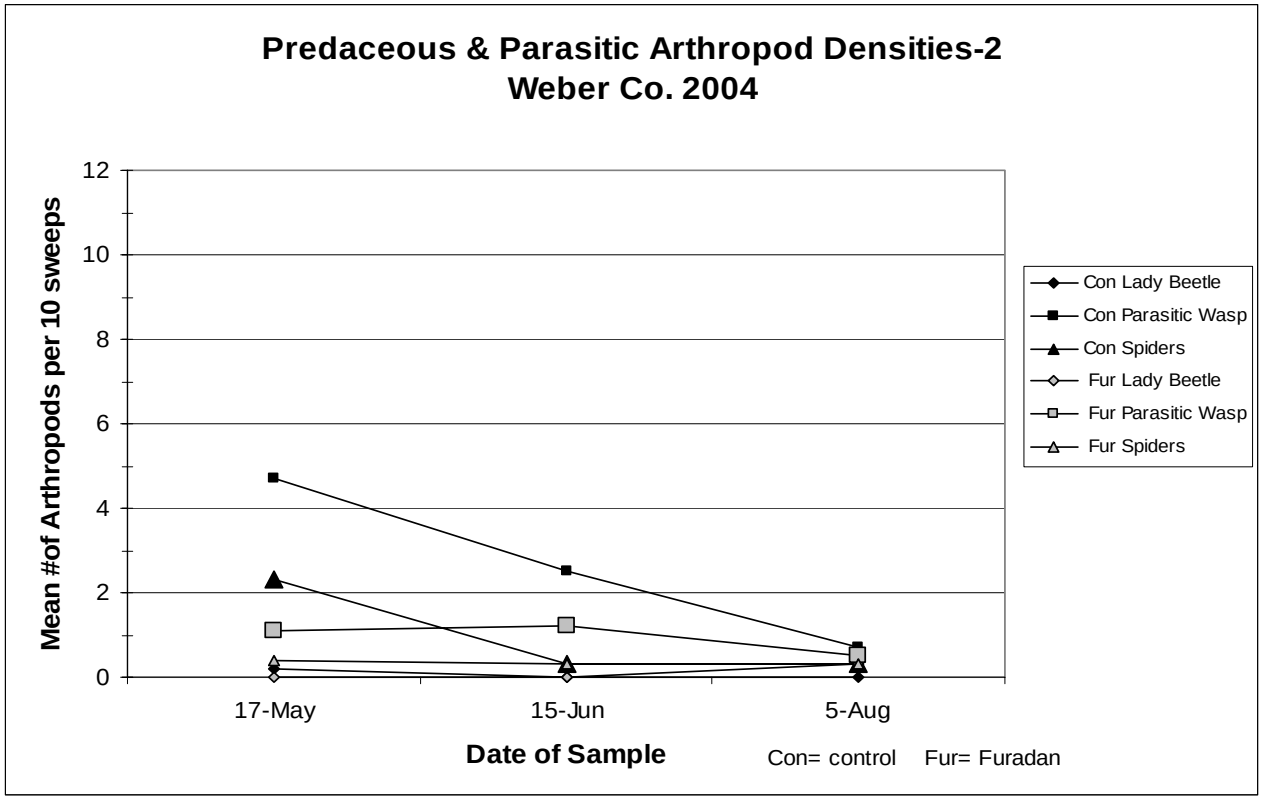

Other Phytophagous Arthropod Densities
Box Elder Co. 2004
Mean # of Arthropods per 10 sweeps
80
70
60
50
40
30
20
10
0
17-May
15-Jun
5-Aug
20-Sep
Date of Sample
Con Pea Aphid
Con Lygus Bug
Con Grasshopper
Fur Pea Aphid
Fur Lygus Bug
Fur Grasshopper

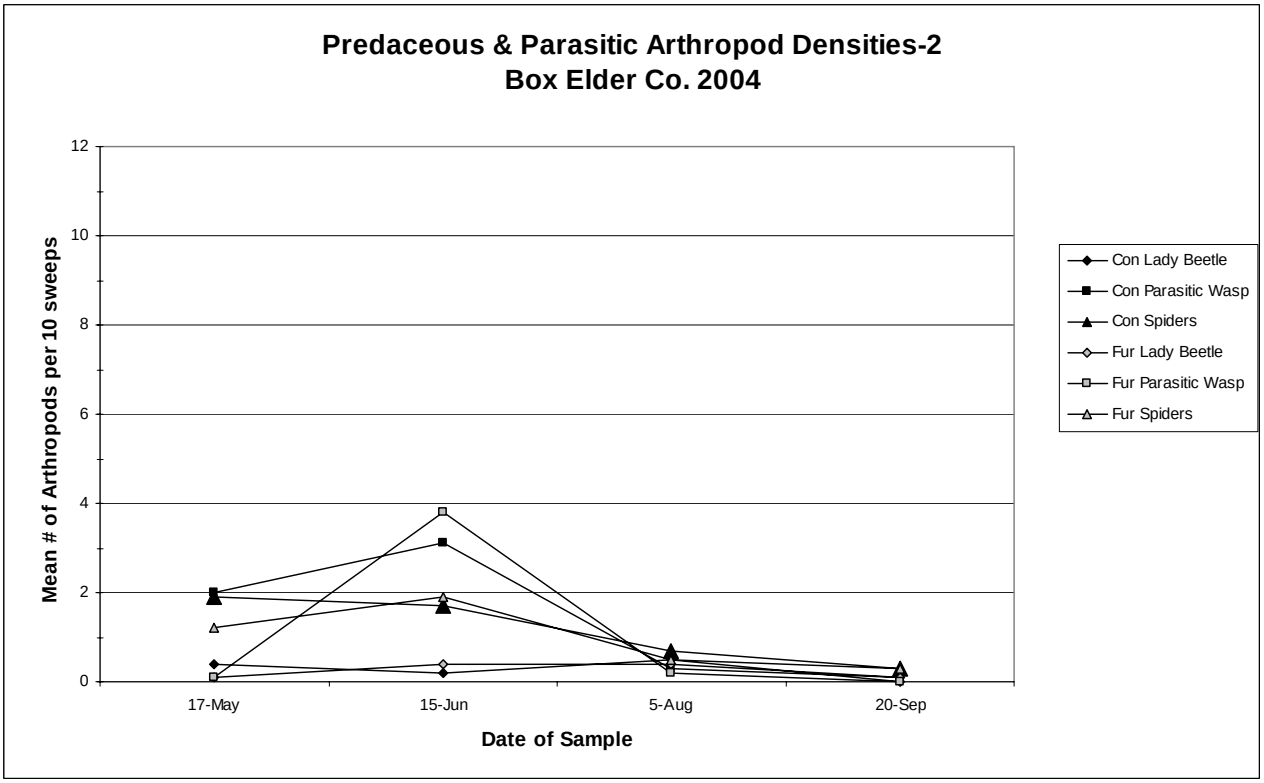

Other Phytophagous Arthropod Densities -2
Weber Co. 2004
Mean # of Arthropods per 10 sweeps
40
35
30
25
20
15
10
5
0
17-May
15-Jun
29-Jul
Date of Sample
Con Leafhopper
Con Thrips
Con Spider Mite
Fur Leafhopper
Fur Thrips **
Fur Spider Mite
Con= control Fur= Furadan
** Fur Thrips on 29-Jul = 215.3


Other Phytophagous Arthropod Densities- 2
Box Elder Co. 2004
Mean # of Arthropods per 10 sweeps
40
35
30
25
20
15
10
5
0
17-May
15-Jun
5-Aug
20-Sep
Date of Sample
Con Leafhopper
Con Thrips Adult
Con Spider Mite
Fur Leafhopper
Fur Thrips Adult
Fur Spider Mite
Con= control Fur= Furadan


Predaceous & Parasitic Arthropod Densities
Weber Co. 2004
Mean # of Arthropods per 10 sweeps
12
10
8
6
4
2
0
17-May
15-Jun
29-Jul
Date of Sample
Con= control Fur= Furadan
Con Minute Pirate
Con Damsel Bug
Con Big-Eyed Bug
Fur Minute Pirate
Fur Damsel Bug
Fur Big-Eyed Bug


Predaceous & Parasitic Arthropod Densities
Box Elder Co. 2004
Mean # of Arthropods per 10 sweeps
12
10
8
6
4
2
0
17-May
15-Jun
5-Aug
20-Sep
Date of Sample
Con Minute Pirate
Con Big-Eyed Bug
Con Damsel Bug
Fur Minute Pirate
Fur Big-Eyed Bug
Fur Damsel Bug


Predaceous & Parasitic Arthropod Densities-2
Weber Co. 2004
Mean #of Arthropods per 10 sweeps
12
10
8
6
4
2
0
17-May
15-Jun
5-Aug
Date of Sample
Con= control
Fur= Furadan
Con Lady Beetle
Con Parasitic Wasp
Con Spiders
Fur Lady Beetle
Fur Parasitic Wasp
Fur Spiders


Predaceous & Parasitic Arthropod Densities-2
Box Elder Co. 2004
Mean # of Arthropods per 10 sweeps
12
10
8
6
4
2
0
17-May
15-Jun
5-Aug
20-Sep
Date of Sample
Con Lady Beetle
Con Parasitic Wasp
Con Spiders
Fur Lady Beetle
Fur Parasitic Wasp
Fur Spiders