

Controlling Alfalfa Weevil and Aphids in Alfalfa

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Integrated Pest Management

- the “standard” in alfalfa
- many of the principles for IPM developed in the alfalfa system
- What is it?
 - Integrated Pest Management (IPM) is an effective and environmentally sensitive approach that relies on a **combination** of common-sense practices
 - IPM programs use current, comprehensive **information** on the biology of pests and their interaction with the environment
 - information, in combination with available pest control methods, is used to manage pest damage by the most **economical** means, and with the least possible hazard to people, property, and the environment.

Integrated Pest Management

- IPM is a perfect fit in alfalfa production systems
- Why?
 - perennial crop
 - a large number of beneficials in alfalfa both in terms of numbers and species
 - crop can withstand some crop damage without economic losses
 - long history of research from the alfalfa system

Integrated Pest Management

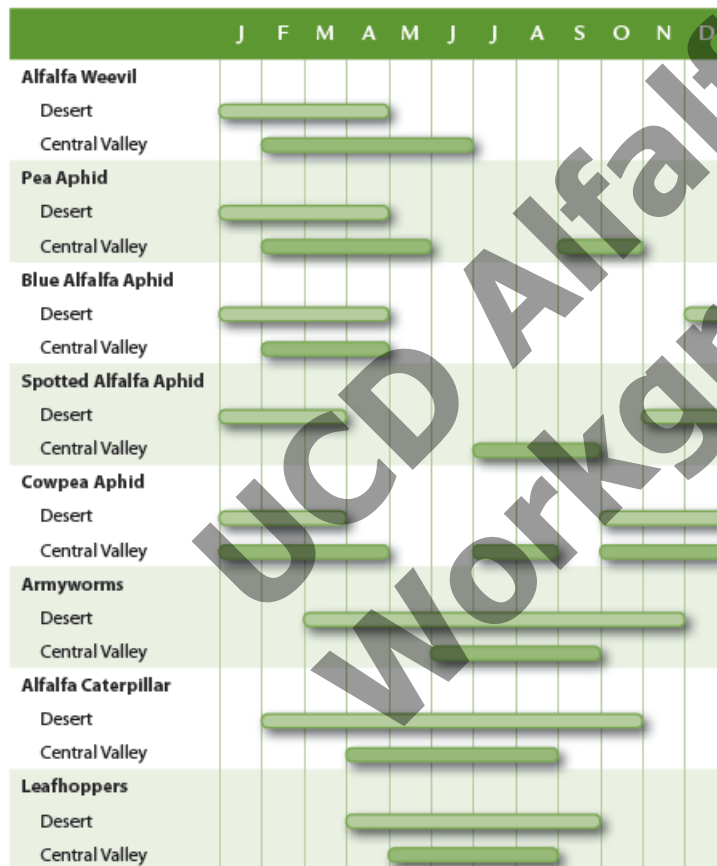
Benefits

Reduces:

- secondary outbreaks of pests, i.e., additional pests
- pest resurgence - bounce-back effect
- hazard to honeybees and other desirable insects
- phytotoxicity to crop
- off-site movement of insecticides
- hazard to applicators and others involved in crop production
- insecticide resistance

FIGURE 9.1

Seasonal occurrence of the major alfalfa pests in the Imperial Valley and the Central Valley of California.



Numerous occasional pests

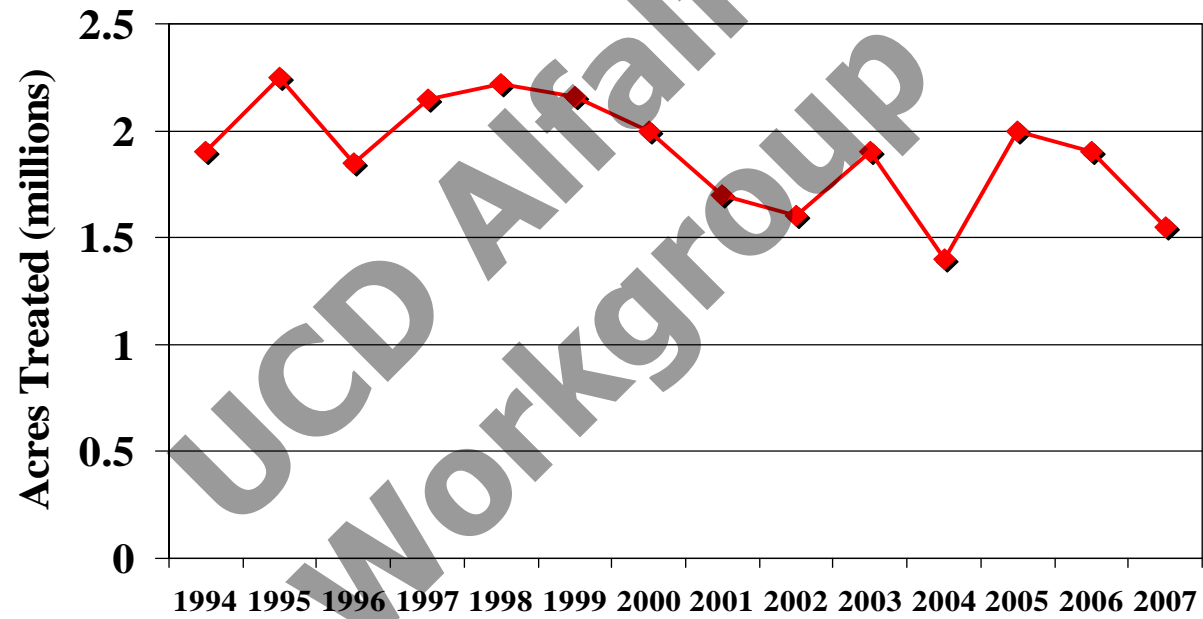
Insects and Mites

- Blister Beetles
- Clover Root Curculio
- Grasshoppers
- Ground Mealybug
- Mormon Cricket
- Sharpshooters
- Silverleaf Whitefly
- Spider Mites
- Threecornered Alfalfa Hopper
- Thrips
- Webworm

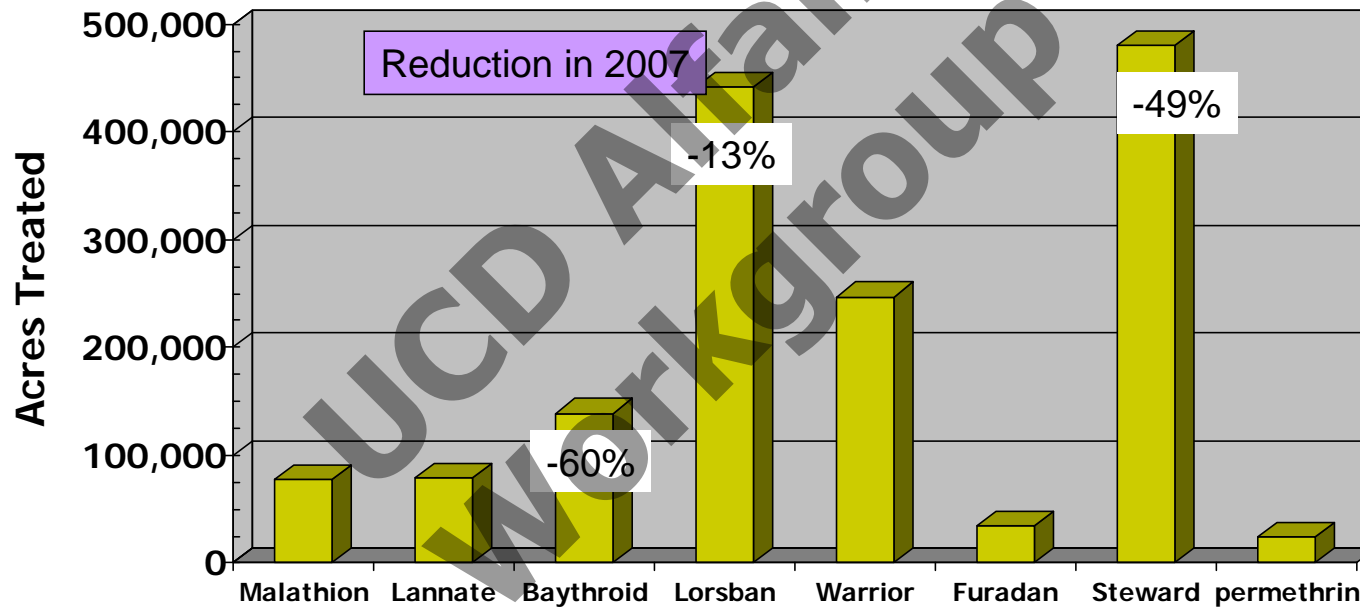
Still most insects in alfalfa



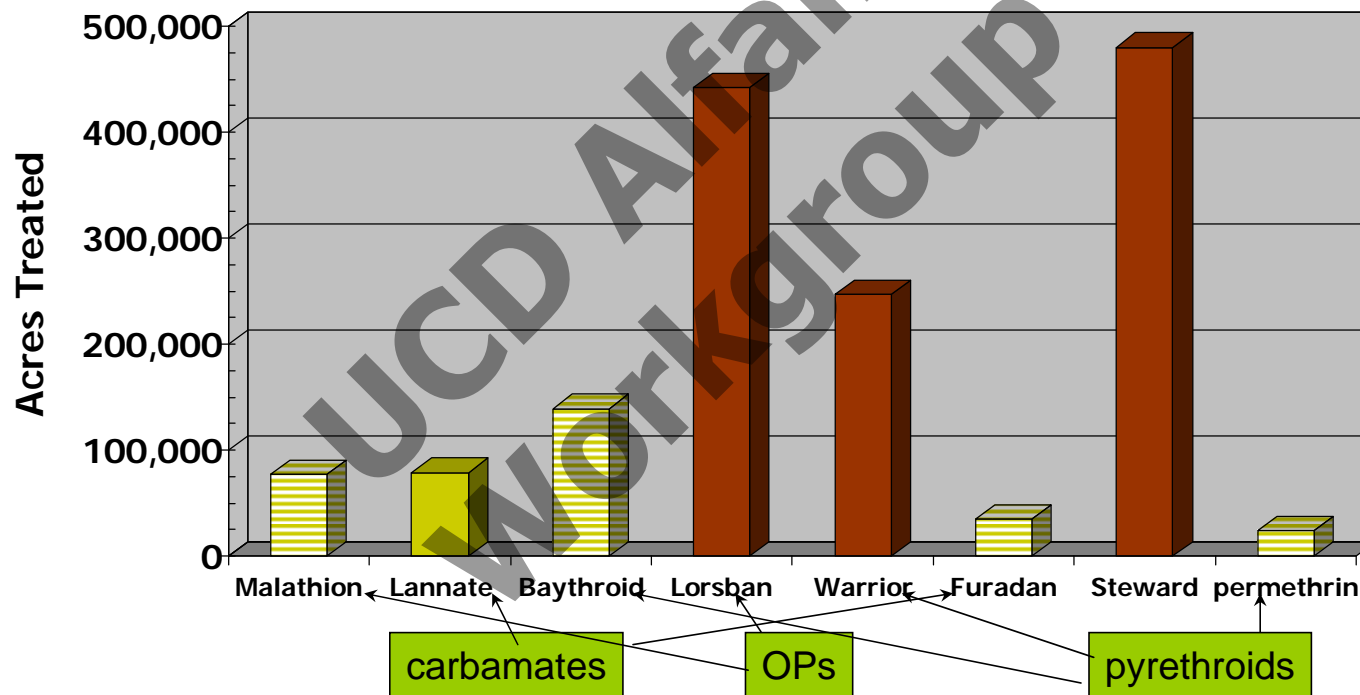
Insecticide Usage - Alfalfa



Alfalfa Pesticide Use - 2006



Alfalfa Pesticide Use – 2002-06



Alfalfa Pesticide Use Issues

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Surface Water Hazard Assessments to Aquatic Organisms

This web site uses Adobe Acrobat [PDF](#) enhancements.

[Admin Report 99-1](#)

Hazard Assessment of the Fungicides Benomyl, Captan, Chlorothalonil, Maneb, and Ziram to Aquatic Organisms. (PDF, 183 kb)

[Admin Report 98-2](#)

Hazard Assessment of the Insecticide Malathion to Aquatic Life in the Sacramento-San Joaquin River System. (PDF, 110 kb)

malathion

[Admin Report 96-6](#)

Hazard Assessment of the Insecticide Methomyl to Aquatic Organisms in the San Joaquin River System. (PDF, 110 kb)

Lannate

[Admin Report 96-1](#)

Hazard Assessment of the Insecticide Methidathion to Aquatic Organism in the Sacramento-San Joaquin River System. (PDF, 72 kb)

Supracide

[Admin Report 94-1](#)

Hazard Assessment of the Insecticide Chlorpyrifos to Aquatic Organisms in the Sacramento-San Joaquin River System. (PDF, 127 kb)

Lorsban

[Admin Report 94-2](#)

Hazard Assessment of the Insecticide Diazinon to Aquatic Organisms in the Sacramento-San Joaquin River System. (PDF, 110 kb)

diazinon

[Admin Report 92-3](#)

Hazard Assessment of the Insecticide Carbofuran to Aquatic Organisms in the Sacramento River System. (PDF, 110 kb)

Furadan

Alfalfa Pesticide Use Issues

Home » Pyrethroid reevaluation will reach far beyond California



Timely, Reliable Information
for Western Agriculture

HOME GRAPES RICE ALFALFA NUTS VEGETABLES COTTON

Pyrethroid reevaluation will reach far beyond California

Aug 18, 2007 12:00 PM, By Harry Cline Farm Press Editorial Staff hcline@farmpress.com

SAVE THIS EMAIL THIS PRINT THIS MOST POPULAR

Fair warning to American agriculture: When California leads, the nation bleeds.

Golden State regulators are in the beginning stages of the most extensive pesticide reevaluation focuses on widely used pyrethroid pesticides. The reassessment will impact the use of the California, but nationwide, where it has been used for more than three decades without any impact until now.

The California Department of Pesticide Regulation placed 20 synthetic pyrethroids in 608 products under review, after the active ingredient was discovered in sediments — not the water — of waterways.

* has been detected bound to sediments at levels toxic to a quarter inch long crustacean.

 Department of Pesticide Regulation 

California Notice 2006-13
POST UNTIL October 6, 2006

**NOTICE OF DECISION TO BEGIN REEVALUATION
OF CERTAIN PESTICIDE PRODUCTS CONTAINING PYRETHROIDS**

Pursuant to Article 9, Subchapter 1, Chapter 2, Division 6 of Title 3 of the California Code of Regulations, the Director of the Department of Pesticide Regulation (DPR) notices her decision to begin a reevaluation of certain pesticide products containing one or more pyrethroid active ingredients. Interested persons may comment on this decision up to and including the date shown in the top-right corner of this notice to the Department of Pesticide Regulation, Pesticide Regulation Branch, 1001 I Street, P.O. Box 4015, Sacramento, California 95812-4015.

REEVALUATION

DPR is hereby commencing a reevaluation of certain pesticide products containing one or more of the pyrethroid active ingredients listed below. This reevaluation involves 123 registrants and 608 pesticide products. DPR determined that the number of products included in this reevaluation were too numerous to list within this notice. A list of products included in the reevaluation is available upon written request to the address listed above or on DPR's website at <http://www.cdpr.ca.gov/dscc/regulation/reevaluation/chemicals/pyrethroids.htm>.

BASIS OF REEVALUATION

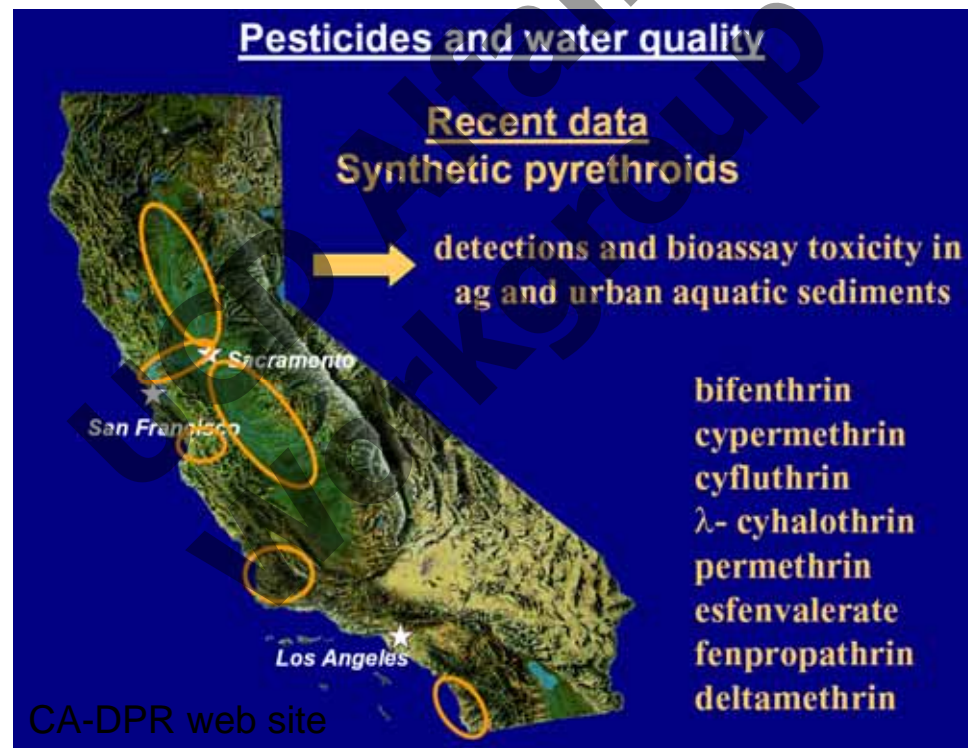
DPR initiates this reevaluation based on recent monitoring surveys and toxicity studies revealing the widespread presence of synthetic pyrethroid residues in the sediment of both agricultural and urban dominated California waterways at levels toxic to *Daphnia magna* (*D. magna*). Scientists conducted sediment bioassays using *D. magna*, a resident species found in some Central Valley water bodies. Scientists commonly use *D. magna*, an aquatic crustacean, as an indicator of environmental health and water quality in streams, lakes, and other bodies of water. Significant toxicity was observed at numerous sites. There was a high correlation between concentrations of pyrethroids and observed toxicity. Findings further indicate that the unique physical, chemical, and toxicological properties of the pyrethroid class of chemicals contribute to their propensity to accumulate in sediment at toxic levels.

Pyrethroids are synthetic insecticides. Pyrethrins, which are natural insecticides, are found in *Chrysanthemum cinerariaefolium*, a perennial plant with a daisy-like appearance. DPR did not include pesticide products containing naturally occurring pyrethrins in this reevaluation because pyrethrins are known to break down rapidly in the environment.

1001 I Street • P.O. Box 4015 • Sacramento, California 95812-4015 • www.cdpr.ca.gov
A Department of the California Environmental Protection Agency

Alfalfa Pesticide Use Issues

Issues – Pyrethroid re-evaluation



Volatile Organic Compounds (VOCs)

Air Quality in the SJV

- ❖ Alternatives to fumigants/reductions
- ❖ Lowering emissions from EC formulations
- ❖ Lorsban 4E, pyrethroid ECs, Zephyr, Kelthane, dimethoate, Dibrom are targets
- ❖ Changes in pest management
- ❖ Adoption of innovative technologies



Integrated Pest Management - Alfalfa

Management Techniques

1. Insecticides
2. **Reduced Risk Insecticides**
3. Early harvest
4. Host plant resistance
5. Naturally-occurring predators, parasites, and insect pathogens

Alfalfa Insect and Mite Pests

□ Weevils

- Egyptian alfalfa weevil in Central Valley, desert areas
- alfalfa weevil in intermountain and coastal areas



Alfalfa/Egyptian Alfalfa Weevil Complex

In California

Egyptian Alfalfa Weevil

Hypera brunneipennis

- *Imperial Valley*
- *Central Valley*
- *warmer areas*

Alfalfa Weevil

Hypera postica

- *coastal areas*
- *intermountain area*
- *cooler areas*

- recent DNA analyses shows no difference between species/strains
- a symbiotic rickettsia, *Wolbachia*, accounts for some of the differences

Alfalfa/Egyptian Alfalfa Weevil Complex



Alfalfa/Egyptian Alfalfa Weevil Complex





Alfalfa/Egyptian Alfalfa Weevil Complex



Seasonal Biology of Alfalfa Weevil

Fall through
Spring

Egg

Larva

DAMAGE!!!
(Spring –
first cutting)

Aestivation
away from
field – late
spring to
early fall

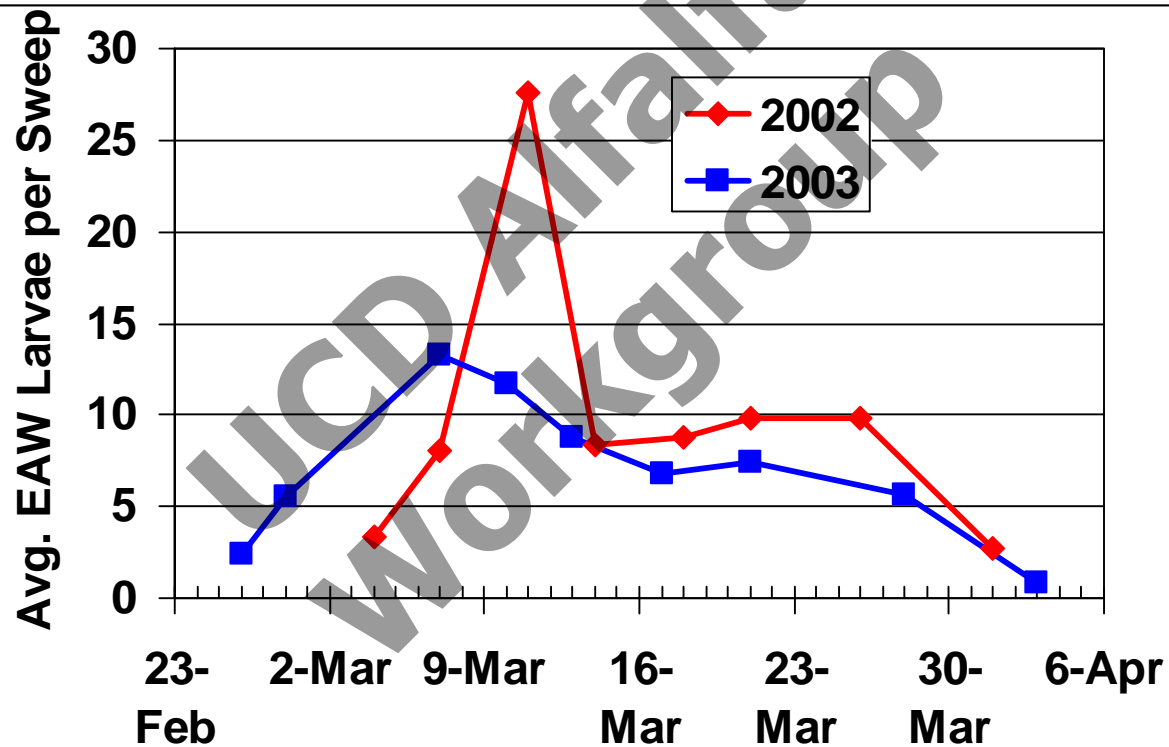
Adult

Pupa





Alfalfa/Egyptian Alfalfa Weevil Complex



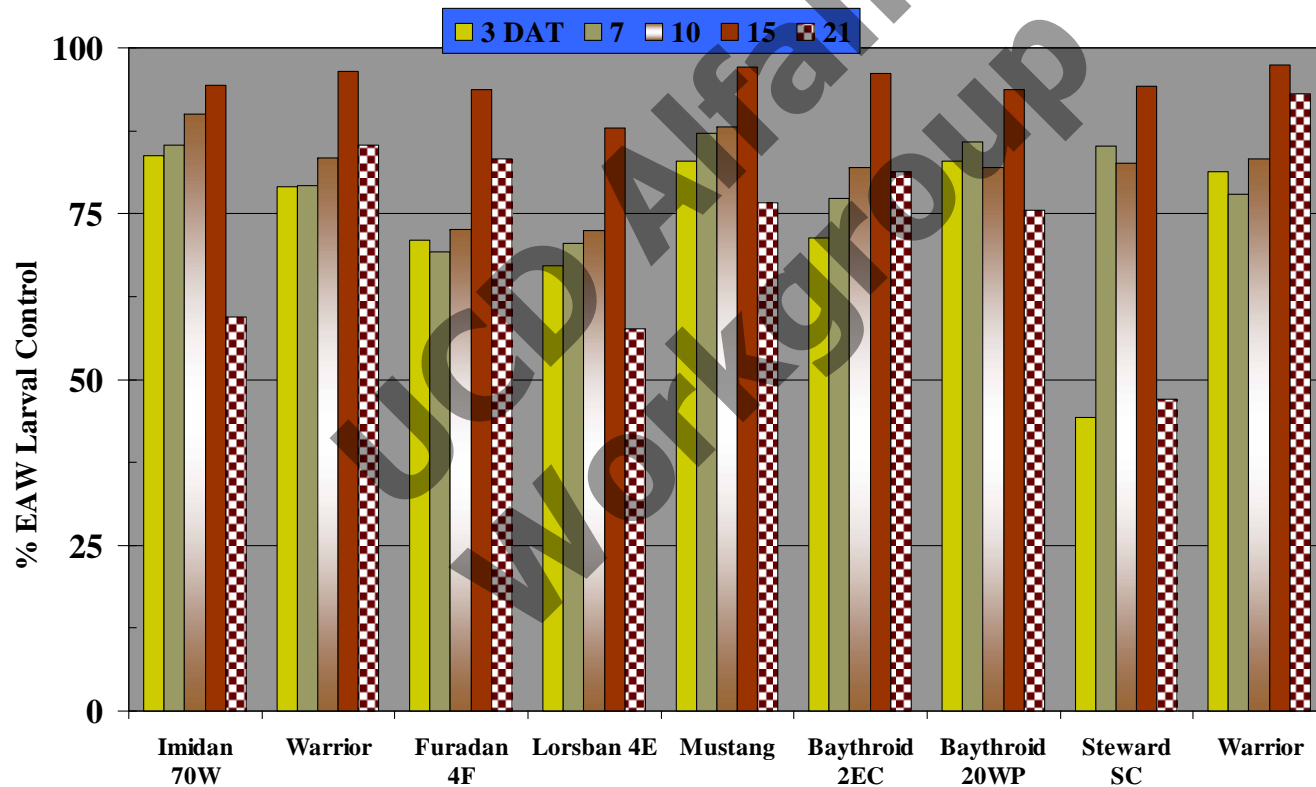


Weevil Complex

Management Options

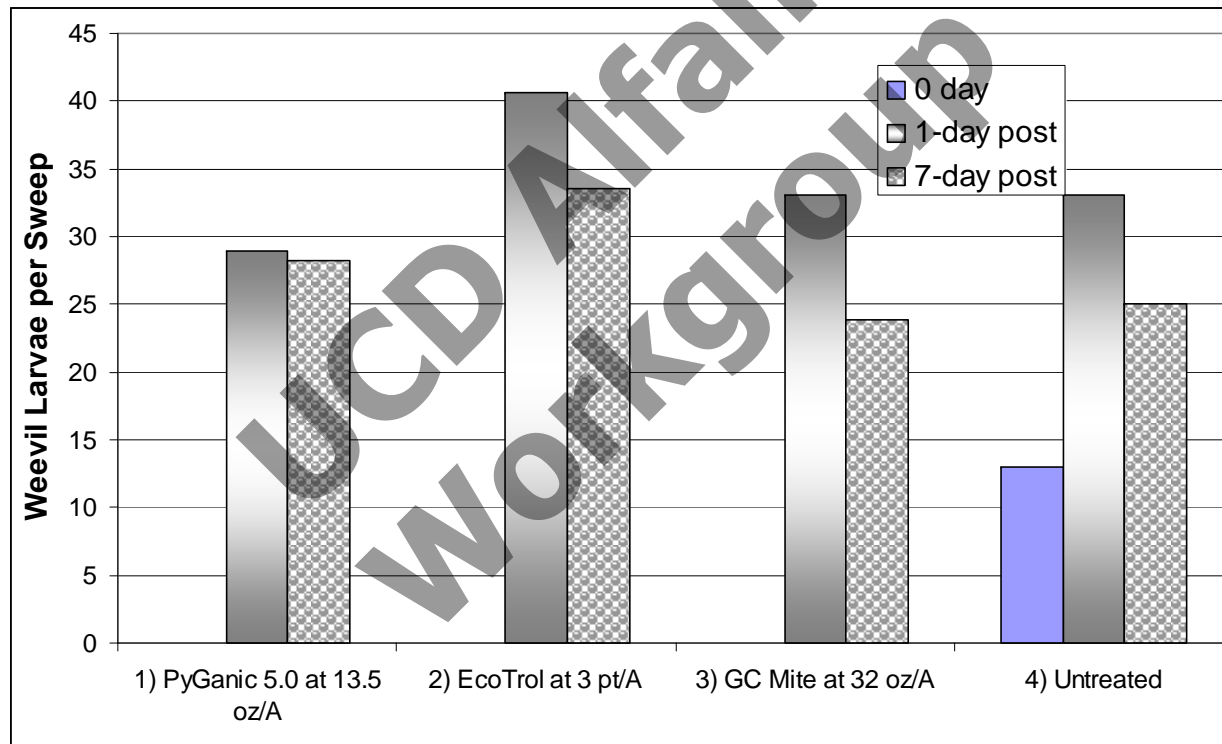
- Insecticides
- Early harvest
- Natural controls
- No host plant resistance

Percentage EAW Larval Control - 2002



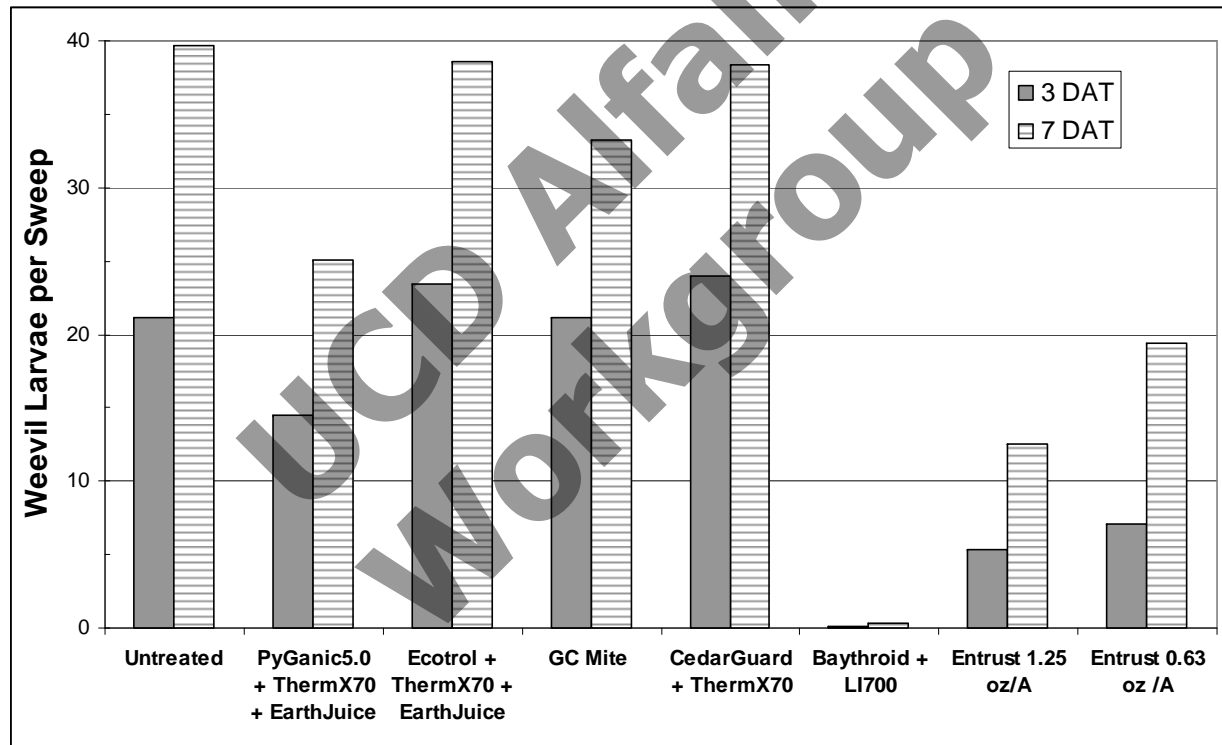
Alfalfa Weevil Larval Control – 2007

Yolo Co.



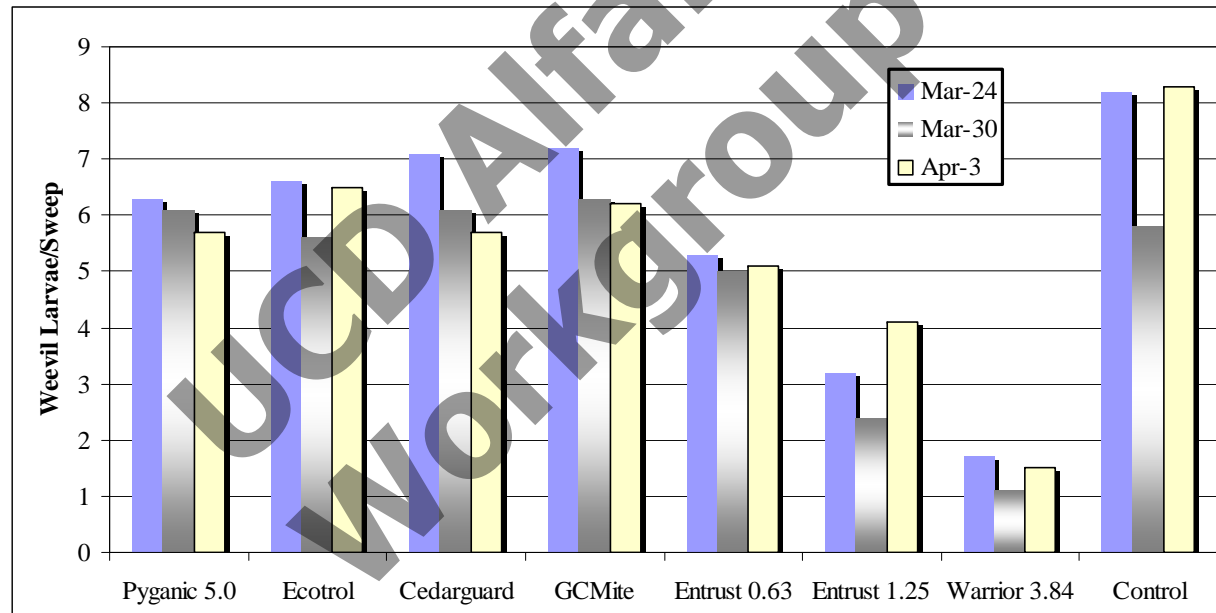
Alfalfa Weevil Larval Control – 2007

Siskiyou Co.



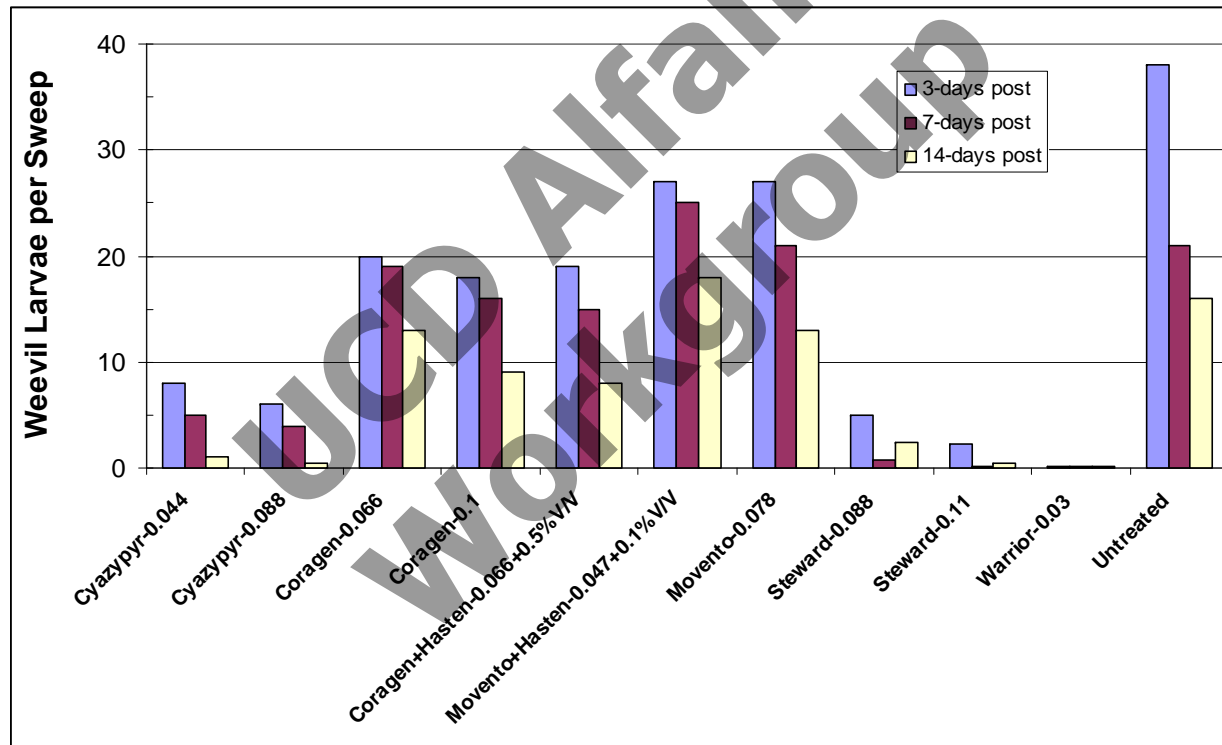
Alfalfa Weevil Larval Control – 2008

Yolo Co.



Alfalfa Weevil Larval Control – 2008

San Joaquin Co.

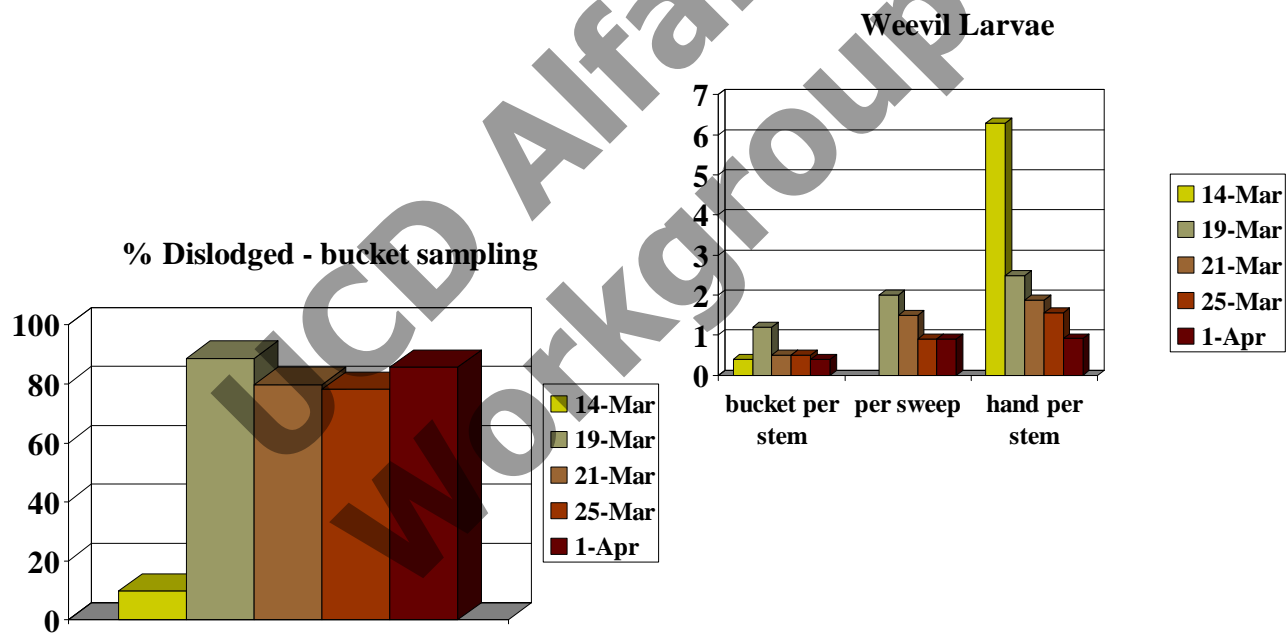


Sampling Alfalfa Weevils

- With these softer and/or organic products it may be necessary to treat when the larvae are smaller
- Sweep net does not sample small larvae well
- Compared larval capture with
 - Standard sweep net
 - Collecting stems, rapping in bucket; took stems to lab to see what was missed
 - Collecting stems, dissecting, and counting larvae



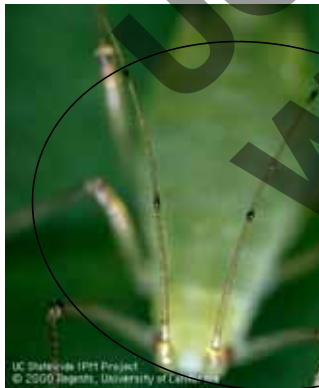
Sampling Alfalfa Weevils



Aphids in Alfalfa

□ Aphids

- pea
- blue alfalfa
- spotted alfalfa
- cowpea



Aphids in Alfalfa

- Aphids
 - pea
 - blue alfalfa
 - spotted alfalfa
 - cowpea



ID of Aphid Species in Alfalfa

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STATEWIDE INTEGRATED PEST MANAGEMENT PROGRAM

Key to Aphids Most Commonly Found in San Joaquin Valley Alfalfa and Cotton

http://www.ipm.ucdavis.edu/TOOLS/KEYAPHID/

UNIVERSITY OF CALIFORNIA
STATEWIDE INTEGRATED PEST MANAGEMENT PROGRAM

Glover, at certain times of the year.

Since economic thresholds have been developed for individual species, proper aphid management requires accurate identification.

Use this key to identify an aphid. While aphids appear to be very simple insects, they are really very complex, both in their biology and their morphology. As with other insects, external morphological features are used to identify individuals to the species level.

antennal tubercle antenna head

This drawing of a typical aphid shows a number of morphological features important in identification.

1. Look at an aphid.

Aphid Treatment Thresholds Pea Aphids and Blue Alfalfa Aphids

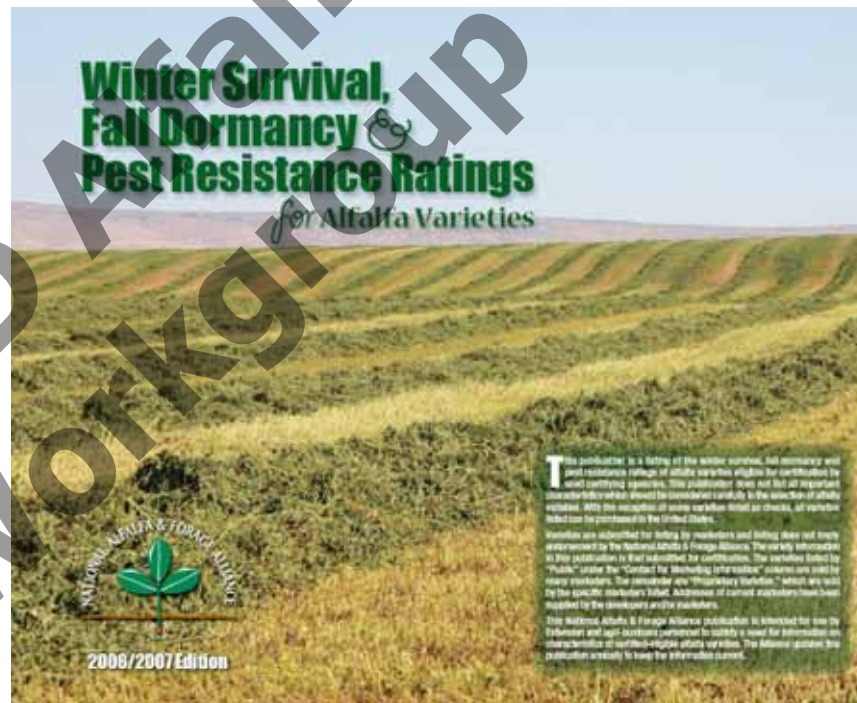
Plant height	Pea aphids	Blue alfalfa aphids	Cowpea aphids*
Under 10 inches	40 to 50 per stem	10 to 12 per stem	10 to 12 per stem
10 to 20 inches	70 to 80 per stem	40 to 50 per stem	40 to 50 per stem
Over 20 inches	100 + per stem	40 to 50 per stem	40 to 50 per stem

* Not yet developed

Alfalfa Insect and Mite Pests

Aphid Management

1. Host plant resistance
2. Natural enemies
3. Insecticides



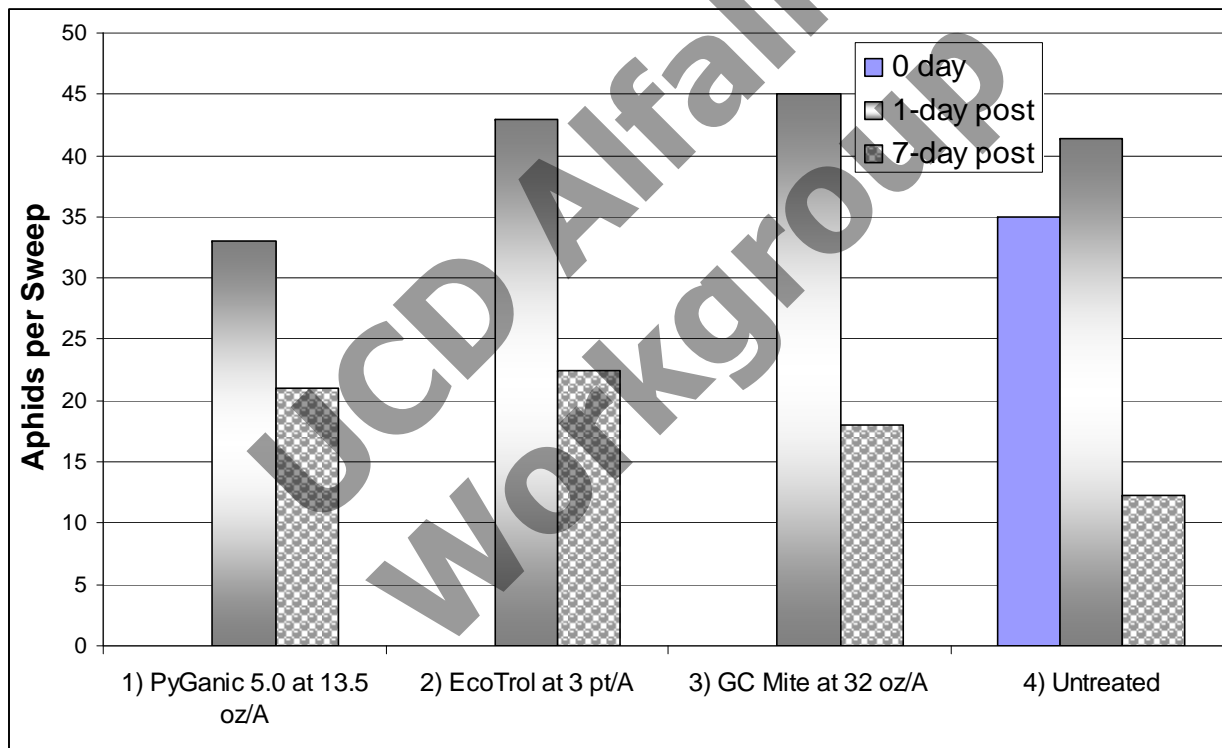
Aphids in Alfalfa

Management Considerations

- Host plant resistance
 - Aphids are constantly evolving so resistance can break-down
 - Resistance can be compromised during cool periods
- Biological control
- Cowpea aphids thrive in hot temperatures

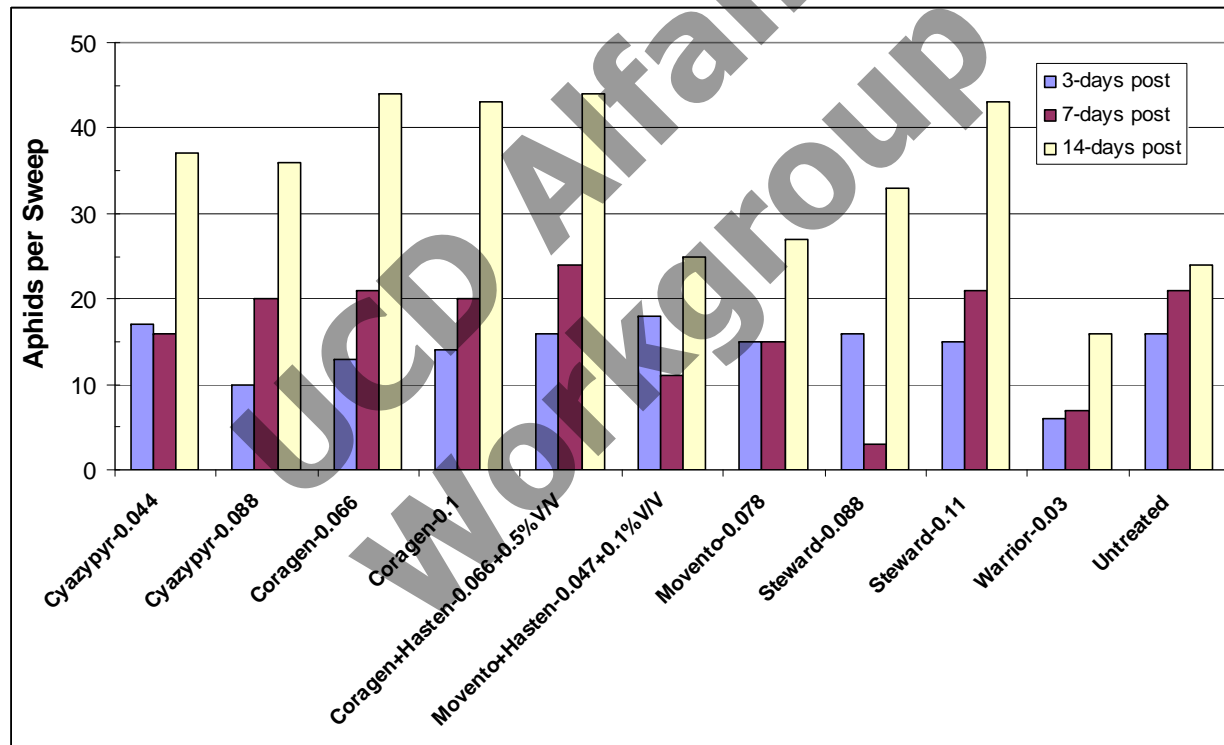


Aphid Management – 2007 Yolo Co.



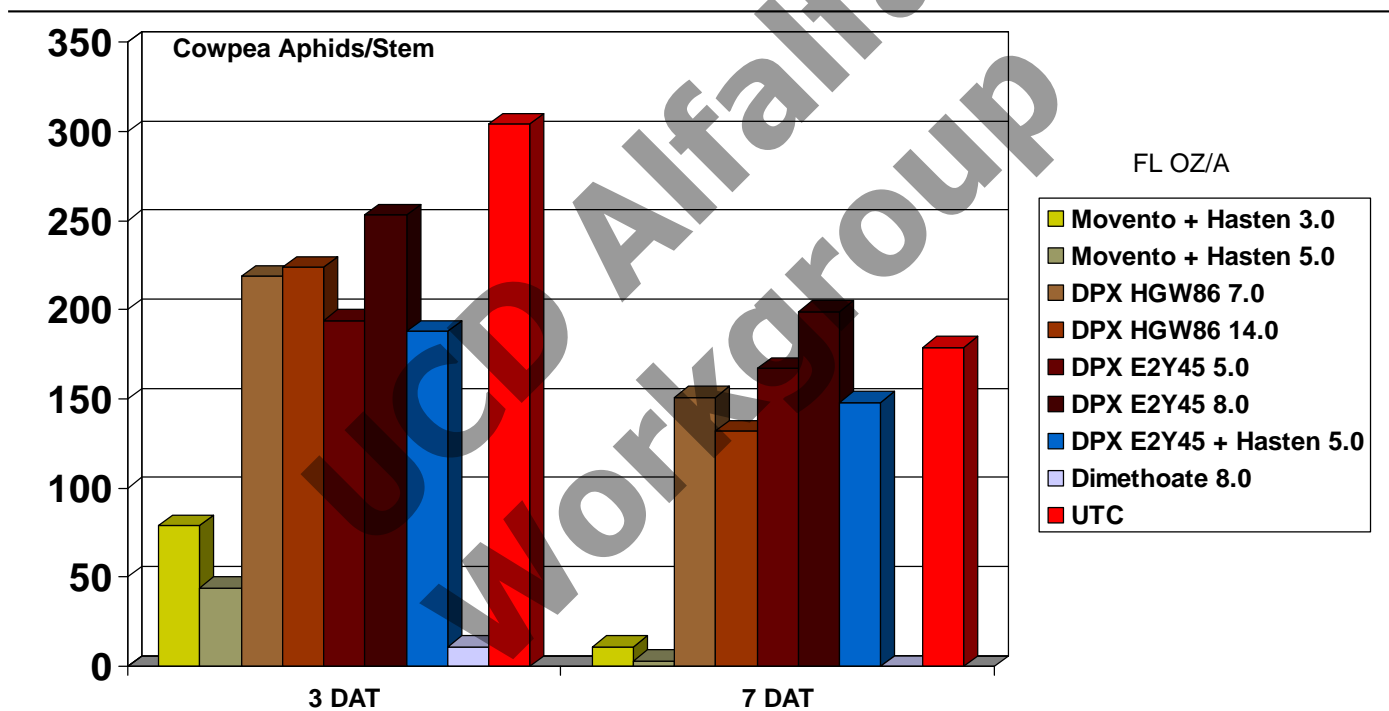
Aphid Control – 2008

San Joaquin Co.



Cowpea Aphids in Alfalfa – 2008

San Joaquin Co.



Application: Aug. 5, 20 gpa, Hasten @ 0.5% V/V

Aphid infestation 150-750 aphids/stem.

2008 Alfalfa Aphid Trial



Questions





UCD Alfalfa
Workgroup

Questions



Alfalfa Weevil – an introduced pest

Biological Control Agents

Release program from 1957-1988:

- Parasitic wasps
 - *Bathyplectes* spp.
 - *Microctonus aethiopoides*
 - *Oomyzus incertus*

Naturally occurring:

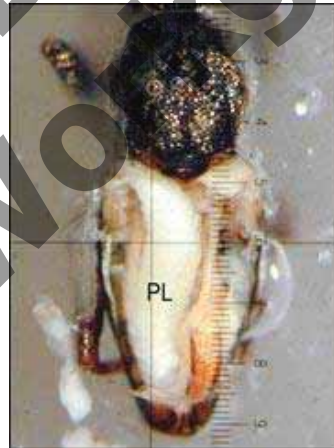
- Fungus
 - Zoophthora phytonomi*

Natural Controls

- Minute parasitic wasps that attack larval stage
- Weevil larvae continue to feed then die at pupation



Adult-stage internal parasite



- Adult female oviposits several eggs in large larvae
- Parasitized larvae turn mahogany-brown



AW mummy

Zoophthora phytonomi

- Fungus
- Genus only infects insects—species specific to AW larvae
- Very common in some years/some fields



Type I stage (infectious)



Type II stage (resting spore)

Weevil Parasitism, 2005

