UNIVERSITY *of* CALIFORNIA
Cooperative Extension Riverside County

Agriculture & Natural Resources
290 N. Broadway, Blythe, CA 92225-1649
Telephone (760) 921-5060; Fax (760) 921-5059
email: vmbarlow@ucdavis.edu

LETTUCE FIELD DAY

University of California
Agricultural & Natural Resources
Cooperative Extension - Blythe

When:

2010, Dec. 20th, Monday, at 10:00 AM

Where:

Please RSVP Vonny at 760-921-5060
(if no answer please leave a message)

UNIVERSITY CALIFORNIA
Cooperative Extension Riverside County
Agriculture & Natural Resources
290 N. Broadway, Blythe, CA 92225-1649
Telephone (760) 921-5064; Fax (760) 921-5059

Prepared by Vonny M. Barlow

Spring stubble application of Baythroid XL in alfalfa as a management tool for Threecornered alfalfa tree hopper and Potato leafhopper

Introduction

Alfalfa, *Medicago sativa* L. production in California exceeded 950 (x1,000) acres in 2009 with production exceeding 6,650(x1,000) tons with an estimated value of 1,383,200 (x1,000) dollars. Given that California is an alfalfa "poor" state and must import alfalfa to supplement the states production needs makes it critical that alfalfa hay production be bolstered. Wild vegetation areas (ie. drainage ditches, weedy fields) adjacent to alfalfa fields act as a refuge and continuous source of Threecornered alfalfa tree hopper (TCAH). Both the Potato leafhopper (PLH) and TCAH (**Fig. 1a & b**) mechanically wound alfalfa during feeding and/or ovipositing by adult females. Damage also includes reduced stem length and mass, increases leaf/stem ratio, and decreases morphological stage of development. Weakened plant stems are prone to breakage and/or lodging. Once alfalfa has lodged it becomes difficult to harvest and lodged areas that remain in the field can harbor greater hopper populations compared to stubble alfalfa. If TCAH populations remain untreated they can significantly reduce alfalfa hay yield and quality. The project begun this year seeks to develop an economic and environmentally beneficial approach to hopper pest management in alfalfa grown in the desert region.

Materials & Methods

Commercial alfalfa fields in their 2nd year of production were selected with a history of high populations of TCAH prior to establishment of experimental plots. The experiment consisted of a split plot field design that was replicated three times in the town of Blythe located in California's southern desert. Treatments consisted of a control (no chemical applications) and a single directed "stubble"

application of Baythroid XL at the labeled rate of 2.8 fl. oz./A made immediately after the first alfalfa cutting was removed from the field. Alfalfa fields consisted of cv. 'WL-535'alfalfa (≈ 20/A each) with smaller (split-plots) of (≈ 10/A each) in each of the fields. Each treatment plot was delineated into 4 equal quadrants (≈ 2.5/A each). Approximately 10d after alfalfa stubble treatment was made twice a week sampling began.

On each sampling date 10-180° sweeps were taken per quadrant with a sweep net (15 in. diameter), for a total of 40 sweeps per treatment (80 per field). Beat net samples were taken at 3 locations consisting of 3 plants each per quadrant with a sweep net (15 in. diameter) and a 26 in. "beating stick", for a total of 24 beat net samples per treatment (48 locations/144 plants field). Both sweep net and beat net material were immediately transferred into individual 1 gal. plastic bags and placed into an ice chest. Samples were immediately processed afterwards by first freezing the bag and their contents and then hand sorting by insect type. Numbers of TCAH and PLH adults and nymphs were then totaled and averaged to produce the mean abundance of TCAH and PLH per treatment. Plant stand vigor was determined on sampling dates by measuring plant height of 5 randomly selected alfalfa stems per quadrant for a total of 20 stems per treatment (40 stems per field). Alfalfa yield was determined on harvest dates by totaling the number of alfalfa bales per treatment and randomly weighing 10 bales per treatment (20 per field).

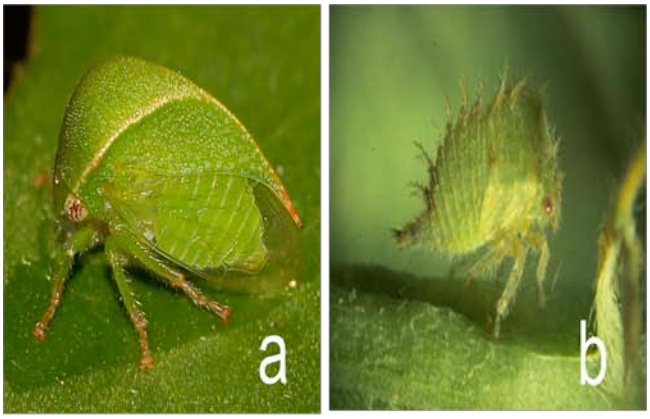
Results

Insect populations for both TCAH adults and PLH followed closely with one another and showed that treatments were not significantly different between early spring alfalfa stubble treated with Baythroid XL and untreated controls (**Figs. 3 & 4**). Few TCAH adults and nymphs were recovered using the beat-net sampling method compared to conventional sweep-net sampling in the spring stubble and control treatments. Treatment had no impact on alfalfa plant length over the 36 sample dates between Baythroid XL treated stubble alfalfa and untreated controls (**Fig. 5**). Alfalfa yield ($^{\#}$ of

bales of dry alfalfa) per treatment was not significantly different with 223.5 bales produced in Baythroid XL treated alfalfa compared to 188.67 bales of alfalfa produced in untreated controls.

Summary

Wild areas supporting a diversity of overwintering host plants may act as a source of TCAH movement into alfalfa fields. Development of an Integrated Pest Management Program (IPM) to manage TCAH and PLH in alfalfa could potentially be useful in reducing the number of insecticide applications necessary to manage these pests. The alfalfa plant with its dense upper canopy effectively acts as a barrier to insecticides penetrating into the crown of the alfalfa plant where TCAH immature stages can be found feeding near the soil line. This creates protected areas that allow populations of TCAH to build. A directed application of insecticide into the alfalfa crown was thought to be a possible "tool" to manage TCAH populations early on in the forage alfalfa production cycle; potentially reducing the need for future chemical applications. The work presented here from the first year of the project demonstrates that TCAH and PLH populations in alfalfa could not be effectively reduced with a single directed stubble application of insecticide to the alfalfa crown. Continuous emergence of TCAH from drainage ditches and other weedy areas near alfalfa fields can only be directly managed with materials once the TCAH reach the crop itself. Management of both TCAH and PLH populations in the field can only be effective as long as residual activity of Cyfluthrin remains sufficient in the alfalfa crown/plant to exert any kind of management. A possible way of compensating for shortcomings in residual activity of materials applied to the alfalfa crown would be development of improved timing of applications to the plant crown. This along with a better understanding of overwintering of TCAH movement into alfalfa fields from wild areas would be critical for development of an improved TCAH IPM program in alfalfa.



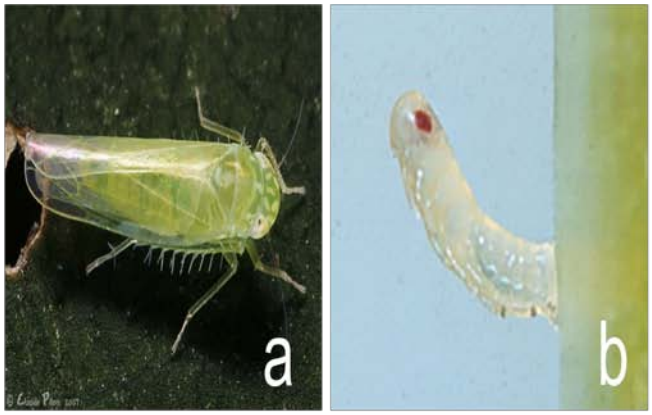


Fig. 1 Threecornered alfalfa tree hopper; a, adult, b, immature Threecornered alfalfa tree hopper
Fig. 2 Potato leafhopper; a adult, b, immature Potato leafhopper emerging from egg inserted into an alfalfa stem

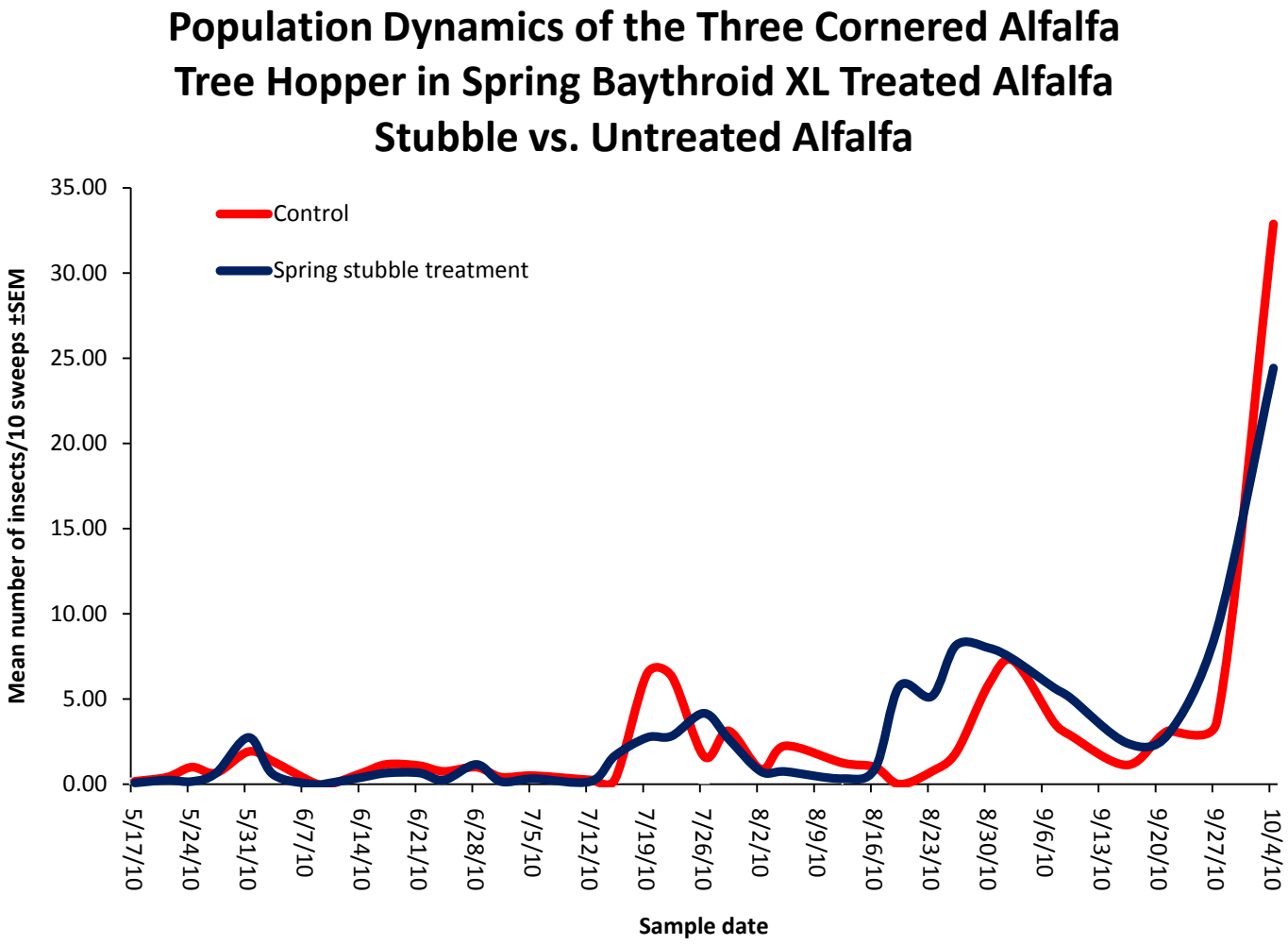


Fig. 3 Three cornered alfalfa hopper populations in Baythroid XL versus untreated alfalfa

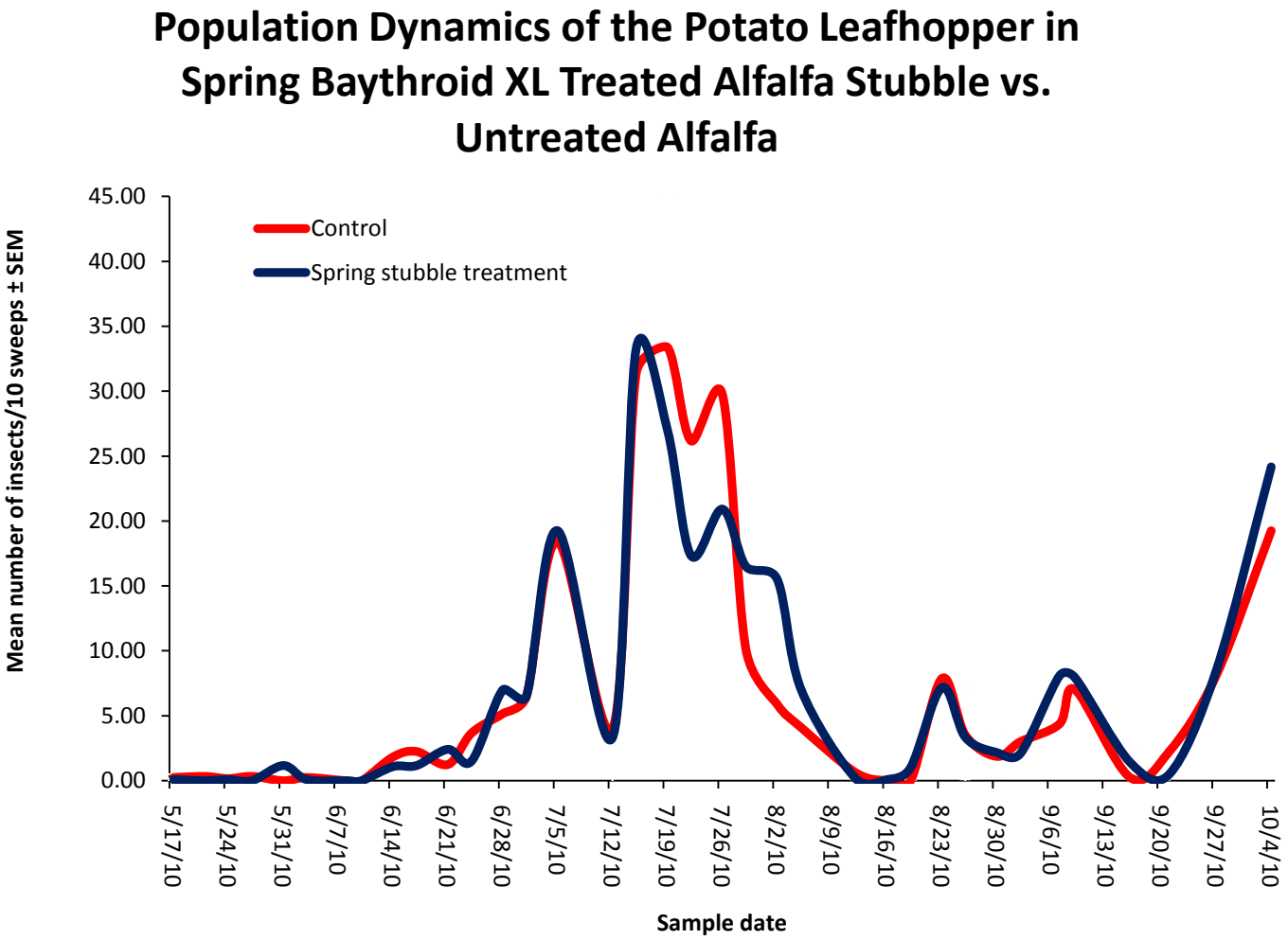


Fig. 4 Three cornered alfalfa hopper populations in Baythroid XL versus untreated alfalfa

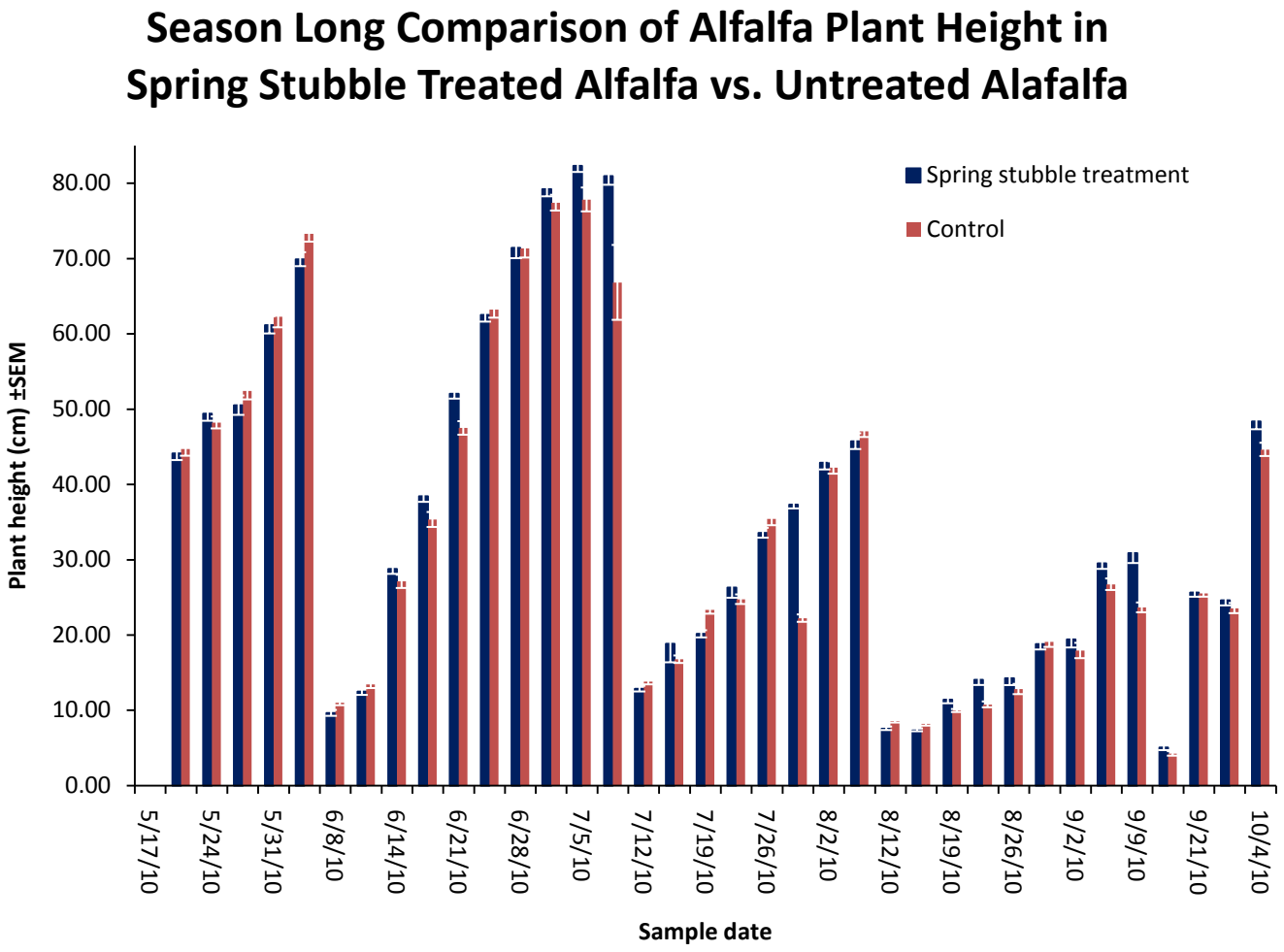


Fig. 5 Alfalfa plant height in early spring stubble alfalfa treated with Baythroid XL and untreated alfalfa

UNIVERSITY *of* CALIFORNIA

Cooperative Extension

Prepared by [1]Vonny M. Barlow and [2]Larry Godfrey

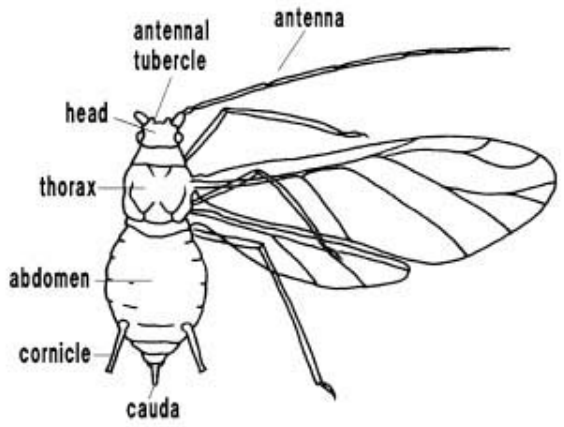
Aphid Key

Note: This key includes only the aphid species that are most commonly found in alfalfa in California's San Joaquin Valley. Adapted from "Identification: Key to Aphids Commonly Found in San Joaquin Valley Alfalfa and Cotton" by Charles G. Summers [3]

Aphids attacking California alfalfa and cotton may be difficult to identify. The alfalfa aphids, **pea aphid** *(Acyrthosiphon pisum* (Harris)) and **blue alfalfa aphid** *(A. kondoi* Shinji), are similar in appearance. Recently, the **cowpea aphid**, *Aphis craccivora* Koch, has become a pest of alfalfa and has been found colonizing cotton in California's San Joaquin Valley. The **cowpea aphid** on cotton is easily confused with **cotton aphid**, *A. gossypii* 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.



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

1. Look at an aphid through a 10x hand lens to see the important characters that distinguish the aphids included in this key.
2. On each page of the key, follow the arrow that best matches the character of the aphid you're trying to identify.

Begin Key

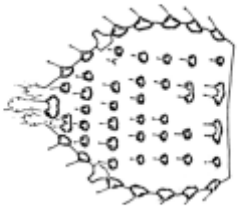
Follow the description that best describes the aphid.

Body is pale green, pink, or white

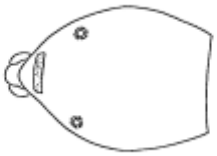
Body is black, olive green, or yellow

Go to page 5

Does the dorsal abdomen have rows of spots?



Six to eight rows of spots on dorsal abdomen



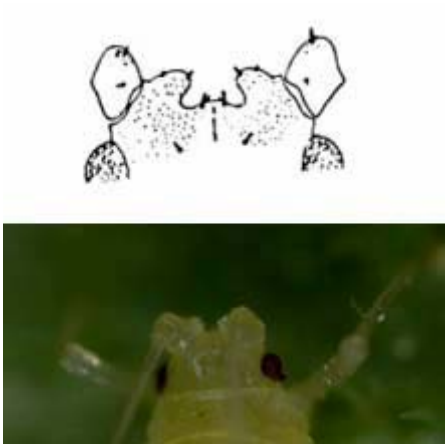
Dorsal abdomen is without spots

Based on the key characteristics, the aphid is likely to be

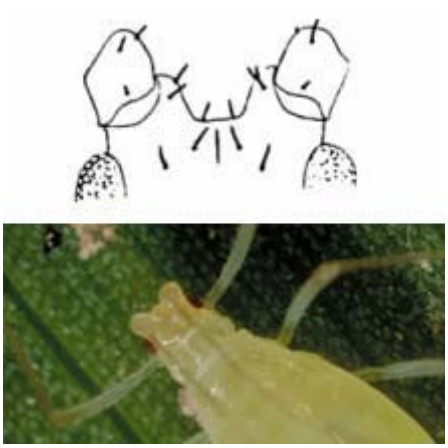
Go to page 3

Spotted alfalfa aphid *(Therioaphis maculata)*

From page 2 "dorsal abdomen is without spots"



Antennal tubercles are converging



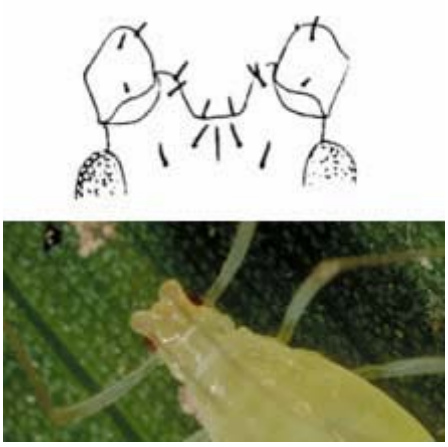
Antennal tubercles are diverging

Based on the key characteristics, the aphid is likely to be

Go to page 4

Green peach aphid *(Myzus persicae)*

From page 3 "antennal tubercles are diverging"



Antennal tubercles are diverging

Body is pink

Based on the key characteristics, the aphid is likely to be

Pea aphid *(Acrythosiphon pisum)*

Body is green

Go to page 6a

From page 2 "body is black, olive green, or yellow"

Body is black (shiny or dull)

Body is pale yellow, yellowish green, or olive green

Go to page 6b

From "body is black (shiny or dull)"

Cauda is bushy with many hairs, and cornicles and cauda are of equal length

Cauda is not bushy, has few hairs, and cornicles are longer than cauda

Go to page 6c

Based on the key characteristics, the aphid is likely to be

Bean aphid *(Aphis fabae)*

6a

From page 4 "body is green"

Antennae are uniformly brown

Go to page 7a

Antennae have dark bands between light segments

Go to page 7b

6b. Based on the key characteristics, the aphid is likely to be

Cotton (or melon) aphid *(Aphis gossypii)*

6c. Based on the key characteristics, the aphid is likely to be

Cowpea aphid *(Aphis craccivora)*

7a. Based on the key characteristics, the aphid is likely to be

Blue alfalfa aphid *(Acyrthosiphon kondoi)*

7b. Based on the key characteristics, the aphid is likely to be

Pea aphid *(Acrythosiphon pisum)*

Note: A pink-colored biotype of the pea aphid occurs in France, on the east coast and in several western states of the U.S. including California. It is infrequently encountered in the field. Biologically, it behaves identically to the green form found in California, including its response to resistant cultivars.

[1] Entomology Farm Advisor, University of California Agricultural and Natural Resources Cooperative Extension Program, 290 North Broadway, Blythe, CA 92225

[2] Entomology Extension Specialist, Agricultural Dept. of Entomology, One Shields Avenue, UC-Davis, Davis, CA 95616

[3] Summers, C. G. 2001. Key to common alfalfa and cotton aphids in California. UC Plant Protection Quarterly 11(3):8-10.