

What's the Buzz on Bees

December 8, 2015



Speakers

Gabriele Ludwig, Almond Board (Moderator)

Bob Curtis, Almond Board (Moderator)

Christi Heintz, Project Apis m.

Neal Williams, UC Davis

Mike Silveira, B&S Orchards

Danielle Veenstra, Almond Board

Brittney Goodrich, UC Davis





**Gabriele Ludwig,
Almond Board**

A close-up photograph of several green almonds on a branch, with vibrant green leaves. The background is softly blurred, showing more of the tree and some out-of-focus figures of people, suggesting an outdoor setting like a farm or orchard.

**Christi Heintz,
Project Apis m.**

What's the Buzz about Bees?

Christi Heintz

Almond Board Bee Task Force



What's the Buzz about Bees? – Overview of Today's Session

- Dr. Neal Williams
 - Mike Silveira
 - Danielle Veenstra
 - Brittney Goodrich
-
- ✓ Top Bee Issues
 - ✓ Federal Pollinator Strategy
 - ✓ Honey Bee Forage
 - ✓ Almond Board BMPs



Top Bee Issues Today



- Pests – Varroa mite
- Pathogens – Viruses
- Pesticides – tank mixes
- Poor Nutrition – lack of forage

Federal Strategy for Pollinators

- Restore colony health to sustainable levels by 2025.
 - Increase Eastern monarch butterfly populations to 225 million butterflies by year 2020.
 - Restore or enhance seven million acres of land for pollinators over the next five years.
-
- ✓ Encouraging partnerships
 - ✓ Top brass are talking bees
 - ✓ State pollinator protection plans
 - ✓ EPA
 - Re-evaluation of neo-nicotinoids
 - Expediting review of Varroa control products
 - Reviewing toxicity testing and bee exposure



What is your Almond Board doing about bees?

- Bee Task Force
- Pollination Research Program
- Participating in partnerships
- Encouraging forage plantings
- Almond Board Honey Bee BMPs



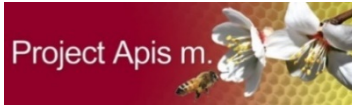


**Neal Williams,
UC Davis**

Forage and Integrated Almond Pollination

Neal M. Williams

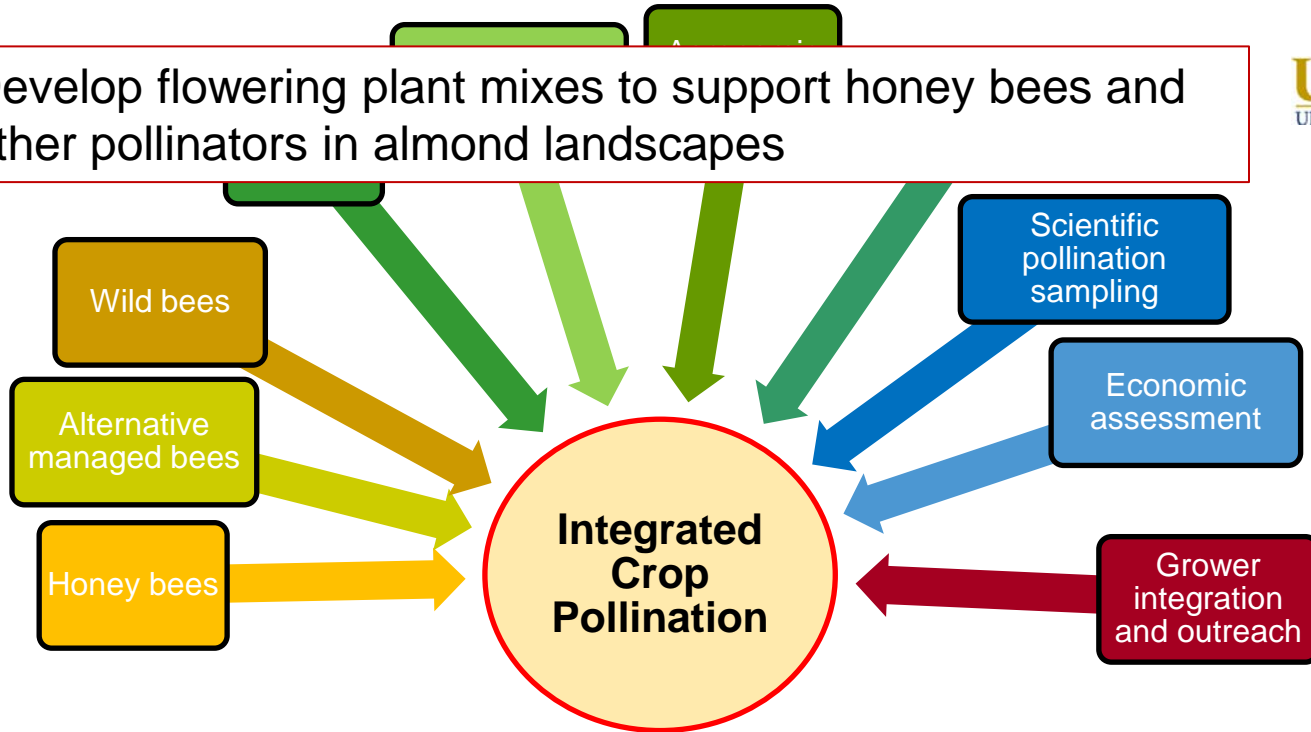
University of California, Davis



Integrated Crop Pollination



Develop flowering plant mixes to support honey bees and other pollinators in almond landscapes

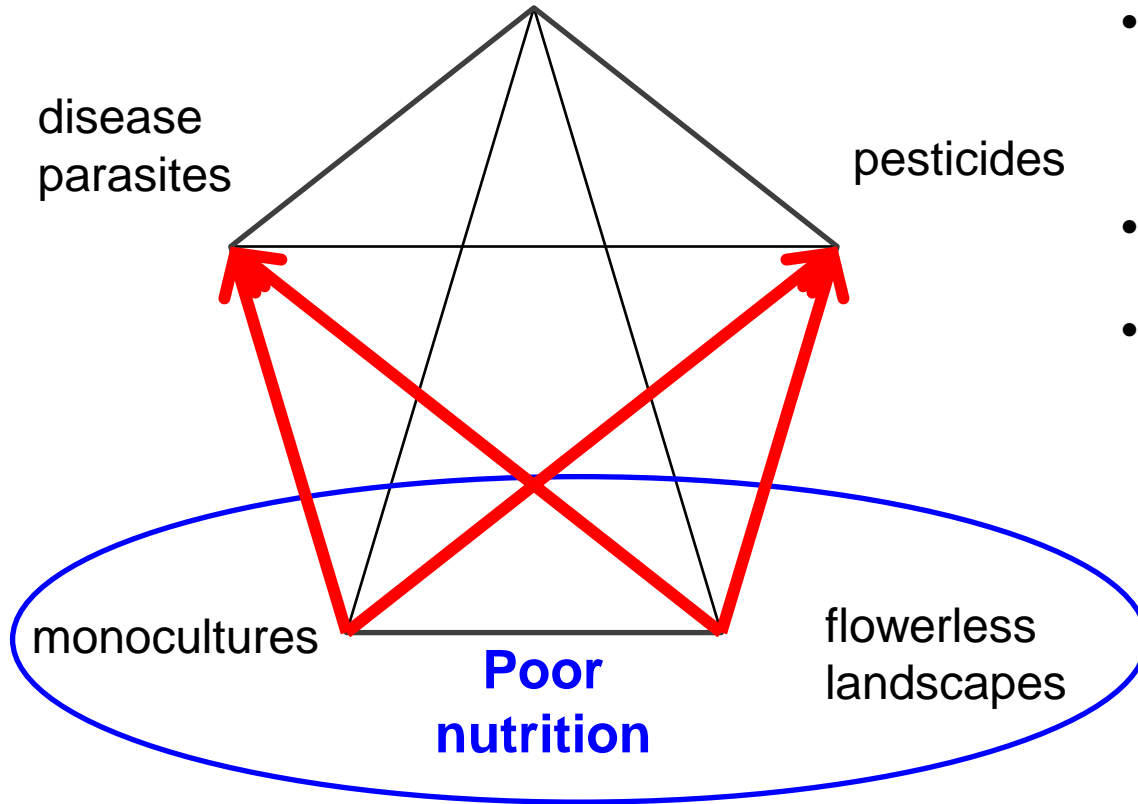




Challenges facing honeybees

- Overwinter mortality
 - Must build back colonies
 - Almond pollination demands vigorous hives
- Low forage resource levels preceding almond bloom
 - Hives are supplemented
- **Could benefit from diverse pollen sources**
- **Integration of other pollinators??**

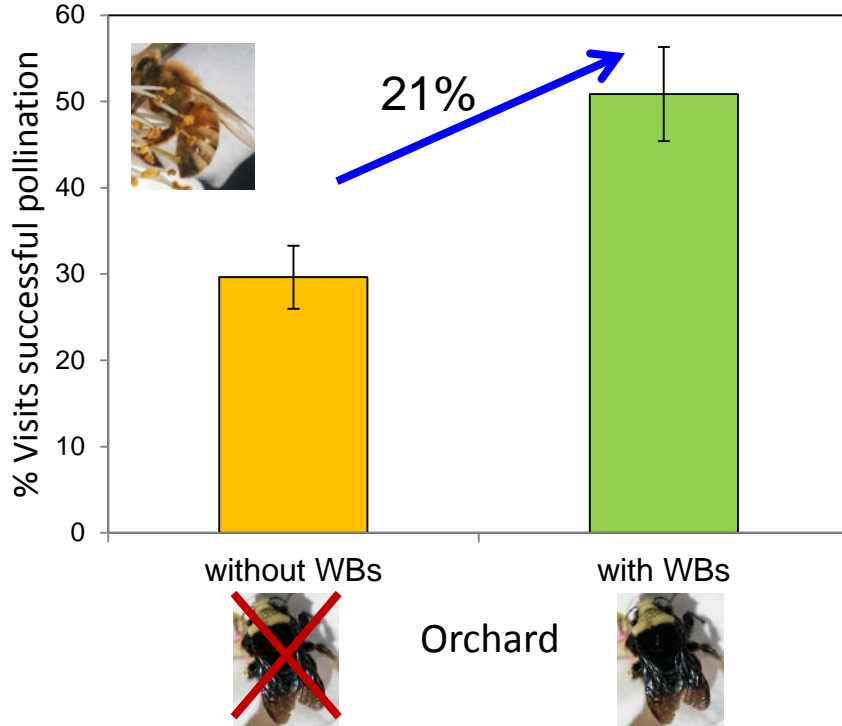
Importance of forage for bees



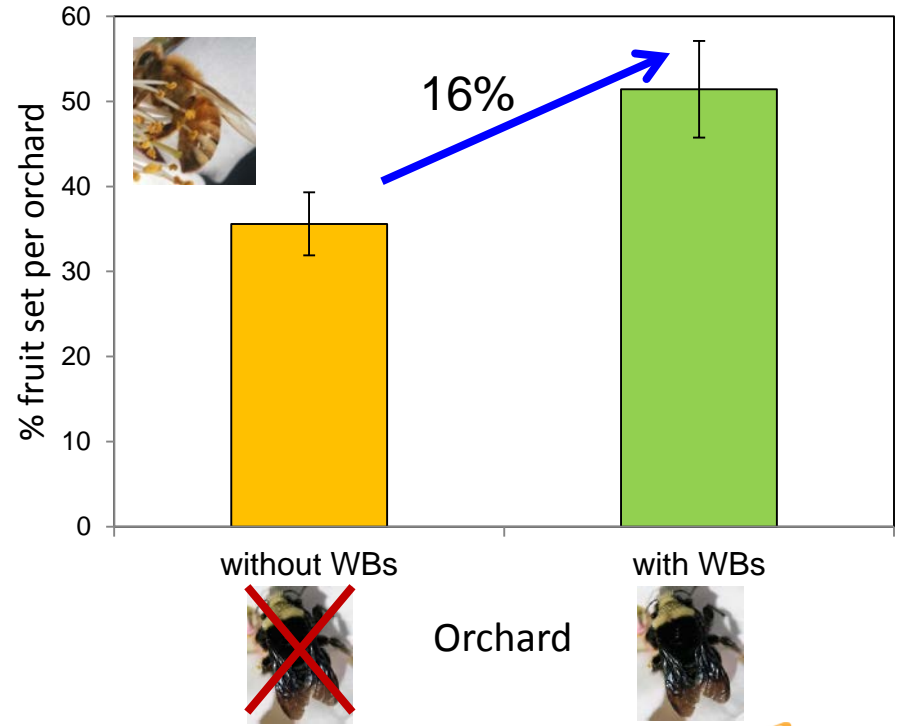
- Almond provides an abundant pollen resource – based on trapping
- Multi-floral diets benefit colonies
- Other bee species benefit from additional forage because they remain post almond bloom

Potential benefits of integrating wild bees - Pollination Synergy

Single visit pollination by honey bees



Single visit fruit set by honey bees



Fruit set data from 5 trees per orchard for 7 orchards with WBs and 7 without WBs

What we are researching - Project Timeline

2013-14 Test mixes different in-orchard locations

- Honeybee and native bee use of different plant species
- Timing of bee visits relative wildflower and to almond bloom
- Seasonal and within Day

2014-15 Functional impact on bees and pollination

- Examine impact of mix honey bee use, managed blue orchard bee performance (**Project ICP**)
- Potential for competition for bee visits between pollinator mix and orchard (**PAm/ OSU/ UCDAVIS**)

2015-2016

- **Extend testing of flower mixes to Northern growing region**
- **Quantify honey bee use of pollinator mixes**
- **Test potential competition for bee visits between flower mixes and orchard**

Mix compositions

- Almond wildflower mix



Great valley phacelia



California blue bell



Five spot



Baby blue eyes

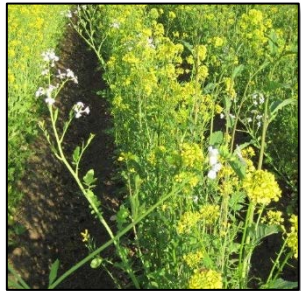


Chinese houses



California poppy

- Mustard Mix

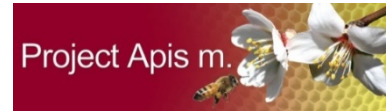


- Rapini mustard
- Braco White Mustard
- Nemfix Mustard
- Radish

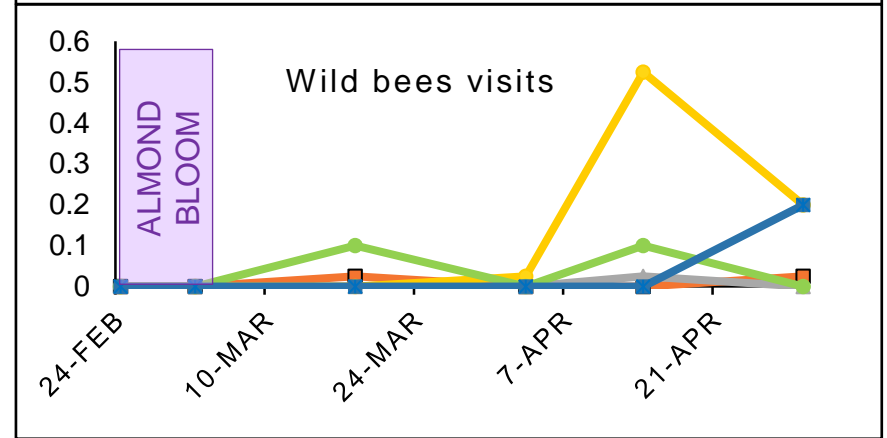
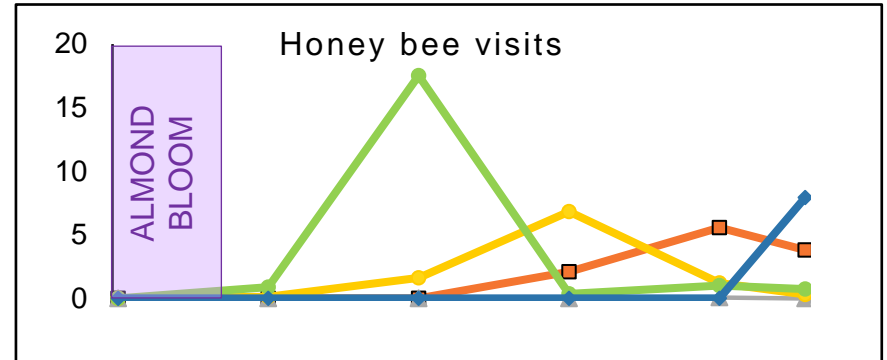
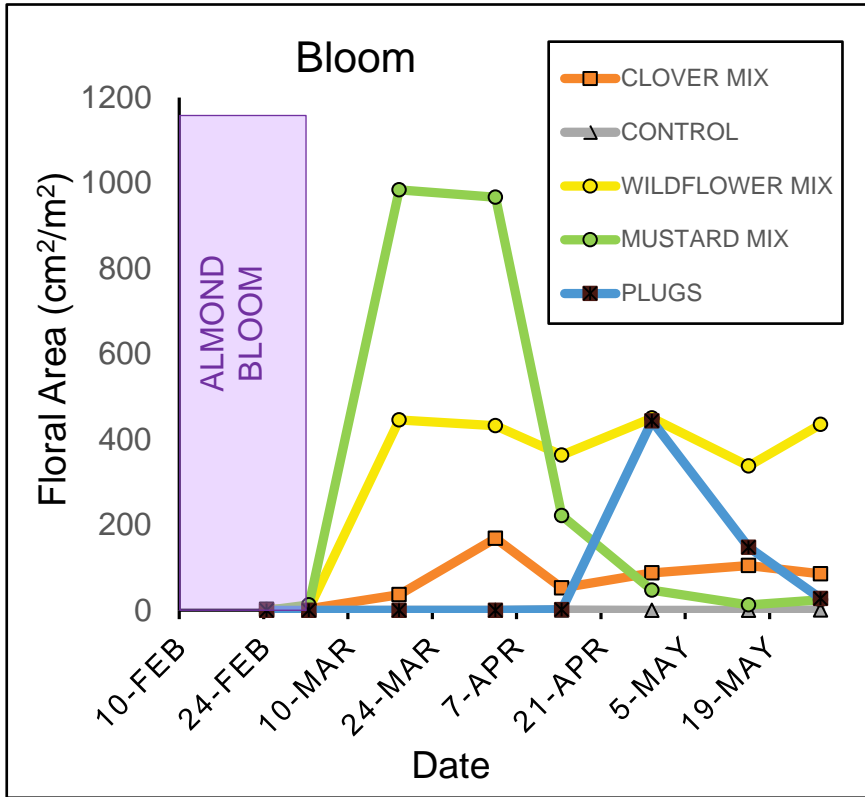
- Clover Mix



- Crimson Clover
- Hykon Rose Clover
- Nitro Persian Clover
- Frontier Balansa Clover
- Alyssum



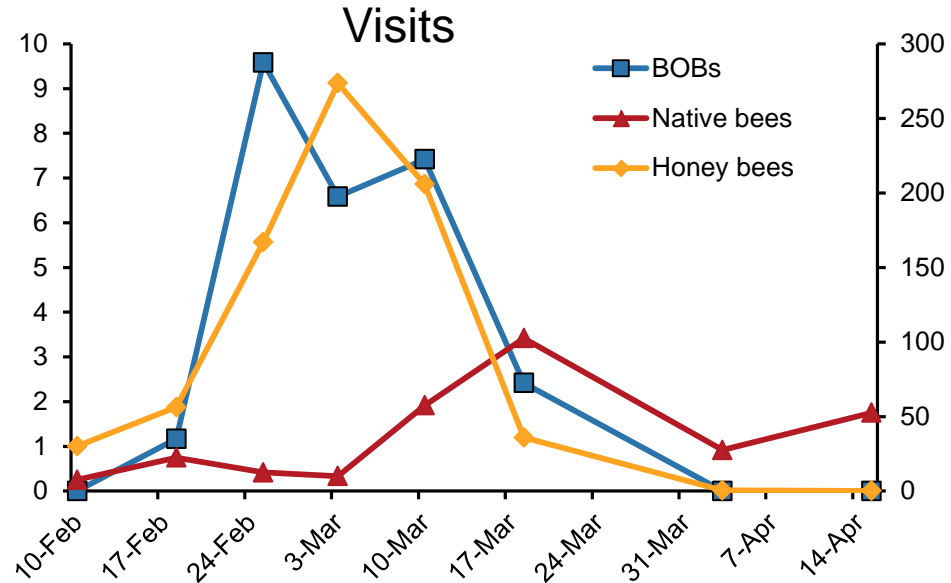
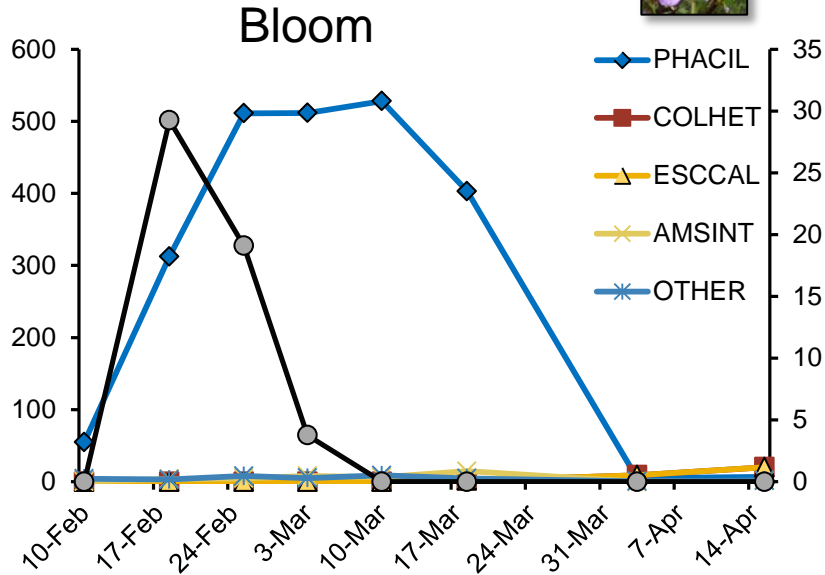
Bloom timing and visitation (2014)



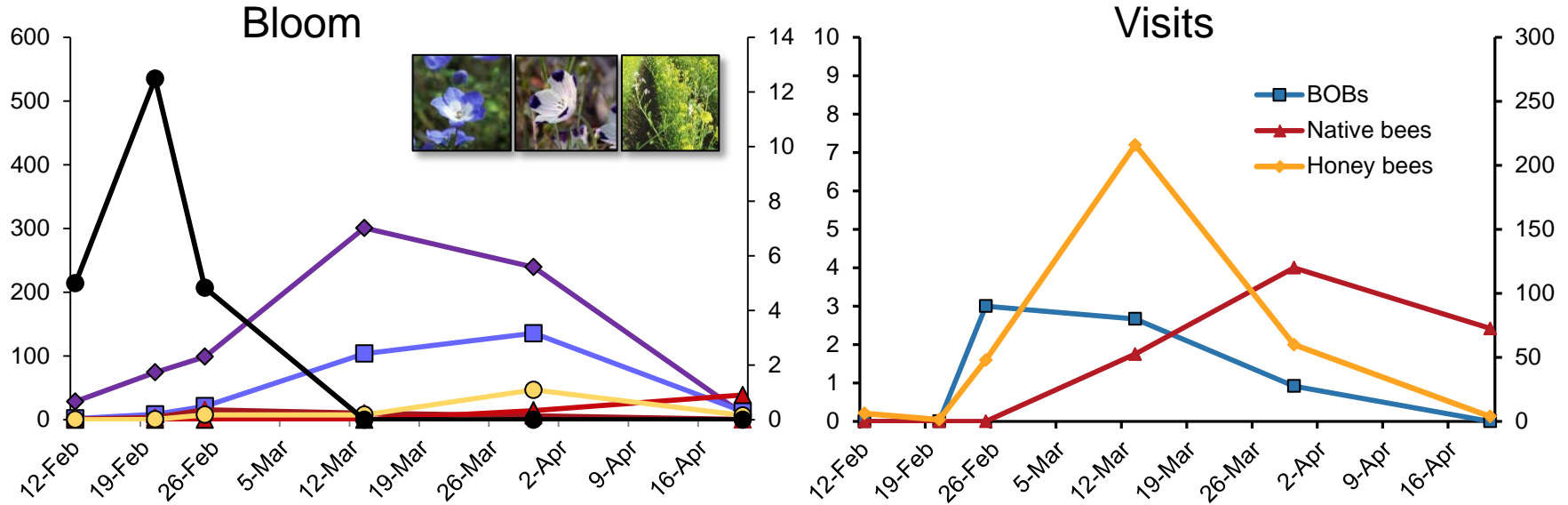
Forage plantings 2015



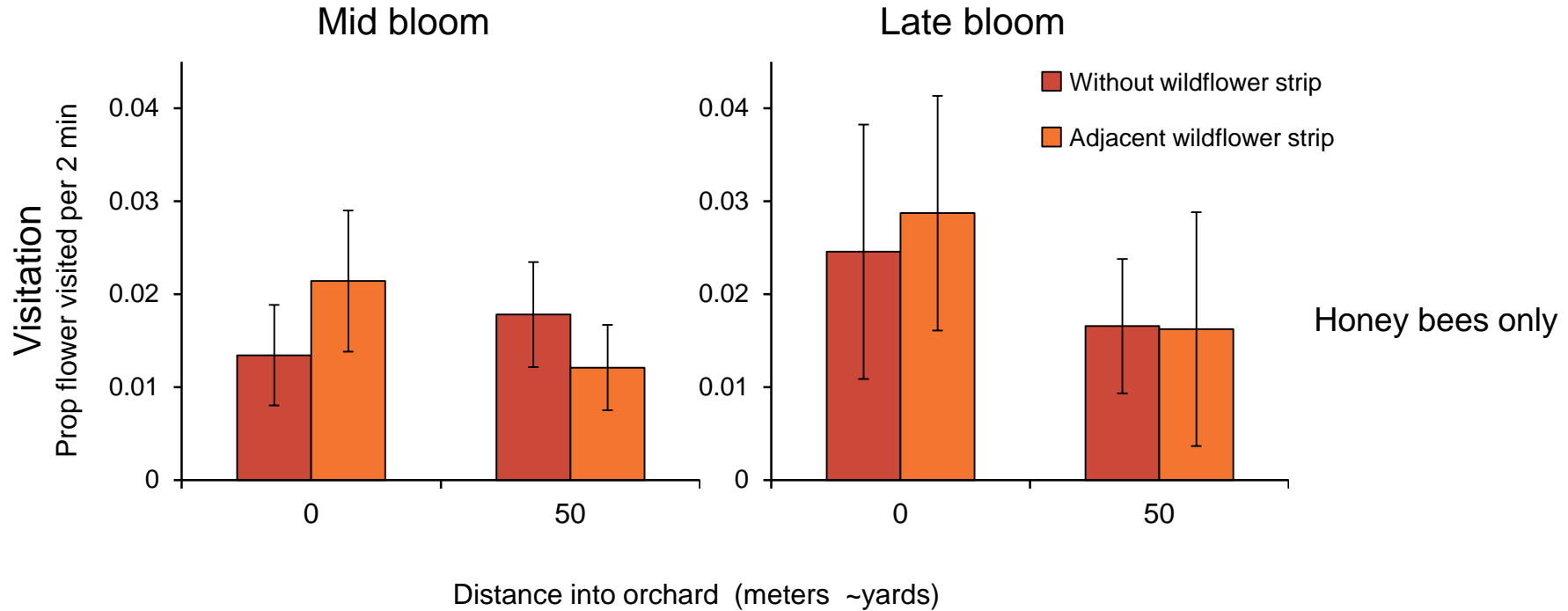
Bloom timing and visitation 2015 (Site 1)



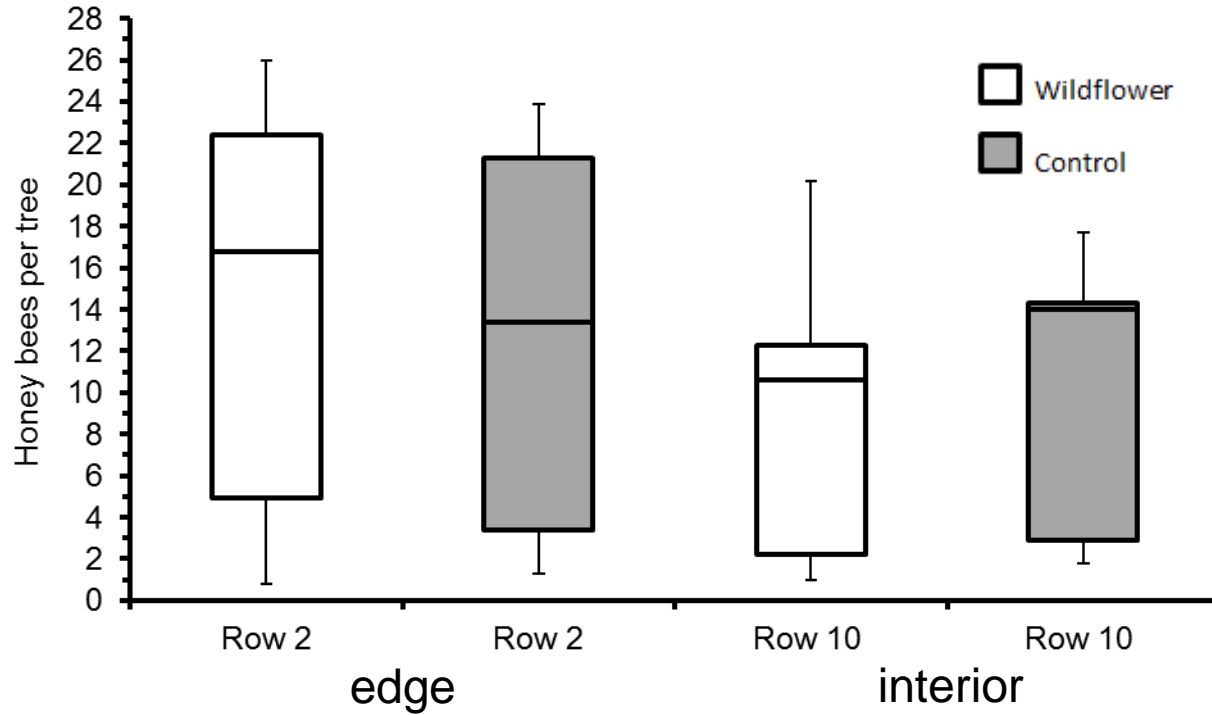
Bloom timing and visitation 2015 (Site 2)



Visitation to Almonds (potential competition of flower strips) 2014



Visitation to Almonds (potential competition of flower strips) 2015



Northern sites- enhancing existing habitat



Summary

- **Mustard and wildflower** mixes provided the **most bloom** and wildflower flowering persisted longer after almond flowering
- **Mustard and wildflower mix attracted** the **most honeybees**
- **Wildflower** mix, then mustard **attracted** the **most wild bees**
- Mixes **did not** attract honey bees away from the orchard flowers





 **california**
almonds[®]
Almond Board of California



**Mike Silveira,
B&S Orchards**



Grower Experience and Perspectives on Cover Crops and Bee Forage

Mike Silveira, B&S Orchards











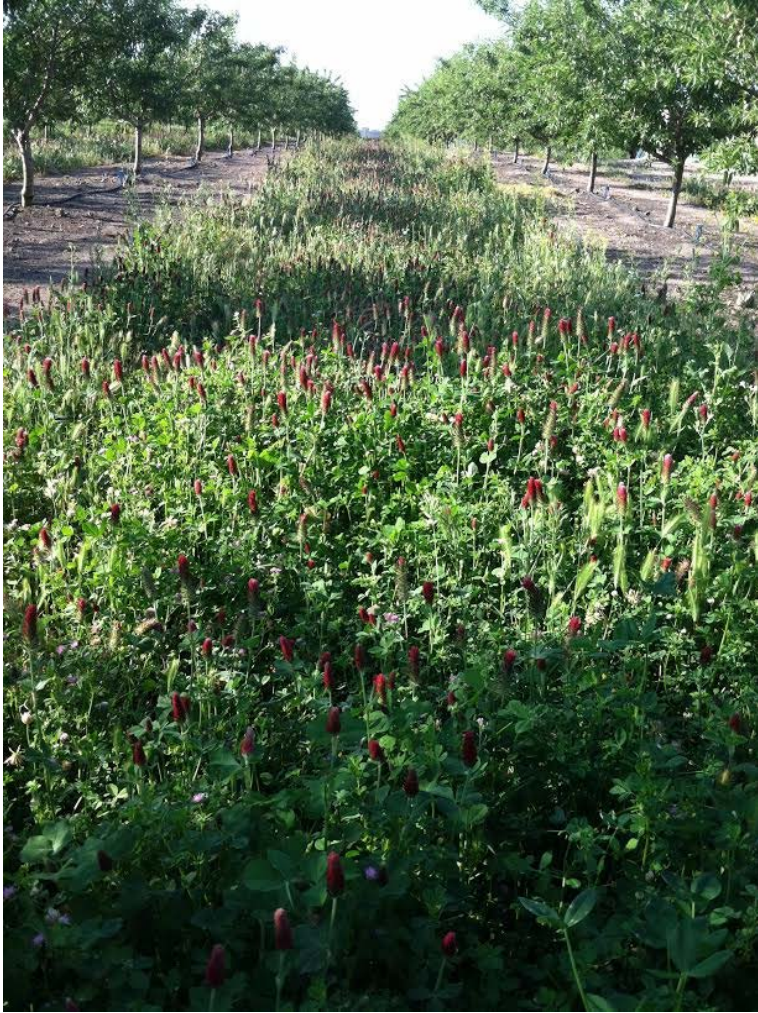






















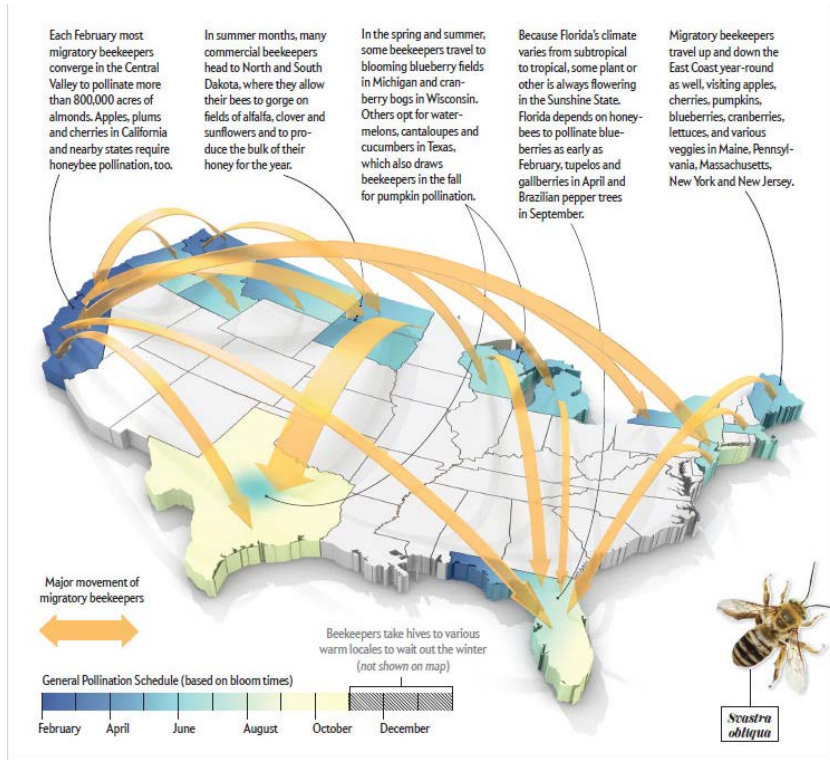


**Danielle Veenstra,
Almond Board**



Honey Bee Best Management Practices for California Almonds

Why should all pollination stakeholders care?



The Pollination Partnership

- Almonds need honey bees and honey bees benefit from almonds
- Bees are a valuable resource and almond production input
- The time bees spend in almonds impacts hive health throughout the year until they return the next season

Source: *Scientific American*, September 2013

Media + Public Perception

What a difference a year makes!

2014



Pollinator Stewardship Council

info@pollinatorstewardship.org

80,000+ beehives damaged or dead; Beekeepers Meet With EPA

April 3, 2014 By Michele Colopy

The last two weeks the Pollinator Stewardship Council has received reports of bee kills at the end of the almond bloom. A meeting with EPA was held by Pollinator Stewardship

Mother Jones

POLITICS

ENVIRONMENT

CULTURE

PHOTO ESSAYS

Are Your Delicious, Healthy Almonds Killing Bees?

—By Tom Philpott | Tue Apr. 29, 2014 5:00 AM EDT

News.Mic



No, Your Almond Milk Obsession Is Not Killing All the Bees

By Tove Danovich November 19, 2014

LIKE MIC ON FACEBOOK:

2015

Capital Press
The West's Ag Website

Home » Ag Sectors » Orchards, Nuts & Vines

Hives appear OK after quick, robust almond bloom

Tim Hearden Published: February 24, 2015 2:29PM
Capital Press

Western FARM PRESS
TIMELY RELIABLE INFORMATION FOR WESTERN AGRICULTURE

FARM PRESS BLOG

Save the almonds if you want to protect honey bees

by Todd Fitchette in Farm Press Blog

Apr 28, 2015

- Almond blossoms are said to be a complete food source for honey bees

THE SACRAMENTO BEE

EDITORIALS MARCH 21, 2015

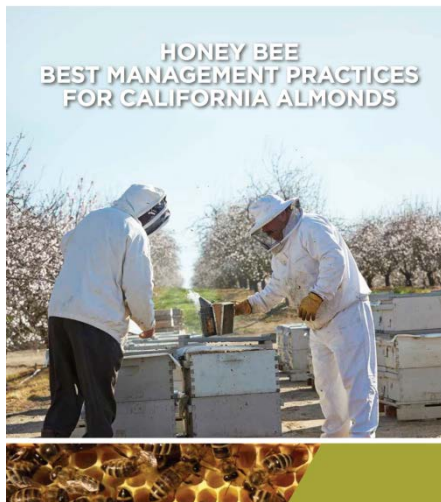
Bees need allies beyond Big Almond

HIGHLIGHTS

California's booming almond industry is one of the few bright spots for the struggling bee populations. But everyone needs to pitch in for bee colonies to survive.

Honey Bee BMP Resources

“Honey Bee Best Management Practices for California Almonds” Comprehensive Guide



General/Decision Maker Quick Guide

HONEY BEE BEST MANAGEMENT PRACTICES QUICK GUIDE FOR ALMONDS

All parties involved in honey bee pollination of California Almonds and/or applying pesticides should follow these precautions to ensure both honey bee hive health and the best possible pollination of the almond crop:

- 1. Communication should occur between all pollination stakeholders about pest control decisions.** These stakeholders, as outlined in the “Honey Bee BMP Communication Chain for California Almonds” on the reverse, can include beekeeper, bee broker, county agricultural commissioner, grower (owner/lessee), farm manager, pest control adviser (PCA) and pesticide applicator.
- 2. Agreements should include a pesticide plan that outlines which pest control materials may be used.** Grower and beekeeper should agree on which products may be applied if a treatment is deemed necessary. If deemed necessary, growers should give beekeepers 48-hour notice before treatment.
- 3. If applying pesticides, contact your local county agricultural commissioner** as specified in “Honey Bee BMP Communication Chain for California Almonds” on the reverse to give advance notification to beekeepers with nearby managed hives.
- 4. Avoid applying insecticides during almond bloom** until more is known, particularly about their impact on bee brood (young developing bees in the hive). If treatment is necessary, only apply fungicides and avoid tank-mixing insecticides with fungicides.
- 5. Any fungicide application deemed necessary during bloom should occur in the late afternoon or evening, when bees and pollen are not present.** This timing avoids contaminating pollen with spray materials.
- 6. Provide clean water for the bees to drink.** This will ensure that they spend more time pollinating the crop than searching for water. Either cover or remove water sources before a pest control treatment, or empty and refill water after a treatment is made. Check water levels throughout bloom and refresh as necessary.
- 7. Do not directly spray hives with any pesticide spray application.** Ensure that the spray-rig driver turns off nozzles when near hives. Spray applications that come in contact with bee hives could adversely affect bee health and the pollination of the crop.
- 8. Do not hit flying bees with any spray application materials.** Bees that come in contact with agricultural sprays will not be able to fly because of the weight of spray droplets on their wings.
- 9. Report suspected pesticide-related bee incidents** to the county agricultural commissioner’s office. Bee health concerns cannot be addressed without the data from these incidents. See “Honey Bee BMP Communication Chain for California Almonds” on the reverse for reporting detail.
- 10. Beekeeper and grower should agree on hive removal timing.** The University of California recommends bee removal when 90% of the flowers on the latest blooming variety are at petal fall. Past this point, no pollination is taking place, and bees that forage outside the orchard (up to 4 miles) seeking alternate food sources and water will have a higher risk of coming in contact with insecticide-treated crops.



Almond Board of California
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A digital version of this publication is available at Almonds.com/BeeBMPs
Also available:
Honey Bee Best Management Practices for California Almonds
Applicator/Driver Honey Bee Best Management Practices Quick Guide for Almonds

Applicator/Driver Quick Guide

APPLICATOR/DRIVER HONEY BEE BEST MANAGEMENT PRACTICES QUICK GUIDE FOR ALMONDS

Pesticide applicators should follow these precautions to ensure both honey bee hive health and the best possible pollination of the California Almond crop:

- 1. Read labels carefully and follow directions.** Do not use pesticides at bloom with label cautions that read “highly toxic to bees,” “toxic to bees,” “residual times” or “extended residual toxicity.”
- 2. Before applying pesticides at any time of year, contact the county agricultural commissioner to notify beekeepers with nearby managed hives.** This is mandatory for pesticide products with “toxic to bees” label statements and recommended for all other applications, particularly during almond bloom.
- 3. Water should either be covered or removed before a pest control treatment is made, or emptied and refilled after the treatment is made.** Providing clean water for bees to drink will ensure that they spend more time pollinating the crop than searching for water.
- 4. Do not directly spray hives with any pesticide spray application.** Spray-rig driver should turn off nozzles when near hives for all materials applied. Spray applications that come in contact with bee hives could adversely affect bee health and the pollination of the crop.
- 5. Do not hit flying bees with spray applications.** Bees that come in contact with agricultural sprays will not be able to fly because of the weight of spray droplets on their wings.
- 6. Report suspected pesticide-related bee incidents** to the grower, beekeeper and county agricultural commissioner. Bee health concerns cannot be addressed without the data from these incidents.

*When a pesticide to be applied bears “toxic to bees” statements on its label, beekeepers with hives within 1 mile of the application must be notified if they have requested notification by the applicator at least 48 hours before the planned application.

A digital version of this publication is available at Almonds.com/BeeBMPs

Also available:
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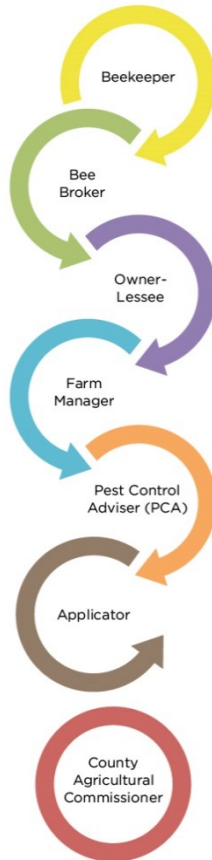
Available downstairs at ABC Booth or online at Almonds.com/BeeBMPs

HONEY BEE BMP COMMUNICATION CHAIN

- Engage in agreements with growers.
- Register hives with county agricultural commissioner by Jan. 1 each year or upon arrival in California.
- Request optional notification from county agricultural commissioner each year upon registration and with any hive movement.
- Immediately report any suspected pesticide-related bee incidents to owner-lessee/county agricultural commissioner at almond bloom and throughout the year.

- Communicate details and specifications of pesticide application agreement to the PCA and applicator.
- Follow the *Honey Bee Best Management Practices Quick Guide for Almonds* and, if applying pesticides, follow the *Applicator/Driver Honey Bee Best Management Practices Quick Guide for Almonds*.
- If applying pesticides, contact local county agricultural commissioner to notify beekeepers with nearby managed hives before making applications any time of year. This is mandatory for "toxic to bees" label statements* and recommended for other applications, particularly during almond bloom.
- Immediately report suspected pesticide-related bee incidents to beekeeper/county agricultural commissioner at almond bloom and throughout the year.

- Follow the *Applicator/Driver Honey Bee Best Management Practices Quick Guide for Almonds* and relay messages to the spray-rig driver.
- Before applying pesticides, contact local county agricultural commissioner to notify beekeepers with nearby managed hives before making applications any time of year. This is mandatory for "toxic to bees" label statements* and recommended for other applications, particularly during bloom.
- Immediately report suspected pesticide-related bee incidents to farm manager/owner-lessee/beekeeper/county agricultural commissioner.



- Engage in agreements with beekeepers/bee brokers.
- Communicate details and specifications of agreements to stakeholders down the chain (farm manager, PCA, applicator).
- Follow the *Honey Bee Best Management Practices Quick Guide for Almonds* and, if applying pesticides, follow the *Applicator/Driver Honey Bee Best Management Practices Quick Guide for Almonds*.
- If applying pesticides, contact local county agricultural commissioner to notify beekeepers with nearby managed hives before making applications any time of year. This is mandatory for "toxic to bees" label statements* and recommended for other applications, particularly during almond bloom.
- Immediately report any suspected pesticide-related bee incidents to beekeeper/county agricultural commissioner at almond bloom and throughout the year.

- Communicate details and specifications of pesticide application agreement to applicator.
- Follow the *Honey Bee Best Management Practices Quick Guide for Almonds*.
- Immediately report suspected pesticide-related bee incidents to grower/beekeeper/county agricultural commissioner at almond bloom and throughout the year.

- Collect and map locations of managed bees throughout the county based on information provided by registered beekeepers.
- Provide pesticide applicators the contact information for beekeepers with hives within a 1-mile radius of the application location.
- Investigate reports of suspected pesticide-related bee incidents.

Key BMP: Communication should occur between all pollination stakeholders about pest control decisions

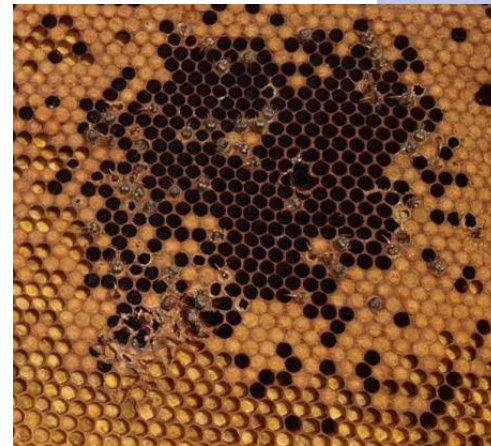
- Agreements/contracts should include a pesticide plan that outlines which pest control materials may be used.
- If treatment is deemed necessary, growers/PCAs/applicators should contact their beekeepers as well as contact County AG Commissioners so that beekeepers with near by managed hives are notified 48 hours in advance.
- As well, beekeepers should register their hives with County Agricultural Commissioner offices and request notifications for pesticide applications.
- Report suspected pesticide related incidences to County AG Commissioners. Bee health concerns cannot be addressed without data from potential incidents.



Key *BMP*: Avoid applying insecticides during bloom

- Avoid applying insecticides at bloom until more is known, particularly about their impact on bee brood (immature bees) and avoid tank mixing insecticides with fungicides.
 - Bee losses have occurred as a result of tank mixing insecticides with bloom time fungicides.
 - The term ‘insecticide’ includes insect growth regulators, also known as IGRs.
 - Currently most bee label warnings are only based on acute adult toxicity.
- There are alternative IPM insecticide timings.
 - See <http://www.ipm.ucdavis.edu/> > Agricultural Pests > Almonds

*Impact on
immature
bees*



Newly emerged, wingless bees pulled from the combs by other bees, and empty cells of brood that failed in their attempts to emerge as adults.

Key *BMP*: Spray fungicides when bees and pollen are not present

- Any fungicide application deemed necessary during bloom should occur in the late afternoon or evening, when bees and pollen are not present.
 - Avoids contaminating pollen with spray materials
 - But, don't spray so late that fungicides do not have time to dry before bees begin foraging
 - Spraying while bees are foraging can degrade floral scent chemicals that the bees “home in on”
- In general, spray applications should not directly hit hives or flying bees.





Overall Objective:

Ensure that almonds continue to be a good and safe place for bees





Bob Curtis, Almond Board





**Brittney Goodrich,
UC Davis**



Almond Pollination Contract Survey

Brittney Goodrich and Rachael Goodhue

Agricultural and Resource Economics, UC Davis



Almond Pollination Contract Survey

2015 Almond Contract Survey

As many of you know, a lack of industry-wide data exists on the nature of pollination agreements. We hope that through this survey we will be able to provide the Almond Board with this much-needed information, as well as information on how to make pollination agreements effective in eliciting desired colony strength outcomes.

The purpose of this survey is to gather information on how growers use pollination contracts, the effectiveness of contract provisions, and the effectiveness of contract types chosen. This information will be used to help the Almond Board and researchers in the Agricultural and Resource Economics Department at the University of California, Davis.

In the survey, you will be asked questions about the nature of pollination agreements, the effectiveness of contract provisions, and the effectiveness of contract types chosen. This information will be collected that we will not be collecting any contact information.

The resulting analysis may be shared with growers, researchers, or through outreach publications, or through presentations. If you decide you no longer want to participate, you can opt out at any time. We cannot collect any identifying information.

Each of you have been handed a Turning Technologies ResponseCard® clicker in which you can use to provide us with your responses. Participation in this survey is completely voluntary. If you decide you no longer want to participate or if you wish to opt out at any time, you can do so at any time. We cannot collect any identifying information.

By using your clicker to respond, you are consenting to participate in this study as previously discussed. There is no cost to you for participating.

Contact information for the researchers conducting the survey is provided below.

Thank you for your participation!

Researcher Contact Information:

PI Dr. Rachael Goodline
Phone: (530) 754-7812
E-mail: goodline@primal.ucdavis.edu

Mark Dr. Rachael Goodline
Dept. of Agricultural and Resource Economics
University of California, Davis
Davis, CA 95616-5270

Ph.D. Candidate: Brittany Goodrich
Phone: (415)-310-0350
E-mail: Goodrich@primal.ucdavis.edu

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As many of you know, a lack of industry-wide data exists on the nature of pollination agreements. We hope that through this survey we will be able to provide the Almond Board with this much-needed information, as well as information on how to make pollination agreements effective in eliciting desired colony strength outcomes.

provisions and types are used most frequently, how grower characteristics influence the contract provision and types chosen, and the effectiveness of contract types and provisions on delivered colony strength to almond orchards. This study is being conducted by researchers in the Agricultural and Resource Economics Department at the University of California, Davis.

Clicker Explanation



Answer Selection Buttons:

- Letters: A-J
- Numbers: 0-9



Channel receiver button:

Please do **not** press unless instructed to do so!



Question Button:
Cancels previously entered answers-please refrain from pressing!



Question Types

1. Multiple Choice-Select **ONE** Answer
 - Answers denoted A-J
 - Last entry is recorded (Can change answer)
2. Multiple Choice-Select **MULTIPLE** Answers
 - Answers denoted A-J
 - All entries are recorded
3. Numerical Entry
 - Type in answers using numbers 0-9



Answer Submission

- Polling must be opened for each question:
 - Polling open when there is a countdown in the bottom right corner
- Answer submitted:
 - Blinks GREEN (one long or two short)
- Submission Problems:
 - Blinks red many times: Remote is not connected to receiver.
 - Blinks orange/amber once: Polling not yet opened or invalid answer selected
- If you believe your clicker has stopped working at any point please raise your hand for assistance.



Thank you for participating in the survey!

Test Question: Do you grow almonds?

Select **one** answer:

- A. Yes
- B. No

If your light blinks:

- **Green** twice: Your answer has been submitted and you are ready to take the survey!

- **Red** many times: Your remote is not connected to the receiver

Connection Instructions:

- Press: “**Channel**” then “**4**” then “**1**” then “**Channel**” to connect
- Raise your hand if you cannot connect and someone will assist you!

Section I: 2015 Contract Questions



1. What form of pollination agreement did you use during the 2015 pollination season?

Select **one** answer:

- A. Written Contract
- B. Oral Agreement/Contract
- C. Both written and oral contracts depending on specific beekeeper/broker
- D. None of the above.

2. In the 2015 pollination season, how many beekeepers did you rent hives from directly?

Select **one** answer.

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5
- F. 6
- G. 7
- H. 8 or more
- I. 0 - I contract through an independent pollination broker
- J. 0 - I own hives to meet my pollination needs

3. In the 2015 pollination season how many beekeepers supplied hives to you through an independent pollination broker?

Select **one** answer.

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5
- F. 6
- G. 7
- H. 8 or more
- I. Unknown
- J. 0

4. Of all of the beekeepers/brokers you used during the 2015 pollination season, what is the length of the longest standing contractual relationship you've had with any of them?

Select **one** answer.

- A. 2015 pollination season only
- B. 2-3 pollination seasons
- C. 4-6 pollination seasons
- D. 7-10 pollination seasons
- E. 11 or more pollination seasons
- F. Not applicable

5. Of all of your 2015 pollination agreements, what was the average frame count stipulated in the agreement that covered the **largest** amount of your almond acreage?

Select **one** answer.

- A. None included in agreement
- B. 5 frames per hive or less
- C. 6 frames per hive
- D. 7 frames per hive
- E. 8 frames per hive
- F. 9 frames per hive
- G. 10 or more frames per hive
- H. Unknown
- I. Not applicable

6. Of all of your 2015 pollination agreements, what was the price per hive stipulated in the agreement that covered the **largest** amount of your almond acreage?

Please type in the fee per hive rounded to the nearest dollar.
(For example if your fee was \$180/hive press “1” then “8” then “0” on the keypad.)

7. On average how many hives did you stock per acre on mature almond orchards in the 2015 pollination season?

Select **one** answer.

- A. 0-1 hive per acre
- B. 1.1-1.5 hives per acre
- C. 1.6-2 hives per acre
- D. 2.1-2.5 hives per acre
- E. More than 2.5 hives per acre
- F. Unknown

8. Were there clauses related to the following issues in any of your 2015 pollination season agreements?

Select ALL that apply (**Multiple answers allowed**):

- A. Pesticide application
- B. Hive Theft
- C. Colony Collapse Disorder
- D. Late placement of hives
- E. Bloom percent for approximate Move-in and Move-out dates
- F. Beekeeper access to hives after placement
- G. Inspection specifics (ex: Inspecting party, percentage inspected, etc.)
- H. Unpaid balances
- I. Minimum number of colonies per drop
- J. None of the above

9. Please check **ALL** of the actions you would have taken **according to your 2015 pollination agreements** *if* a beekeeper's average colony strength was found to be **significantly below** the agreed upon average in one of your orchards.

Select ALL that apply (**Multiple answers allowed**):

- A. No action would have been taken.
- B. I would have communicated with the beekeeper to bring more hives to compensate.
- C. I would have penalized the beekeeper in form of a per frame deduction for the number of frames below the agreed upon average.
- D. I would have penalized the beekeeper in form of a fixed or percent of total amount paid for pollination.
- E. I would have removed the beekeeper's hives and found others as replacement.
- F. I would have planned to not contract with that beekeeper again.
- G. I would have imposed another penalty.
- H. Not applicable.

Section II: 2015 Outcome Questions



10. In the 2015 pollination season, which best describes the strength of the **majority** of initially delivered colonies to your almond orchards?

Select **one** answer:

- A. Colonies delivered exceeded the agreed upon average frame count.
- B. Colonies delivered were approximately at the agreed upon average frame count.
- C. Colonies delivered were significantly below the agreed upon average frame count.
- D. I can't remember.
- E. I didn't monitor hive strength.
- F. Not applicable

11. Select **ALL** of the actions you took against **any** of your beekeepers/brokers due to low strength colonies provided during the 2015 pollination season:

Select ALL that apply (**Multiple answers allowed**):

- A. No action necessary. I received high strength colonies.
- B. No action taken even though I received low strength colonies.
- C. I communicated with a beekeeper/broker to bring more hives to compensate.
- D. I penalized a beekeeper/broker in form of a per frame deduction for the number of frames below the agreed upon average.
- E. I penalized a beekeeper/broker in form of a fixed or percent of total amount paid for pollination.
- F. I removed a beekeeper's/broker's hives and found others as replacement.
- G. I will not contract with a beekeeper/broker again.
- H. I imposed another penalty.
- I. Not applicable.

12. In the 2015 pollination season, did you pay per-frame bonuses to beekeepers that delivered colonies with higher than the contract stipulated average frame count?

Select **one** answer.

- A. My contracts did not include per frame bonuses of this type.
- B. I paid a per-frame bonus to less than half of my beekeepers.
- C. I paid a per-frame bonus to at least half of my beekeepers.
- D. I had contracts that included the per-frame bonus, but I did not pay it to any beekeepers.

Section III: General Contract Questions



13. How often do you have a third party inspector perform colony strength inspections?

Select **one** answer.

- A. Every pollination season
- B. Only in pollination seasons when colonies seem to be of low strength
- C. Never (*ex: Broker monitors hive strength, Trust beekeeper so inspection unnecessary, I inspect myself, etc.*)

14. Of the following, which would you consider is the **most important** factor for selecting a beekeeper to provide hives for your almond orchards?

Select **one** answer.

- A. Prior relationship with the beekeeper
- B. Beekeeper summer location (*ex: California, Texas, North Dakota, or combination of different locations*)
- C. Beekeeper specialization (*Queen breeding/Honey Production/Pollination Services*)
- D. Beekeeper operation size
- E. Colony strength guarantees made by beekeeper
- F. I select beekeepers solely by the lowest fee offered
- G. Other
- H. Not applicable (*ex: I contract through a broker and don't choose my beekeepers.*)

15. What is the most important factor influencing your per acre hive stocking density?

Select **one** answer.

- A. Crop potential (*ex: Orchard age, canopy, variety, etc.*)
- B. Average colony strength stipulated in pollination agreement
- C. Crop insurance requirements
- D. Price per hive relative to almond prices
- E. Rule of thumb: 2 hives/acre
- F. Other

Section IV: 2015 Background Information



16. During the 2015 pollination season, where was the majority of your bearing almond acreage?

Select **one** answer.

- A. Northern Almond Producing Counties: Butte, Colusa, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo and Yuba counties
- B. Central Almond Producing Counties: Merced, San Joaquin and Stanislaus counties
- C. Southern Almond Producing Counties: Fresno, Kern, Kings, Madera and Tulare counties
- D. Other county.

17. How many bearing almond acres did you operate in 2015?

Please type in the number of almond bearing acres that you operated in 2015.
(For example if you operated 24 acres of almonds, press “2” then “4” on the keypad.)

18. How long have you been growing almonds?

Please type in the number of years you have been growing almonds.
(For example if you have been growing almonds for 10 years, press “1” then “0” on the keypad.)

19. In 2015, what was the average yield per acre across all of your almond orchards?

Please type in your average yield in pounds per acre.

(For example if you had an average yield of 1800 lbs/acre, press “1” then “8” then “0” then “0” on the keypad.)

Thank you for completing the survey!

- Some preliminary results will be posted tomorrow in the Poster Session Area (#4 on map): Almond Pollination Contracting
- Questions or Comments?
 - Contact information:
 - Brittney Goodrich
 - Phone: (415)-310-0350
 - E-mail: goodrich@primal.ucdavis.edu
 - Or find me in the Poster Session Area (#4 on map) for the remainder of the conference.
- Please turn in your clicker!



A close-up photograph of a glass of almond milk on the left, which is out of focus, and a glass jar filled with almonds on the right, which is in sharp focus. The background is a warm, golden-yellow color.

Questions?

Closing Thoughts

- **Continuing Education Credits** are available for many of today's symposiums. To receive CCA credit, you must sign in before and after each individual symposium at the back of the room.
- For **DPR credits**, simply sign in and out of the CEU kiosk at the beginning and end of the day.

