

Innovative Tools for Alfalfa IPM

Alfalfa Field Day, Kearney Ag Center

9/13/16

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■ Integrated Pest Management Program

Technology and IPM in the Field

- Smart mobile devices, Cellular 3G and 4G, Cloud based programming
- Scouting and reporting
- Decision support
- Community based data sharing
- Live links to Resources are provided in this PDF
- Notes from presentation are available by clicking the bubble in the corner



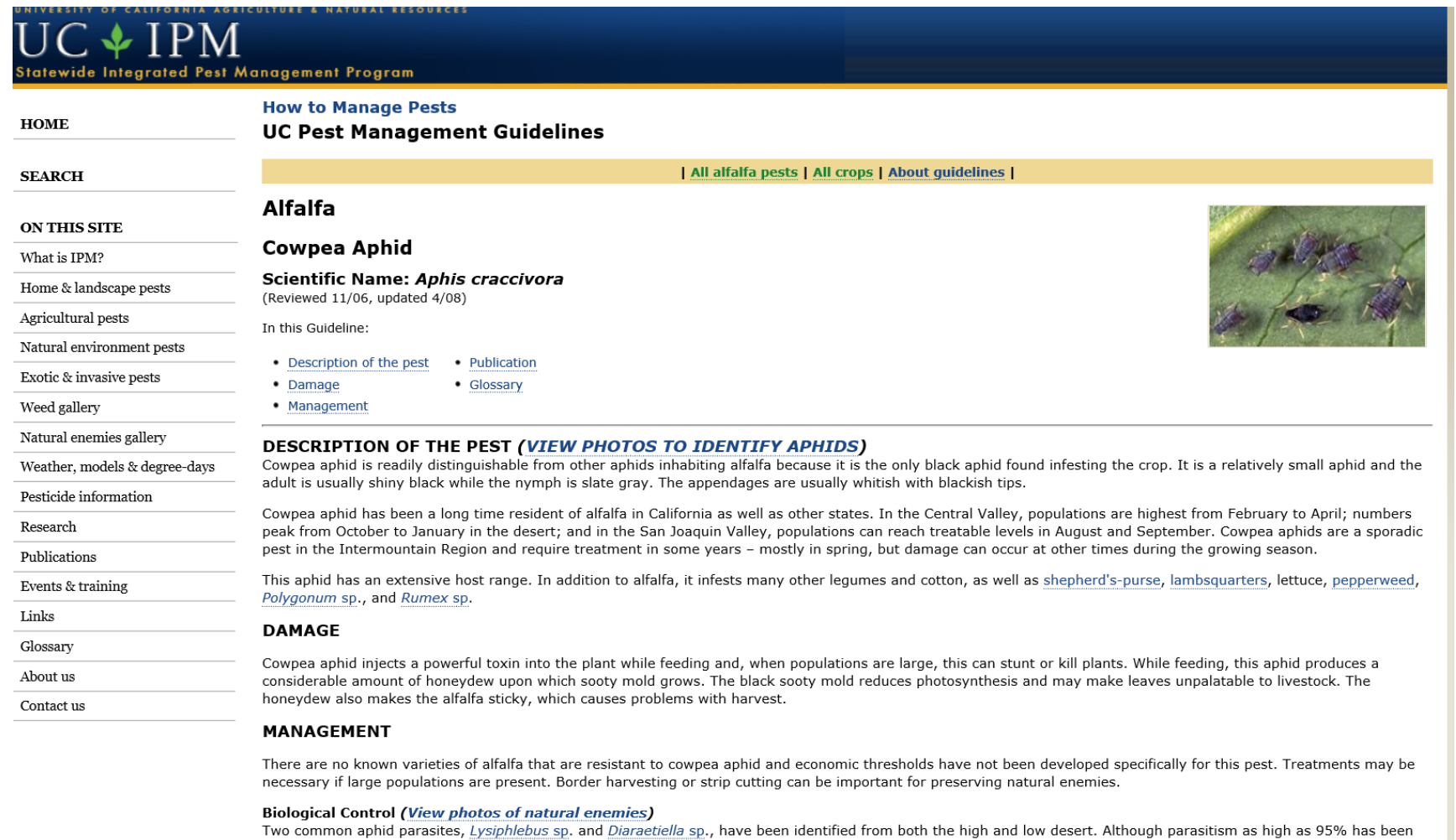


Scouting Apps

- Many of you are more familiar with these than I
- Apps are commercial, public or in-house
- Record location, crop, pests, density etc
- Some link to warehouse inventory for seamless ordering and delivering
- Follow-up paperwork generated

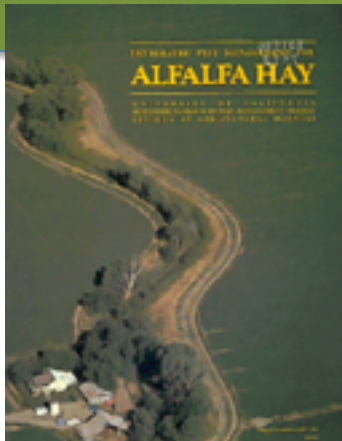


UC IPM Pest Management Guidelines Are a Content Rich Source of Information Which Can Be Overwhelming



The screenshot shows the UC IPM website interface. At the top, the logo for UC IPM (University of California Integrated Pest Management) is displayed. Below the logo is a navigation menu with links for HOME, SEARCH, ON THIS SITE, What is IPM?, Home & landscape pests, Agricultural pests, Natural environment pests, Exotic & invasive pests, Weed gallery, Natural enemies gallery, Weather, models & degree-days, Pesticide information, Research, Publications, Events & training, Links, Glossary, About us, and Contact us. The main content area is titled "How to Manage Pests" and "UC Pest Management Guidelines". A yellow navigation bar contains links for "All alfalfa pests", "All crops", and "About guidelines". The current page is for "Alfalfa" and "Cowpea Aphid". The scientific name is *Aphis craccivora*, reviewed 11/06, updated 4/08. A list of links includes "Description of the pest", "Damage", "Management", "Publication", and "Glossary". A photograph shows several dark aphids on a green leaf. The "DESCRIPTION OF THE PEST" section includes a link to "VIEW PHOTOS TO IDENTIFY APHIDS" and text describing the aphid's characteristics and distribution. The "DAMAGE" section explains the aphid's feeding behavior and the resulting honeydew and sooty mold. The "MANAGEMENT" section discusses the lack of resistant alfalfa varieties and the importance of border harvesting or strip cutting. The "Biological Control" section mentions two common aphid parasites, *Lysiphlebus sp.* and *Diaraetiella sp.*, with a parasitism rate of up to 95%.

Click Here to
Access Alfalfa IPM
Guidelines



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COWPEA APHID (4/08)Scientific Name: *Aphis craccivora***DESCRIPTION OF THE PEST***(View photo online to identify aphids)*

Cowpea aphid is readily distinguishable from other aphids inhabiting alfalfa because it is the only black aphid found infesting the crop. It is a relatively small aphid and the adult is usually shiny black while the nymph is slate gray. The appendages are usually whitish with blackish tips.

Cowpea aphid has been a long time resident of alfalfa in California as well as other states. In the Central Valley, populations are highest from February to April; numbers peak from October to January in the desert; and in the San Joaquin Valley, populations can reach treatable levels in August and September. Cowpea aphids are a sporadic pest in the Intermountain Region and require treatment in some years – mostly in spring, but damage can occur at other times during the growing season.

This aphid has an extensive host range. In addition to alfalfa, it infests many other legumes and cotton, as well as shepherd's-purse, lambsquarters, lettuce, pepperweed, *Polygonum* sp., and *Rumex* sp.

DAMAGE

Cowpea aphid injects a powerful toxin into the plant while feeding and, when populations are large, this can stunt or kill plants. While feeding, this aphid produces a considerable amount of honeydew upon which sooty mold grows. The black sooty mold reduces photosynthesis and may make leaves unpalatable to livestock. The honeydew also makes the alfalfa sticky, which causes problems with harvest.

MANAGEMENT

There are no known varieties of alfalfa that are resistant to cowpea aphid and economic thresholds have not been developed specifically for this pest. Treatments may be necessary if large populations are present. Border harvesting or strip cutting can be important for preserving natural enemies.

Biological Control*(View photos online of natural enemies)*

Two common aphid parasites, *Lysiphlebus* sp. and *Diaraetella* sp., have been identified from both the high and low desert. Although parasitism as high as 95% has been documented, aphid population levels can become so high that enough nonparasitized individuals remain to cause significant injury. This aphid is also susceptible to the usual complement of aphid predators including lady beetles, lacewings, bigeyed bugs, damsel bugs, and syrphid flies. Early in the season (February and early-March) many of these predators are generally not active, but in the low desert the sevenspotted lady beetle, *Coccinella septempunctata*, is abundant and feeding on the aphid.

Cultural Control

Use border-strip cutting during harvest to help maintain populations of parasites and predators within the field. For more details, see BORDER-STRIP HARVESTING.

Organically Acceptable Methods

The use of biological and cultural controls are acceptable on organically certified crops. Organically certified insecticides such as azadirachtin (Neemix), neem oil (Trilogy), and pyrethrin (PyGanic) are registered for use on alfalfa to control aphids. Studies conducted in California, however, have shown that at best they provide some suppression of populations but do not control them.

Monitoring and Treatment Decisions

Aphid infestations in a field are typically patchy, especially an early infestation. Stems on alfalfa plants in infested areas are often completely covered with aphids whereas plants in other areas of the field may appear aphid-free. Because of the spotty distribution of cowpea aphid infestations, spot treatments may be feasible, especially if the infestation is on the field border.

On dormant alfalfa, pay close attention to plants as they begin breaking dormancy. If shoots fail to grow normally and cowpea aphid is present, consider control measures.

Original Format of PMGs

Start to monitor fields in February for cowpea aphid and continue to monitor this aphid through fall at which time monitoring can be combined with that of blue alfalfa and pea aphid as described in APHID MONITORING. (During summer months, monitoring of cowpea aphid can be combined with that of spotted alfalfa aphids.)

Record counts on a monitoring form. (Example monitoring forms are available online.)

No guidelines or economic threshold levels have been established for cowpea aphid in alfalfa. Until economic thresholds are developed for the cowpea aphid, use the following thresholds, which were developed for the blue alfalfa aphid:

| Plant height | Aphids |
|-----------------|-------------------|
| Under 10 inches | 10 to 12 per stem |
| 10 to 20 inches | 40 to 50 per stem |
| Over 20 inches | 40 to 50 per stem |

| Common Name (example trade name) | Amount per acre | R.E.I.† (hours) | P.H.I.‡ (days) |
|-------------------------------------|--------------------|--------------------|-------------------|
|-------------------------------------|--------------------|--------------------|-------------------|

The following materials are listed in order of usefulness, taking into account efficacy and impact on natural enemies and honey bees. When choosing a pesticide, also consider environmental impact. Not all registered pesticides are listed. Always read label of product being used.

The following materials have not been tested under California conditions but have been found to be effective in other areas.

| | | | |
|--|-------------|----|--------------|
| A. CHLORPYRIFOS* (Lorsban) 4EC MODE OF ACTION GROUP NUMBER: 1B COMMENTS: Do not make more than 4 applications per year or apply more than once per crop cutting. Do not apply when bees are present. Avoid drift and tailwater runoff into surface waters. Preharvest interval is 7 days for cutting and grazing when 0.5 pt/acre used, 14 days for 1 pt/acre, and 21 days for rates above 1 pt/acre. | Label rates | 24 | See comments |
| B. DIMETHOATE 2.67EC MODE OF ACTION GROUP NUMBER: 1B COMMENTS: Check label to see if product allows only one application per year or per cutting. Do not apply when bees are present. | Label rates | 48 | 10 |

† Restricted entry interval (R.E.I.) is the number of hours (unless otherwise noted) from treatment until the treated area can be safely entered without protective clothing. Preharvest interval (P.H.I.) is the number of days from treatment to harvest. In some cases the R.E.I. exceeds the P.H.I. The longer of two intervals is the minimum time that must elapse before harvest.

* Permit required from county agricultural commissioner for purchase or use.

1 Rotate chemicals with a different mode of action Group number, and do not use products with the same mode of action Group number more than twice per season to help prevent the development of resistance. For example, the organophosphates have a Group number of 1B; chemicals with a 1B Group number should be alternated with chemicals that have a Group number other than 1B. Mode of action Group numbers are assigned by IRAC (Insecticide Resistance Action Committee). For additional information, see their Web site at <http://www.irac-online.org/>.

Decision Support Tools

- Proto-type “App” for 4 crops
 - Alfalfa, almonds, citrus, cotton
- Built off Critical Use of Chlorpyrifos but use is generalized
- Most useful in planning for upcoming crop or season
- Can be used to go through real time “consideration of all alternatives and mitigation measures”



Click Here to
Link to Report



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IPM Decision Support Tool

1. Identification

2. Management Options

3. Report

Crop selected

Alfalfa

I am looking for options that are:

Preseason In season

I would like to manage:

NOTE: Only certain pests are listed below. The Alfalfa Pest Management Guidelines may have a more comprehensive list.

Alfalfa Caterpillar

[QUICK](#) / [DETAILED](#) sampling information

Alfalfa Weevil

[QUICK](#) / [DETAILED](#) sampling information

Beet Armyworm

Blue Alfalfa Aphid

[QUICK](#) / [DETAILED](#) sampling information

Cowpea Aphid

Egyptian Alfalfa Weevil

Leafhoppers

Pea Aphid

Spotted Alfalfa Aphid

Variegated and Other Cutworms

Webworm

Western Yellowstriped Armyworm

Additional Information

Alfalfa Pest Management Guidelines



Alfalfa Caterpillar Identification:

The yellowish-orange or whitish butterflies of the alfalfa caterpillar lay eggs on the new growth of alfalfa that is less than 6 inches tall. Eggs hatch into green caterpillars in 3 to 7 days. Full-grown caterpillars are about 1.5 inches long and are distinguished from other common caterpillars on alfalfa by their velvety green bodies and white lines along their sides. [more information](#)



Let's look at 3 pests and their integrated management

This is screen 2 where all options available in the PMGs are listed by pest

IPM Decision Support Tool

1. Identification

2. Management Options

3. Report

Management options for alfalfa (in season):

Select if you are considering (👍) or not considering (👎) the management options below

| | | Management Options | Alfalfa Cutworm (P1) (Pre-Season/In Season Options) | Alfalfa Weevil (P2) (Pre-Season/In Season Options) | Blue Alfalfa Aphid (P3) (Pre-Season/In Season Options) |
|----------------------------------|----------------------------------|---------------------------------|--|---|---|
| <input type="radio"/> | <input type="radio"/> | Conservation of natural enemies | ✗ / ⓘ | ✗ / ⓘ | ✗ / ⓘ |
| <input type="radio"/> | <input type="radio"/> | Early harvest | ✗ / ⓘ | ✗ / ⓘ | ✗ / ✗ |
| <input checked="" type="radio"/> | <input checked="" type="radio"/> | Grazing (sheep) | ✗ / ✗ | ✓ / ✗ | ✗ / ✗ |
| <input checked="" type="radio"/> | <input checked="" type="radio"/> | Light harrowing during winter | ✗ / ✗ | ✓ / ✗ | ✗ / ✗ |
| <input checked="" type="radio"/> | <input checked="" type="radio"/> | Burning | ✗ / ✗ | ✓ / ✗ | ✗ / ✗ |
| <input checked="" type="radio"/> | <input checked="" type="radio"/> | Resistant varieties | ✗ / ✗ | ✗ / ✗ | ✓ / ✗ |
| <input type="radio"/> | <input type="radio"/> | Border cutting | ✗ / ⓘ | ✗ / ✗ | ✗ / ⓘ |
| <input type="radio"/> | <input checked="" type="radio"/> | Chemical control | ✗ / 🚫 | ✗ / 🚫 | ✗ / 🚫 |



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These are the insecticide choices for all 3 pests

Your selected chemical control options for alfalfa (in season):

| Common Name (example trade name) | P1 | P2 | P3 | MoA ¹ | Selectivity ² | Predatory mites ³ | General predators ⁴ | Parasites ⁴ | Honey bees ⁵ | Duration of impact to natural enemies ⁶ |
|---|----|----|----|------------------|--------------------------|---------------------------------|-----------------------------------|------------------------|----------------------------|---|
| <i>Bacillus thuringiensis ssp. kurstaki</i> (Xentari, Dipel ES) | ✓ | ✗ | ✗ | 11A | narrow | L | L | L | III | short |
| chlorantraniliprole (Coragen, Altacor) | ✓ | ✗ | ✗ | 28 | narrow | L | L | L/M | III | short |
| chlorpyrifos (Lorsban, Lorsban Advanced, Lorsban 15G, PT DuraGuard ME) | ✗ | ✓ | ✓ | 1B | broad | M | H | H | I | moderate |
| flonicamid (Carbine, Beleaf) | ✗ | ✗ | ✓ | 9C | narrow | L | L | L | III | short |
| flubendiamide (Belt) | ✓ | ✗ | ✗ | 28 | — | L | L | L/M | II | short |
| flupyradifurone (Sivanto 200SL) | ✗ | ✗ | ✓ | 4D | narrow | — | — | — | — | — |
| indoxacarb (Steward) | ✓ | ✓ | ✗ | 22A | narrow | — | L | L | I | moderate |
| lambda-cyhalothrin (Warrior, Scimitar) | ✗ | ✓ | ✓ | 3A | broad | H | H | H | I | moderate |
| methoxyfenozide (Intrepid, Intrepid 2F) | ✓ | ✗ | ✗ | 18 | narrow | L | L | L | II | short |



Screen 3 is the final report

| Report Number | Year | Date/Time | Crop |
|---------------|------|----------------|---------|
| 160921030811 | 2016 | 09/21 03:08 PM | Alfalfa |

Selected pest(s):

| | Alfalfa Caterpillar (P1) | Alfalfa Weevil (P2) | Cowpea Aphid (P3) |
|---------------------------|--------------------------|---------------------|-------------------|
| Your Sampling Data | | | |

Your selected management options for alfalfa (in season):

| Management Options | P1 (Pre-season/In Season Options) | P2 (Pre-season/In Season Options) | P3 (Pre-season/In Season Options) |
|---------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Conservation of natural enemies | ☒ / 1 | ☒ / 1 | ☒ / 1 |
| Early harvest | ☒ / 1 | ☒ / 1 | ☒ / ☒ |
| Grazing (sheep) | ☒ / ☒ | ☑ / ☒ | ☒ / ☒ |
| Light harrowing during winter | ☒ / ☒ | ☑ / ☒ | ☒ / ☒ |
| Burning | ☒ / ☒ | ☑ / ☒ | ☒ / ☒ |
| Border cutting | ☒ / 1 | ☒ / ☒ | ☒ / 1 |
| Chemical control | ☒ / 1 | ☒ / 1 | ☒ / 1 |

Your selected chemical control options for alfalfa (in season):

| Common Name (example trade name) | P1 | P2 | P3 | MoA ¹ | Selectivity ² | Predatory mites ³ | General predators ⁴ | Parasites ⁴ | Honey bees ⁵ | Duration of impact to natural enemies ⁶ |
|---|----|----|----|------------------|--------------------------|------------------------------|--------------------------------|------------------------|-------------------------|--|
| <i>Bacillus thuringiensis</i> ssp. <i>kurstaki</i> (Xentari, Dipel ES) | ☑ | ☒ | ☒ | 11A | narrow | L | L | L | III | short |
| beta-cyfluthrin (Baythroid, Baythroid, Baythroid XL) | ☒ | ☑ | ☑ | 3A | broad | H | H | H | I | moderate |

Screen 3 has all the information

[Mitigating Pesticide Hazards](#)
[Precautions for Using Pesticides](#)

More info here

References



Alfalfa Caterpillar (P1)

<http://ipm.ucanr.edu/PMG/r1300611.html>



Alfalfa Weevil (P2)

<http://ipm.ucanr.edu/PMG/r1300511.html>



Cowpea Aphid (P3)

<http://ipm.ucanr.edu/PMG/r1301511.html>

Pest Identification

The yellowish-orange or whitish butterflies of the alfalfa caterpillar lay eggs on the new growth of alfalfa that is less than 6 inches tall. Eggs hatch into green caterpillars in 3 to 7 days. Full-grown caterpillars are about 1.5 inches long and are distinguished from other common caterpillars on alfalfa by their velvety green bodies and white lines along their sides. *(see link above for more detail)*

Two identical-looking weevils infest alfalfa in California. They are distinguished by their biology and distribution in the state. The alfalfa weevil is an annual pest in alfalfa districts east of the Sierra Nevada mountains and in the northernmost counties of California. In most other areas of California, it has been displaced by the Egyptian alfalfa weevil, which is a far more serious pest. *(see link above for more detail)*

Cowpea aphid is readily distinguishable from other aphids inhabiting alfalfa because it is the only black aphid found infesting the crop. It is a relatively small aphid and the adult is usually shiny black while the nymph is slate gray. The appendages are usually whitish with blackish tips. *(see link above for more detail)*

UC IPM Sampling Information

In early summer start sweeping fields with adequate plant height 2 to 3 times per week to monitor for caterpillars and continue through fall. Divide each field into 4 sections and take 5 sweeps per section with a 15-inch diameter sweep net, for a total of 20 sweeps. *(see link above for more detail)*

Sweep fields with adequate plant height weekly after weevil larvae begin to appear in late winter or early spring. As thresholds are approached, monitor every 2 to 4 days to determine if populations decline or a treatment is required. *(see link above for more detail)*

Take weekly stem samples for blue alfalfa aphids, pea aphids, cowpea aphids, and natural enemies during stand establishment and in spring- and fall-established stands. Sample for cowpea aphids, spotted alfalfa aphids and natural enemies in summer-established stands. Natural enemies can quickly reduce aphid infestations. As aphid threshold populations are approached, check every 2 to 3 days to determine if natural enemies and disease cause the population numbers to decrease. *(see link above for more detail)*



| Report Number | Year | Date/Time | Crop |
|---------------|------|----------------|---------|
| 160921030811 | 2016 | 09/21 03:08 PM | Alfalfa |

Selected pest(s):

| Alfalfa Caterpillar (P1) | Alfalfa Weevil (P2) | Cowpea Aphid (P3) |
|--------------------------|---------------------|-------------------|
|--------------------------|---------------------|-------------------|

Your Sampling Data

Your selected management options for alfalfa (in season):

| Management Options | P1 (Pre-season/In Season Options) | P2 (Pre-season/In Season Options) | P3 (Pre-season/In Season Options) |
|---------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Conservation of natural enemies | ☒ / ● | ☒ / ● | ☒ / ● |
| Early harvest | ☒ / ● | ☒ / ● | ☒ / ☒ |
| Grazing (sheep) | ☒ / ☒ | ● / ☒ | ☒ / ☒ |
| Light harrowing during winter | ☒ / ☒ | ● / ☒ | ☒ / ☒ |
| Burning | ☒ / ☒ | ● / ☒ | ☒ / ☒ |
| Border cutting | ☒ / ● | ☒ / ☒ | ☒ / ● |
| Chemical control | ☒ / ● | ☒ / ● | ☒ / ● |

Your selected chemical control options for alfalfa (in season):

| Common Name (example trade name) | P1 | P2 | P3 | MoA ¹ | Selectivity ² | Predatory mites ³ | General predators ⁴ | Parasites ⁴ | Honey bees ⁵ | Duration of impact to natural enemies ⁶ |
|---|----|----|----|------------------|--------------------------|------------------------------|--------------------------------|------------------------|-------------------------|--|
| <i>Bacillus thuringiensis</i> ssp. <i>kurstaki</i> (Xentari, Dipel ES) | ● | ☒ | ☒ | 11A | narrow | L | L | L | III | short |
| beta-cyfluthrin (Baythroid, Baythroid, Baythroid XL) | ☒ | ● | ● | 3A | broad | H | H | H | I | moderate |

You can save the report for later reference, with live links!

Benefits of Decision Support

- Provides logical framework for decision making
- Provides framework for planning
- Provides multi-pest information
- Provides easy access to information rich PMG
- Provides summary of all options



Look for These Logos at UC IPM Pest Management Guidelines

- Decision Support Tool



- Honeybee Protection Tool



Introduction to iPiPE

iPiPE is a national effort to develop a flexible platform for multiple crops and pests. It can:

- Track various crop pests and diseases through the observation of local experts
- Enhance communication across a wide area to improve management preparation through pest alerts and interpretation by Extension professionals
- Use pest risk models to predict outbreaks
- Provide self assessment tools for you to evaluate your IPM system



iPIPE Components

- Real time pest management
- Current status of IPM in alfalfa (survey)
- Assessing your IPM efforts (self evaluation)
- Access to Extension professionals and resources



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Real Time Pest Management

- Record scout data from field
- Data is collated and summarized on map
- Pest distribution across the state can be monitored
- Pest models under development (Stem Nematode and BAA)



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iPIPE: “Progress Through Sharing”

A Community Based Tool for Reporting Pest Outbreaks Seeking Cooperators and Pest Spotters

- ✓ Are you interested in reporting observations of important alfalfa pests?
- ✓ Would you be willing to submit your observations to a shared data base?
- ✓ Would you benefit from knowing where alfalfa pest outbreaks are occurring?
- ✓ Would predictive models of key alfalfa pests help your pest management program?

Consider becoming an alfalfa cooperator-pest spotter for iPIPE

Contact: Julie Golod at:
(814) 689 - 9184, goloj689@zedxinc.com

More about iPIPE at: <http://ed.ipipe.org>



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Thank You for Your Attention



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