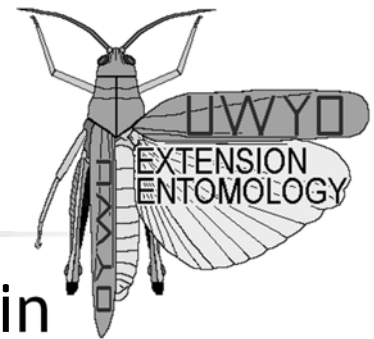


Alfalfa IPM



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Disclaimer



- Trade or brand names used in this presentation are used only for the purpose of educational information
- No product endorsement is implied

Alfalfa Insect Pests

- Many Insects feed on it but few are major pests
 - Alfalfa Weevil
 - Grasshoppers and Mormon crickets
 - Blister Beetles
 - Lygus & Alfalfa Plant bugs – seed production
 - Alfalfa Caterpillar
 - Webworm, Alfalfa Looper, Armyworm
 - Cutworms
 - Pea Aphid, Blue Alfalfa Aphid, Spotted Alfalfa Aphid
 - Pea Leaf Weevil
 - Potato Leafhopper
 - Thrips

alfalfa weevil is a bad one



IPM is the Approach We (UW) Advocate for all pests

Definition:

- **I**ntegrated- combine many approaches to deal with the pest(s)
- **P**est – damage causing insects, mites, weeds, rodents,...etc.
- **M**anagement- the goal is to keep the damage below the economic injury level

Six Steps in IPM

- **1. Proper identification of damage and responsible "pest"**
- **2. Learn pest and host life cycle and biology**
- **3. Monitor or sample environment for pest population**
include:
 - pest present/absent?
 - distribution - all over or only in certain spots?
 - increasing or decreasing in numbers?
- **4. Establish action threshold (economic, health or aesthetic)**
- **5. Choose appropriate combination of management tactics***
- **6. Evaluate results**

Step 1 in IPM

- 1. Proper identification of damage and responsible "pest"
- Alfalfa –Arabic for "best fodder"
- Eurasian in origin, so are the alfalfa weevils
 - **Alfalfa Weevil**
 - *Hypera postica* introduced starting about 95 years ago – two strains Eastern and Western
 - **Another species of "alfalfa weevil" the "Egyptian" *Hypera brunneipennis*** inhabits the SW

Distribution

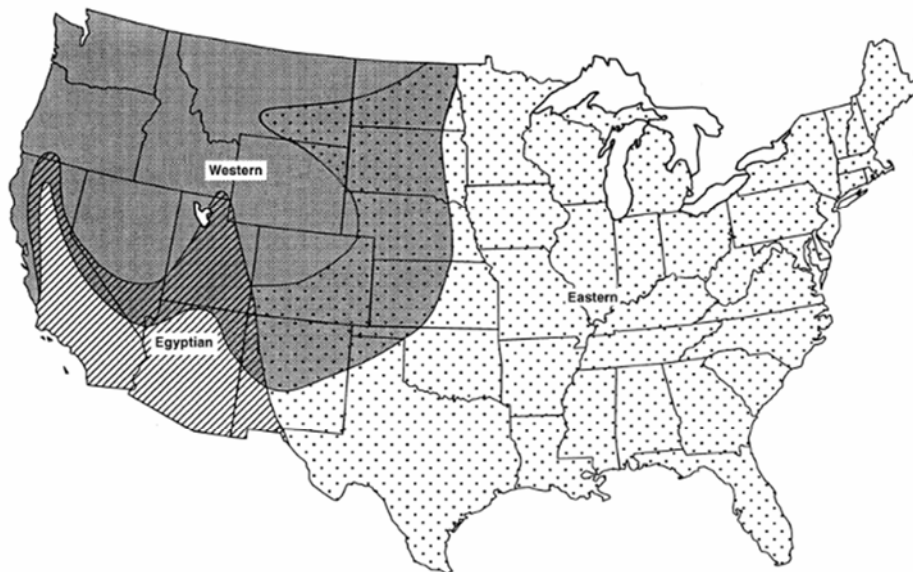
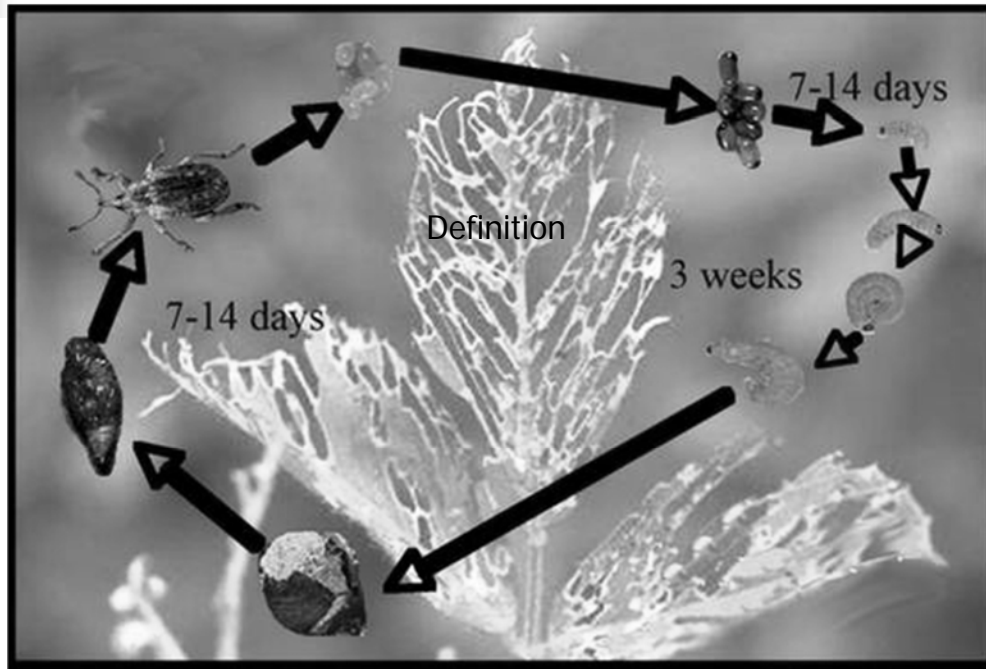


Fig. 1. Distribution of USA alfalfa weevil strains (adapted from D.C. Vacek, US Department of Agriculture, 1986, unpublished report; and Hsiao, 1996).

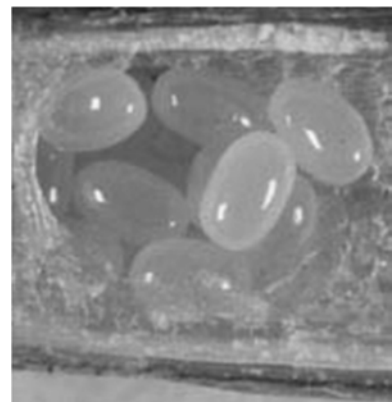
Alfalfa Weevil ID



Step 2 in IPM

Six Steps of IPM





- 2. Learn pest and host life cycle and biology
- 400 to 1000 eggs per female
- 1/50 on an inch long
- 5 to 20 per hole in alfalfa stems (early spring)



Step 2 in IPM cont.

Six Steps of IPM

- 2. Learn pest and host life cycle and biology

Stage	Body Length (mm)	Head Capsule Width (mm)
1	1-2 	0.2
2	2-3 	0.2-0.3
3	4-6 	0.4
4	6-8 	0.5-0.6

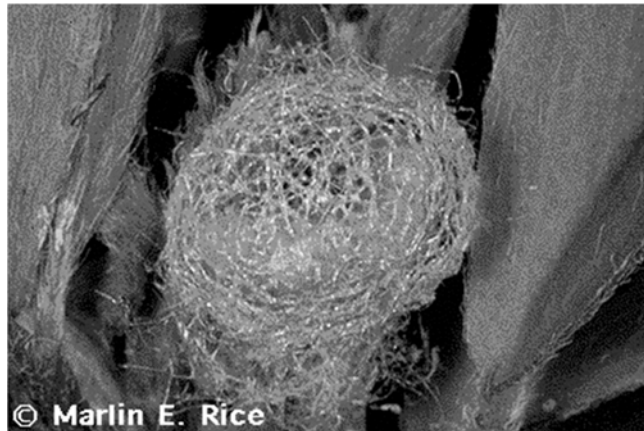


What you're are scouting for

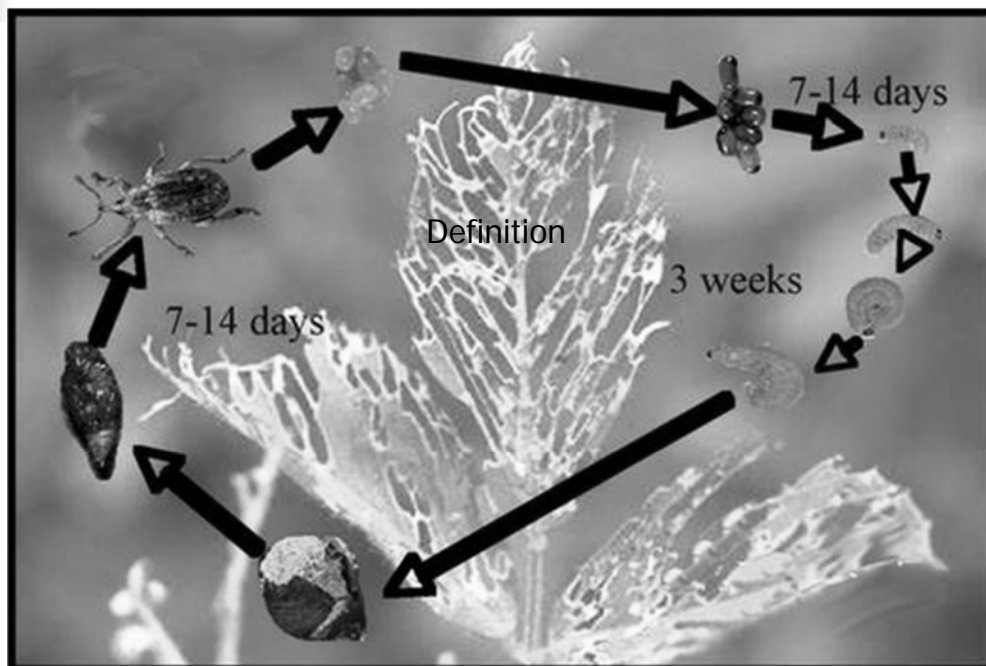


Step 2 in IPM cont.

2. Learn pest and host life cycle and biology
 - 4th instar form silk pupal case to change to adult form – don't feed as pupa



Alfalfa Weevil ID



Step 2 in IPM cont.

2. Learn pest and host life cycle and biology

- Young adults will feed for while, then leave the fields to aestivate during summer
- Not a lot is known about their preferred sites.



Degree Day Development

- Degree day - Degree days accumulated = $[(\text{max} + \text{min daily temperature})/2] - \text{base temperature}$
- For alfalfa weevil it is 48° F; for alfalfa growth itself it is 42° F

Degree Day – Base 48 F

Alfalfa weevil developmental stage by degree days

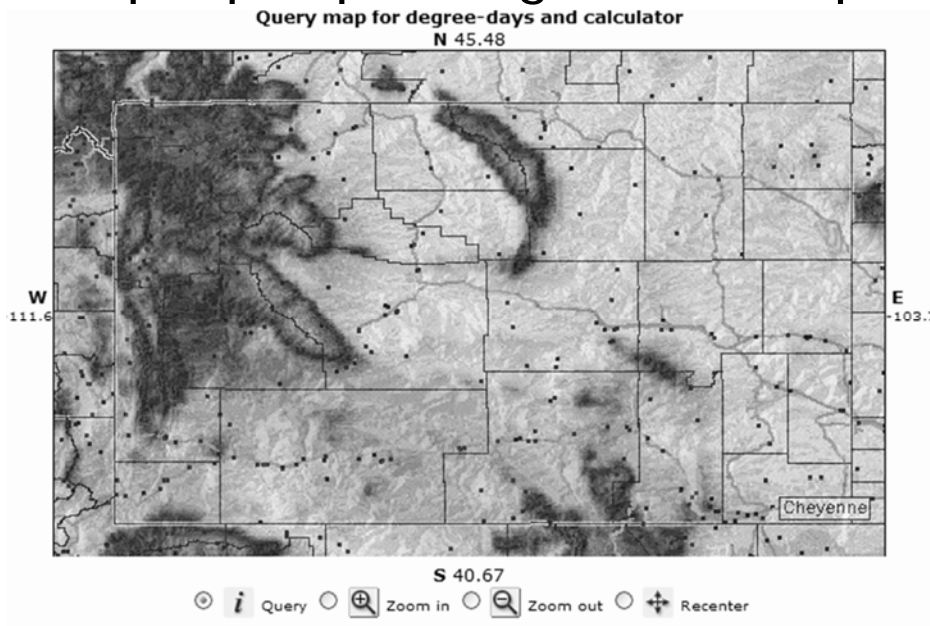
Stage of Development	Degree Days Required to Complete Indicated Life Stage
Egg Hatch	300-310
1 st instar	350-378
2 nd instar	425*
3 rd instar	500
4 th instar	580-590
Pupa - new adult	850

DD accumulation varies year to year

- At Shawnee 300 dd were accumulated by:
- May 16th 2007; June 2nd, 2008
- Noticeable visual damage occurs by 375dd.
- May 26, 2007; June 13th, 2008

DD Calculator

- <http://pnwpest.org/NW/ddmaps.html>



DD Calculator

Degree-day and Disease Risk Models



Query Results:

- Location: -105.3888E, 42.7328N
- Base 32 DDs Jan. 1 - yest. - NW (32F threshold): **6003**
- Counties: Converse
- States: 56 Wyoming
- Degree-day calculator:

Thresholds: lower upper degrees

Calculation method:

Start date (biofix):

End date:

Location: **DOUGLAS AMz WY COOP**

Use the DD?

- Start scouting at 375 dd; Peak second instar occurs at **425** dd
- 550 dd, usually in June, peak 3rd & 4th instar
- Can also be used to estimate alfalfa harvest with different base temperature.

Step 3 in IPM

Six Steps of IPM

- **3. Monitor or sample environment for pest population include:**
 - pest present/absent?
 - distribution - all over or only in certain spots?
 - increasing or decreasing in numbers?

Sampling

- Start monitoring alfalfa stands in fields with south-facing slopes or sandy knolls since these areas dry and warm up faster, accelerating temperature-dependent larval development relative to lower, colder spots in the field.

Sampling - sweep net

“Sweep sampling using a standard sized 15 inch diameter net is the most efficient method for estimating larval populations. Sampling should begin when **425** degree days have been accumulated, when the larvae are expected to be primarily second instars and when alfalfa hay has reached at least 10 inches in height. “

*Have to wait until second instar is present

Sampling - sweep net

“Ten, 180 degree sweeps are taken while the sampler is walking through the field. Count the number of larvae per sweep and repeat this sampling procedure, taking a minimum of three samples for fields up to 20 A, four samples for fields up to 30 A and five samples for larger fields.”

Sampling - bucket

“Once the alfalfa reaches 10" or more in height, break off 5 samples of 10 stems at ground level and shake them into a bucket to collect and count weevil larvae. Be careful not to knock larvae off the stem before shaking it in the bucket (cup your hand around the terminal to catch larvae should they drop from the plant). The stems should be gathered from scattered locations throughout the field..”

How a professional handles a net and a bucket

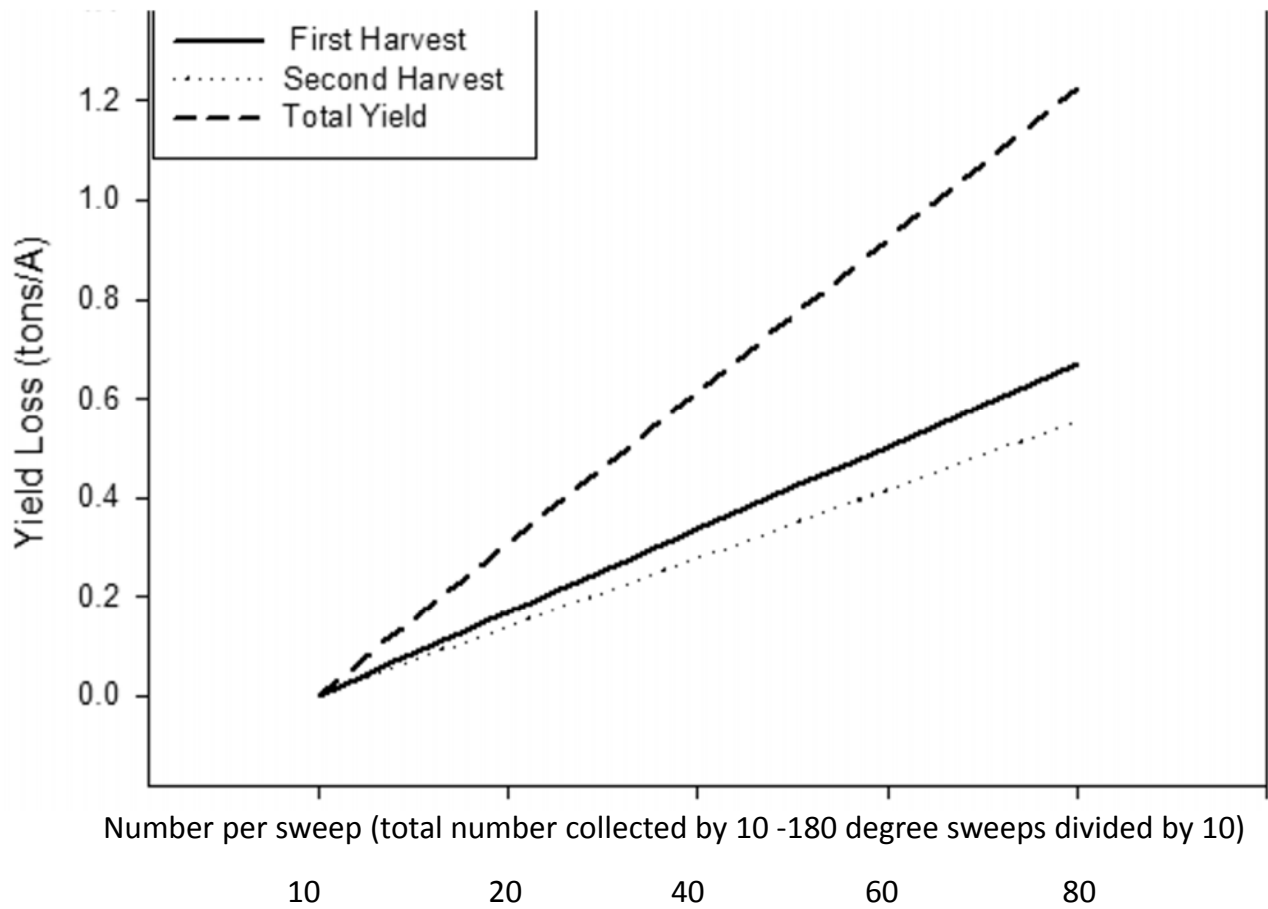
- Demonstration of sweep net procedure
- Always wear recommended safety equipment.
- Read and Follow label directions of all products you chose to use.

Step 4 in IPM

Six Steps of IPM

4. Establish action threshold (economic: cost < benefit)

“Chemical control: If 40% tip feeding occurs more than 7-10 days before harvest, an insecticide treatment is recommended.” was old standard recommendation.



Cost to Treat

- Varies with: chemical, application method, timing (early vs. late; standing crop vs. stubble) 1 year vs. multiyear benefit?

Handout on EIL

- Varies with: chemical cost, application cost, and hay value and 1 year vs. multi-year benefit?
- Benefits: increased yield, nutrient content, stand re-growth speed, alfalfa stand health and vigor.

Steps in IPM

Six Steps of IPM

- 1. Proper identification of damage and responsible "pest"
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- 4. Establish action threshold (economic, health or aesthetic)
- **5. Choose appropriate combination of management tactics***

Management tactics (*plural)

- Implement control tactics (early harvest or pesticide) in timely manner.
- Cultural control - grazing?
- AW Resistant Cultivars?
- Biological control?
- Insecticide treatment?

Management tactics (*plural)

- Implement control tactics (early harvest or pesticide) **in timely manner.**
 - If you are going to harvest early don't wait until the AW grubs have completed development and can pupate!

Management tactics (*plural)

- Cultural control- fall or spring grazing?

- Fall grazing is been shown to be helpful only in those areas where the AW are able to lay eggs and hatch larvae in the fall.

- In Wyoming it is thought that fall grazing and burning do not do much good as the adult AW are out of the fields .

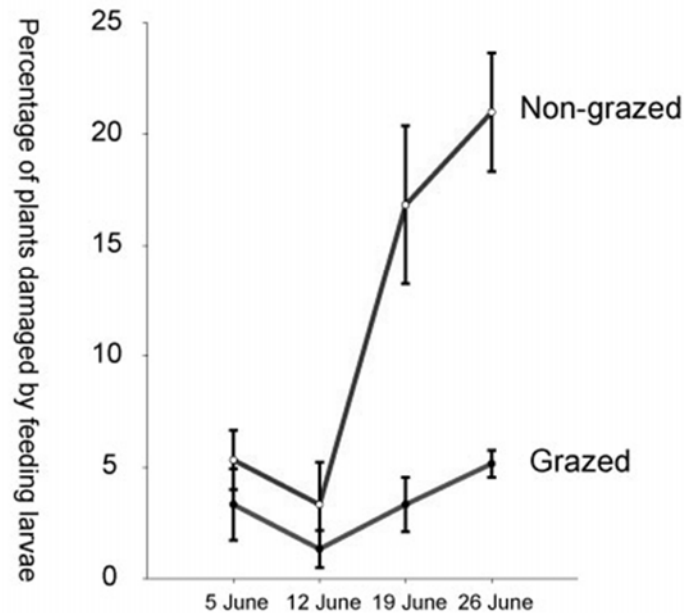
Grazing?

- Early Spring grazing might work better.



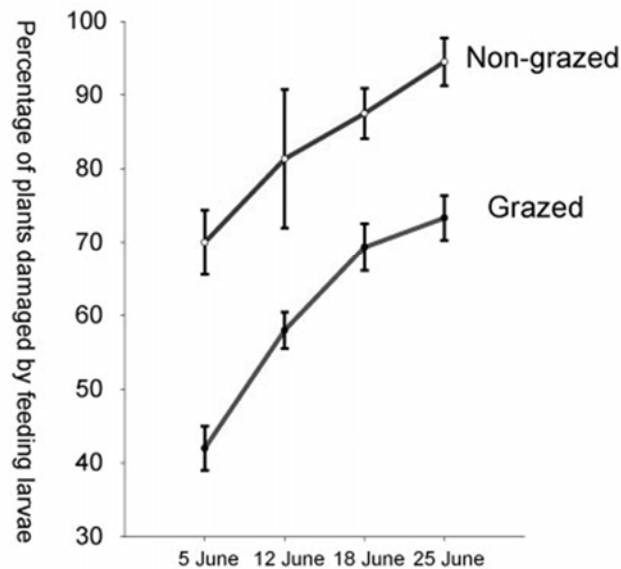
Grazing: 19 January to 3 May during 2002 by sheep in MT

Figure 1. Plants damaged by alfalfa weevil larvae; 2002.



Grazing: 5 February to 15 May during 2003 by sheep in MT

Figure 2. Plants famaged by alfalfa weevil larvae; 2003.



Grazing

- MT study didn't see reductions in yield between grazed and un-grazed fields.



Grazing Problems

- Risk of bloat
- Palatability of immature alfalfa
- Need to allow first cutting to flower to replenish root reserves if grazed early and intensely

Management tactics (*plural)

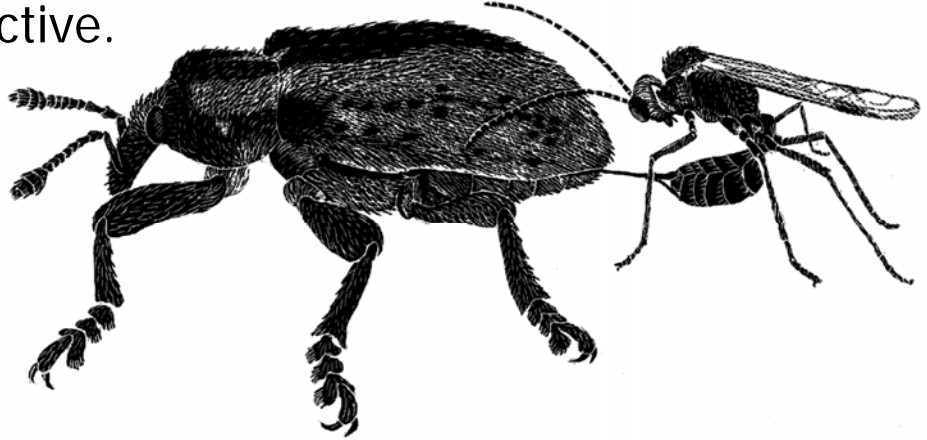
- AW Resistant Cultivars?
 - Not recommended due to the lack of resistance to the three most common alfalfa diseases in those cultivars
 - Prof. Islam recommends hardy, disease resistant, high yielding varieties and use other means to fight the AW.

His Contact information:

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Management tactics (*plural)

- Biological control?
 - Many different predators and parasitoids
 - In some areas of the country they are very effective.

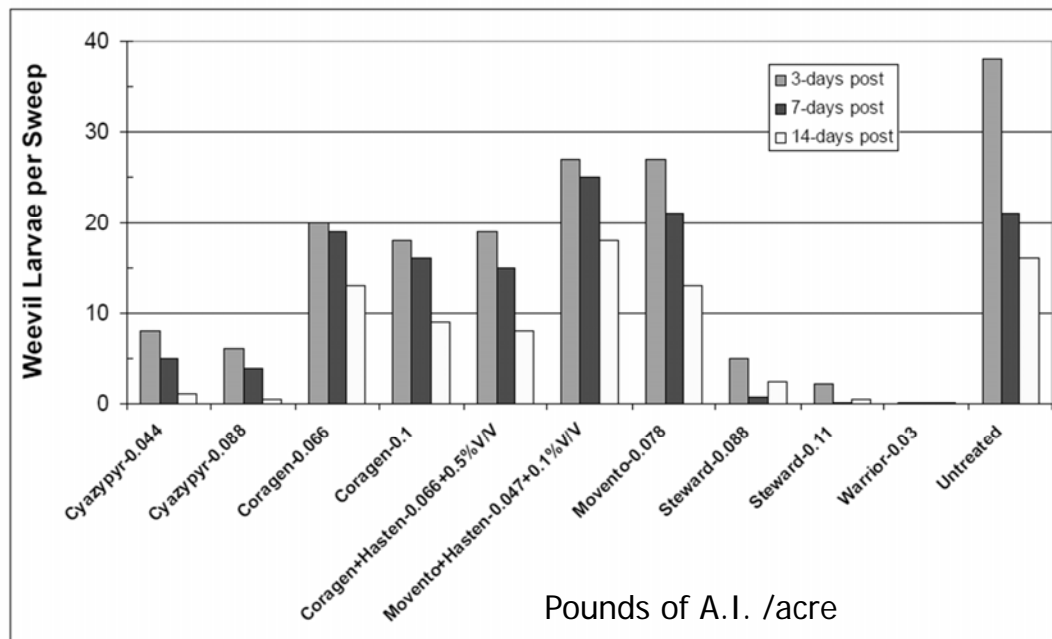


Management tactics (*plural)

- Biological Control
 - Out of your control
 - Don't know why it isn't more successful*
- *maybe *Wolbachia pipientis* endosymbionts.



CA Reduced Risk insecticide Trial of Steward; is labeled



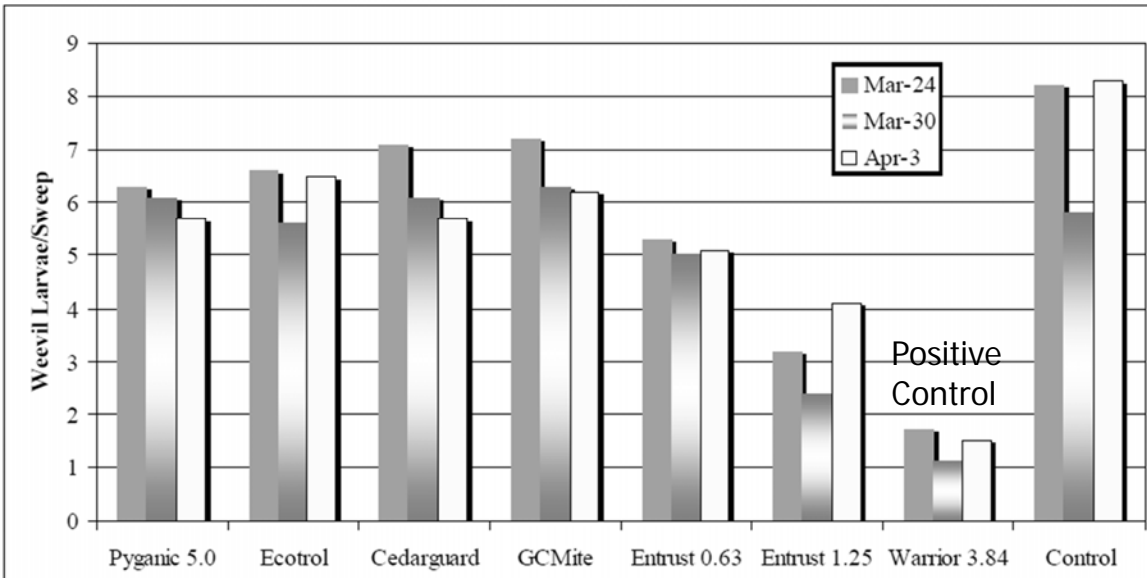
Other Biopesticides?

- Either not labeled or not effective
- Alfalfa is a valuable crop, organic methods of management could be lucrative for certain markets. There is some limited research being conducted in MT.

CA Organic insecticide Trial on AW

Organic Options: Entrust provided the best weevil larval control among the organic materials evaluated. Percentage control in the 50-60% range was seen with the higher rate (1.25 oz./A) of this product.

Entrust SC currently labeled for AW- “suppression”



Management tactics (*plural)

- Other Insecticide treatments?
 - Many labeled
 - Relatively “New”
 - Steward –Indoxocarb – not a RUP
 - Cobalt – old and “new” combined
 - Proaxis – new chemistry - old chemical
 - Besiege – old and “new” combined



Protect Pollinators

- Alfalfa when in bloom can be very attractive to pollinator insects such honey and leaf cutter bees.
 - Choose insecticides with care
 - Timing of applications
 - Warn owners of registered honey and leafcutter bee hives of treatments.



Steps in IPM

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- **6. Evaluate results**



Management tactics

- What are you doing currently?
- Chemigation?
- Spray buggy?
- Aerial?
- Stubble treatments
- What chemicals?
- What results?
- Do you have to treat every year?



Results

- After the **REI has expired** and the treatment has had time to work go in and resample your field
- What reduction did you get? Resample to determine if treatment was effective (best to use larva number methods)
- Compare the yield and feed quality between treated and untreated fields.

Evaluate...

- Evaluate your control with your chosen method: your yield, losses, and your costs,...
- Whatever tactic you chose you have to take paper, pencil and calculator and crunch the numbers to see if you need to change.

Alfalfa Insect Pests

- Many Insects feed on it but few are major pests
 - Alfalfa Weevil
 - Grasshoppers - Squarefoot job aid
 - Mormon crickets
 - Blister Beetles
 - Lygus & Alfalfa Plant bugs – seed production
 - Alfalfa Caterpillar
 - Webworm, Alfalfa Looper, Armyworm
 - Cutworms
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 - Pea Leaf Weevil
 - Potato Leafhopper
 - Thrips



Thank You For Your Attention

- Always wear recommended safety equipment.
- Read and Follow label directions of all products you chose to use.
- Questions on alfalfa IPM?