

HONEY BEE BEST MANAGEMENT PRACTICES FOR CALIFORNIA ALMONDS



WHY SHOULD GROWERS AND OTHERS INVOLVED IN ALMOND POLLINATION CARE?

Honey bees are essential for successful pollination of almonds and the long-term health of the California Almond industry. Why should almond growers — and all parties involved in almond pollination — care about healthy, strong bees? First, bees are a valuable resource and almond production input, and the time they spend in almonds impacts hive health throughout the year, from the time they leave almond orchards until they return the next season. Second, although almonds are only one of more than 90 foods that rely on pollination by bees, because of its size and number of bees needed, the California Almond industry is increasingly being watched by the public on matters related to the health and stability of honey bee populations.

Of particular concern at this time is how to manage the use of pest control materials in ways that minimize their possible impact on honey bees. It is important that growers of all crops implement best management practices to support bee health, and for those whose crops rely on honey bee pollination, to consider honey bee health not only during the pollination season, but during the entire year.

The following pages outline the management practices that research supported by the Almond Board of California, and others, have determined will promote the health of honey bees and protect them from environmental factors that could be detrimental in the almond orchard. While many of these practices are generally applicable across all crops, some are almond specific.

This document covers precautions to follow to protect honey bees during the almond pollination season. Four key precautions are:

1. Maintain clear communication among all parties involved, particularly on the specifics of pesticide application.
2. If it is necessary to spray the orchard, for instance with fungicides, do so in the late afternoon or evening.
3. Until more is known, avoid tank-mixing products during bloom.
4. Avoid applying insecticides during bloom until more is known about the effects on honey bees, particularly to young, developing bees in the hive. Fortunately, there are several insecticide application timing options other than bloom time treatments.

California Almond growers and others involved in the pollination process should follow these important best management practices to preserve the health of honey bees in California Almond orchards.



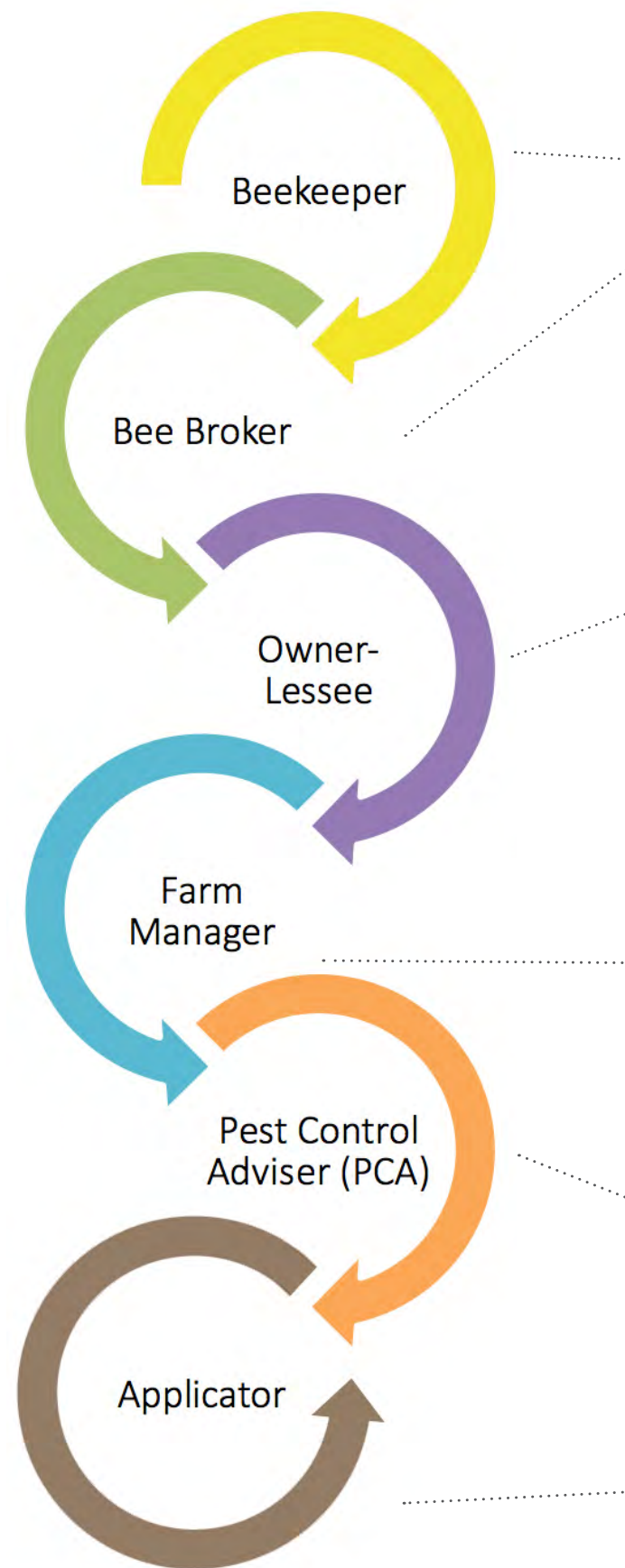


THE COMMUNICATION CHAIN

Establishing a clear chain of communication among all parties involved in pollination and pest management during almond bloom will help ensure that responsibilities are met and information is reported appropriately.

The parties can be simply a beekeeper and a grower, but depending on the scale and organization of the grower operation, can also involve a bee broker, owner-lessee, farm manager, pest control adviser (PCA) and pesticide applicator.

The California county agricultural commissioners are also a vital link in the communication chain. Each year, beekeepers in California are required to initially register their hive locations with county agricultural commissioners and should notify commissioners of subsequent movement to receive voluntary notifications for pesticide applications. This gives growers a resource to contact to determine if there are any honey bee hives within 1 mile of their location. This is important even outside the almond bloom period, particularly when applying insecticides. Even so, it is important to note that a 1-mile buffer will not protect honey bee colonies under all conditions, as bees will forage up to 4 miles to collect food and find water when resources are scarce.¹



¹Eckert, J.E. 1933. *The flight range of the honey-bee*. J. of Agri. Res. 47(8):257-285.

HONEY BEE BMP COMMUNICATION CHAIN FOR CALIFORNIA ALMONDS

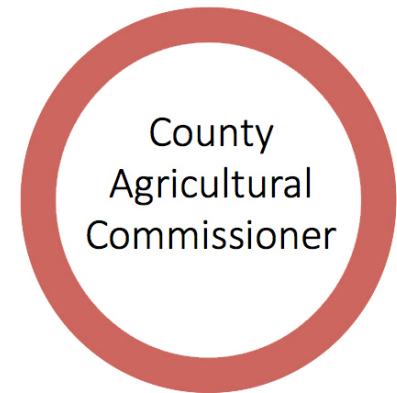
- Engage in agreements with growers.
- Register hives with county agricultural commissioner by Jan. 1 each year or upon arrival in California.
- Request optional notification from county agricultural commissioner each year upon registration and with any hive movement.
- Immediately report any suspected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

- 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 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.

- 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.

- 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.



- 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.

*When a pesticide to be applied bears “toxic to bees” label statements, 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.

GROWER-BEEKEEPER COMMUNICATION PRIOR TO ALMOND BLOOM

The first step toward a successful almond pollination season is communication to ensure expectations between the beekeeper and grower/owner are fully understood. Growers should contact beekeepers as early as possible before the pollination season to discuss their requirements. Growers who do not have an established relationship with a beekeeper can refer to the Pollination Directory on the Almond Board of California website Almonds.com/PollinationDirectory. This database includes both beekeepers and bee brokers.

Growers and their beekeepers should outline and mutually agree on expectations of each other to avoid misunderstandings. Communication on pesticide use during bloom, for instance, should be a fundamental consideration. This could mean outlining a pesticide plan that specifies which pest control materials might be used. Grower and beekeeper should agree on which products can be applied if a treatment is deemed necessary. During bloom, when applications are imminent, establish a line of communication throughout the chain of all parties involved in pollinating almonds and/or applying pesticides to orchards so they are informed in advance.

By registering with the county agricultural commissioner and providing the location of colonies, beekeepers can request an advance notice of applications of pesticides labeled as toxic to bees within a mile of the colonies.

Beyond pesticides, other elements that should be agreed upon prior to bloom are the responsibilities of the grower and the responsibilities of the beekeeper in these areas:

- The number of frames of honey bees, including an average and minimum frame count;
- Date and location of placement in orchard;
- Ambient temperature and time of day at inspection site in the field;
- Payment amount, terms, deposit, progress payment and final payment;
- Accessibility of colonies to beekeeper; and
- When bees are to be removed from the orchard.

A sample of an almond pollination agreement template can be accessed at ProjectApism.org under the BMP menu (For Almond Growers); this template can be customized to meet individual needs and requirements.



For successful pollination and safeguarding of honey bees, growers should contact beekeepers early and follow through with an agreement that outlines the expectations of each.

PREPARING FOR ARRIVAL

For pollination in mature almond orchards, it is common practice to place an average of two hives per acre having an average of eight frames of bees, with six-frame minimum hive strength.² There are a number of variables involved in any local situation, and pollination requirements will vary. Hives should be placed:

- Where they are accessible and convenient at all hours for servicing and removal;
- If possible, near flowering forage before bloom and after bloom;
- With eastern and southern exposures for hive openings to encourage honey bee flight;
- Away from areas prone to shade or flooding;
- For orchards of 40 acres or fewer, hives can be placed outside of the orchard;
- For orchards larger than 40 acres, hives should be placed at no more than quarter-mile intervals, which in larger acreages may be within orchards; and
- Research has shown that it is possible to place bees around the perimeter of orchard blocks of up to 70 acres if they are no more than a quarter-mile wide. However, to provide uniform bee activity in trees throughout the orchard, colonies should be clustered in greater numbers near the middle of the long sides of the orchard (Fig. 1).³



Fig. 1. Example distribution of honey bee colonies for orchards larger than 40 acres. The green box represents the orchard and the numbers outside the box represent the distribution and density of hives at the perimeter of the orchard. Note the concentration of colonies along the middle of the long sides of the orchard. (Diagram adapted from Almond Production Manual, University of California Division of Agriculture and Natural Resources; page 136, 22.7)



Hives should be placed near forage that is flowering before, during and after almond bloom, if possible, as an alternative source of food. (Photo courtesy Project Apis m.)



Hive placement depends on orchard size. Larger acreages may need to have hives placed within the orchard.

²Mueller, Shannon. 2012. "Colony Strength Evaluation." Presented at The Almond Conference.

³Thorp, Robbin. 1996. Bee Management for Pollination. Almond Production Manual, Publication 3364, University of California Division of Agriculture and Natural Resources. pp. 132–138.



Growers should provide a clear area for bee drop-off, and keep access roads free of obstructions and maintained at all times.

Choose locations that have appropriate buffers between pesticide-treated areas and colonies. Provide abundant, potable water, free from contamination, for bees to drink. This will ensure that more time is spent pollinating the crop than searching for water. Water should be checked and refilled throughout the time that the bees are in the orchard. Landings such as burlap or screens over containers make water accessible and prevent bee drowning. Either cover or remove water sources before a pest control treatment, or supply clean water after treatment is made.

Moving the hives into the orchard at about 10% bloom is recommended by the University of California.⁴ At this point, there is enough bloom to hold bees in the orchard so they don't seek blooms elsewhere. However, until blooms from at least one additional compatible variety are available, cross-pollination, and thus fertilization, will not take place.



Almond growers should provide a clear and convenient place for beekeepers for bee drop-off.



Provide potable water sources for bees with a burlap landing. (Photo by Gordon Wardell, Paramount Farming Company)



The University of California recommends moving hives into the orchard at about 10% bloom.

⁴Mussen, E. 2014. *When to leave almond orchards*. UC Apiaries newsletter, Mar./Apr. 2014.

ASSESSING HIVE STRENGTH AND QUALITY

Hives should be inspected as they arrive in the orchard, either by an objective third-party apiary inspector or by the beekeeper, who is observed by the grower. They should inspect for colony strength (see Preparing for Arrival, page 7), and for other parameters as agreed upon.

An inspection will find if the agreed-upon terms are being met. Typically, only a representative sample of hives will be inspected. Growers should notify the beekeeper of the inspection so they can assist in handling the hives.

Colony strength evaluations not only help ensure growers get what they pay for, inspections also help ensure that beekeepers are compensated for additional expenses in providing quality hives. Comprehensive guidelines for all parties can be found in the learning course “Honey Bees and Colony Strength Evaluation,” which can be accessed at class.ucanr.edu.

This online education and training course provides protocols for assessing the strength of honey bees and colonies, and can also help growers become better informed when renting hives from beekeepers and hiring apiary inspectors. The course covers basic bee biology and colony organization; different inspection procedures and standards; and how to recognize some parasites, diseases and other potential problems.

Growers can further monitor colony strength by walking orchards daily during bee flight hours to observe activity levels. Record hives that are weak or inactive, and report them to the beekeeper. This is also an opportunity to observe whether pollination is taking place. If the foraging bees are not collecting and carrying pollen on their legs, there is little to no pollination taking place.



Hives should be inspected by an apiary inspector or the beekeeper as soon as bees arrive in the orchard.



A hive inspection includes an evaluation of colony strength. (Photo courtesy Project Apis m.)



When walking orchards during bee flight hours, look for bees carrying pollen on their legs, which confirms that pollination is taking place. (Photo courtesy Project Apis m.)



PROTECTING HONEY BEES AT BLOOM

Despite efforts to protect honey bees from parasitic mites such as Varroa mite, loss of natural forage, diseases, and the possible effects of some pesticides, beekeepers are losing large numbers of colonies.⁵ Research into the causes of these losses and how to prevent them is ongoing.

Pesticides (and their methods of application) under investigation include usage within the hive for mite and disease control as well as usage on crops. Honey bees are vulnerable to many of the pesticides used to control insects, disease and weeds. California Almond growers must maintain a delicate balance between protecting their crops from disease, insects and weeds, while at the same time protecting honey bees from potentially harmful insecticides, fungicides and other pest control materials.

HONEY BEES AND INSECTICIDES

All parties involved in almond pollination and/or applying pesticides should follow the precaution of not applying insecticides during bloom. Bee losses appear to have occurred in almonds as a result of tank-mixing insecticides with bloom-time fungicides. While the losses could have other causes, there is a scientific basis for concern; this is based on field experience that is being substantiated with controlled studies.^{6,7} Currently, most bee label warnings are only based on adult acute toxicity studies; however, recent information indicates some may be harmful to young developing bees in the hive (bee brood). Until recently, the U.S. EPA has not required data for possible effects on bee brood. Foragers bring back pollen to the hive, which is fed to the bee brood. Insecticide residues have been detected in this pollen. The term 'insecticide' includes insect growth regulators, also known as IGRs.



Insecticide residues have been detected in pollen, including almond, brought back to the hive to feed bee brood. (Photo courtesy Project Apis m.)

⁵Spleen, A.M., E.J. Lengerich, K. Rennich, et al. 2013. Bee Informed Partnership. *A national survey of managed honey bee (2011–12) winter colony losses in the United States: results from the Bee Informed Partnership*. J. Apic. Res. 52(2):44–53.

⁶Mussen, Eric. 2013. *Problems with almond bloom sprays*. UC Apiaries newsletter, Jan./Feb. 2013.

⁷Johnson, R.M., E.G. Purcell. 2013. "Effect of 'Bee-Safe' Insecticides and Fungicides on Honey Bee Queen Development and Survival." Poster presented at 2nd International Conference on Pollinator Biology, Health and Policy, Aug. 14–17, 2013, Pennsylvania State University.

Furthermore, controlled studies⁷ are demonstrating that some insecticides are known to synergize with some fungicides, and when an insecticide and a fungicide are tank-mixed, the spray can be more toxic to bees than either chemical used alone. This synergy has not been documented under field conditions, but until more is known, avoid tank-mixing an insecticide with a fungicide during the almond pollination season.

It is important to note that tank mixing of a number of these insecticides and fungicides is not a label violation. The U.S. EPA and California Department of Pesticide Regulation are evaluating information with an eye toward including warnings on product labels. However, until more is known about the effect of insecticides on bee brood, for their protection, avoid applying any insecticide during almond bloom; instead, rely on other effective timing options outside of the bloom period, such as delayed dormancy or post bloom. The UC Statewide Integrated Pest Management Guidelines for almonds provide insecticide and timing options (see ipm.ucdavis.edu and choose Agricultural Pests, then Almond).

Delayed dormancy is the period from the resumption of growth after dormancy, indicated by bud swell, until green tip, which occurs about Feb. 1, depending on region, variety and weather. **Post bloom** begins after petal fall, typically late March, but also may vary according to region, variety and weather.

Before making insecticide applications during the delayed-dormant or post-bloom period, contact the county agricultural commissioner to determine if there are any bees within a mile, and if there are, notify the beekeeper of the impending spray.

Another valuable resource is “How to Reduce Bee Poisoning from Pesticides,” a Pacific Northwest Extension publication, PNW 591. A free downloadable version is available at Almonds.com/Honey-Bee-Protection (under Additional Resources). It is important to note that toxicity ratings in this publication focus on acute toxicity to adult foraging bees, and additional risks to bee brood in the hive may occur and are not reflected in the toxicity category information given in this booklet.



“How to Reduce Bee Poisoning from Pesticides,” PNW 591, is a valuable resource available in downloadable format at Almonds.com/Honey-Bee-Protection under Additional Resources.



HONEY BEES AND FUNGICIDES

All parties involved in almond pollination and/or applying pesticides should follow the precaution of applying any fungicide deemed necessary during bloom in the late afternoon or evening, when bees and pollen are not present.

Disease protection during almond bloom is important, and fungicide applications are needed in many situations. However, fungicides may negatively impact pollination.

It has also been shown that some fungicides, while fairly safe for use around adult honey bees, may contribute to brood losses in larval and pupal stages.⁸

For some time, the University of California has recommended avoiding the use of fungicides containing iprodione, captan and/or ziram during almond bloom. Research performed in response to field observations of brood effects has confirmed that these fungicides can affect brood development. These compounds provide effective fungal control outside of bloom.

In addition, as noted previously, controlled studies⁷ have demonstrated that some insecticides are known to synergize with some fungicides, and when an insecticide and a fungicide are tank-mixed, the spray can be more toxic to bees than either chemical used alone. This synergy has not been documented under field conditions, but until more is known, avoid tank-mixing an insecticide with a fungicide during the almond pollination season.



To protect honey bees from fungicides, apply in the late afternoon or evening, when bees and pollen are not present.

⁸Mussen, E.C., J.E. Lopez, C.Y.S. Peng. 2004. *Effects of selected fungicides on growth and development of larval honey bees, Apis mellifera L.* Environ. Entomol. 33(5):1151-1154.

USE IPM STRATEGIES TO MINIMIZE AGRICULTURAL SPRAYS

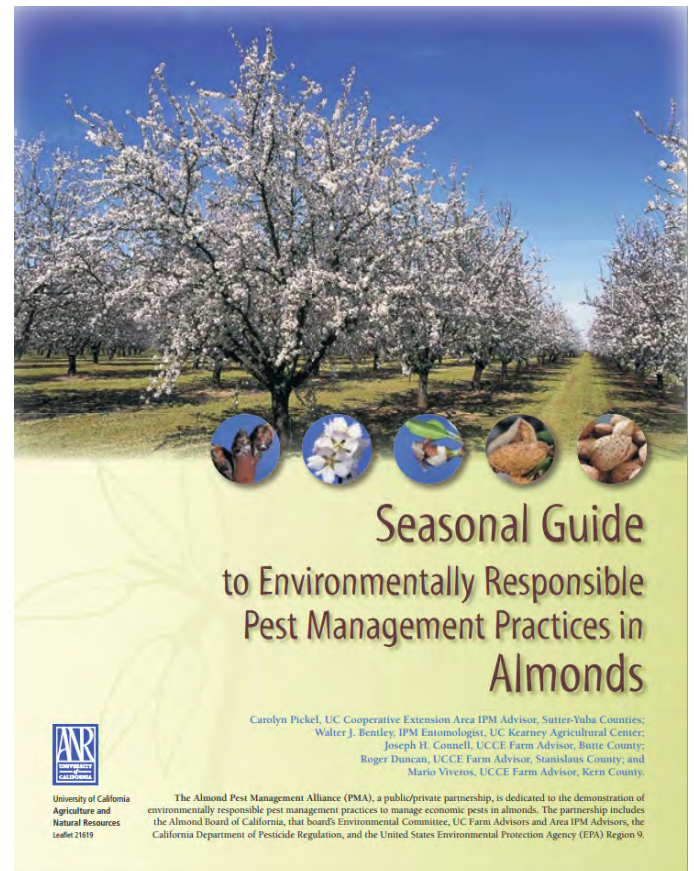
Following a monitoring-based integrated pest management (IPM) program in every season enhances pest control, protects water and air quality, and minimizes exposure of bees and pollen to pesticide sprays. Sources of information on developing and conducting an IPM program in almonds include:

- Seasonal Guide to Environmentally Responsible Pest Management Practices in Almonds, University of California Agriculture and Natural Resources Leaflet 21619. This is available at Almonds.com/IPM under Additional Resources.
- UC IPM Pest Management Guidelines and Year-Round IPM Program for Almonds. These are available at ipm.ucdavis.edu by selecting Agricultural Pests and Almond.

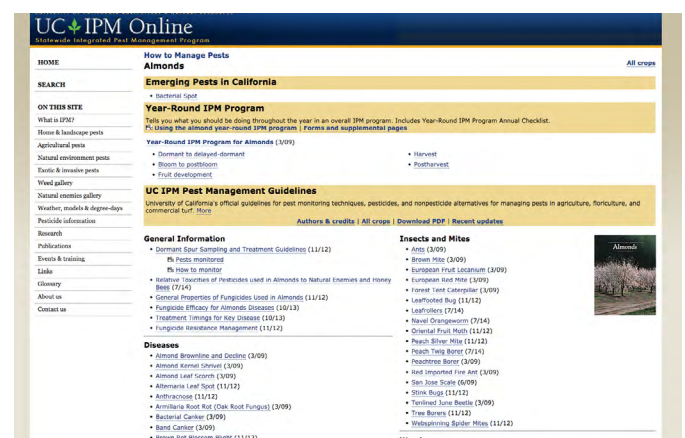
HONEY BEES AND SELF-COMPATIBLE ALMOND VARIETIES

Although using self-compatible (self-fertile) varieties will reduce reliance on bees, it will not eliminate them. A number of factors — genetic, environmental and the structure of the flower — determine self-pollination and set. Even with self-compatible varieties, honey bees can ensure maximum set because bees consistently transfer pollen within the same flower from the anthers to the stigma of the pistil, where fertilization is initiated (see Fig. 2, page 16). However, because pollen no longer needs to be transferred between different varieties, the number of hives required will be reduced.

The best practices for protecting honey bees at bloom apply equally to growers of self-compatible varieties. This is because bees foraging in surrounding orchards are likely to wander into orchards with self-compatible varieties and be exposed to any insecticide or fungicide sprays that have been applied there.



“Seasonal Guide to Environmentally Responsible Pest Management Practices in Almonds” is available at Almonds.com/IPM under Additional Resources.



UC IPM online provides many resources to almond growers.

BEST MANAGEMENT PRACTICES FOR PEST CONTROL DURING ALMOND BLOOM

Following these precautions will help protect honey bees from pesticide applications:

- The first rule to follow when making pesticide applications at bloom time is to read labels carefully and follow directions.
- Do not use pesticides with cautions on the label that read “highly toxic to bees,” “toxic to bees” “residual times” or “extended residual toxicity.” Residual toxicity to bees varies greatly between pesticide products, and can range from hours to a week or more.
- Avoid applying insecticides during almond bloom until more is known. If treatment is necessary, apply only fungicides and avoid tank-mixing insecticides with fungicides.
- Apply fungicides in the late afternoon or evening, when bees and pollen are not present; this will help avoid contaminating pollen with spray materials such as fungicides. Pollen-collecting bees often remove the pollen and leave the almond blossoms by mid-afternoon. However, do not spray so late that the fungicide does not have time to dry before bees begin foraging the next day. See the next section, “Removing Honey Bees from the Orchard,” for guidelines to determine whether exposed pollen is present in flowers.
- Either remove or cover water sources before spraying, or supply clean water after a treatment is made.
- Do not directly spray hives with any pesticide. Ensure that the spray-rig driver turns off nozzles when near hives.
- 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. Avoid pesticide application or drift to blooming weeds in or adjacent to the orchard if honey bees are present.
- Avoid applying a pesticide with a long residual (extended residual toxicity or systemic pesticides) prebloom. More information about residue toxicity time is available in the document “EPA Information on Residue Toxicity Times for Growers and Beekeepers,” which can be accessed at [Almonds.com/Honey-Bee-Protection](https://www.almonds.com/Honey-Bee-Protection).

Remember to keep all parties informed of agricultural sprays according to the communication chain agreed upon, so that beekeepers are always aware of impending applications, and applicators are fully informed of the parameters required regarding materials, timing, location and method of application.



Pollen-collecting bees generally have removed pollen and left almond blossoms by mid-afternoon.

REMOVING HONEY BEES FROM THE ORCHARD

University of California recommends bee removal when 90% of the flowers on the latest blooming variety are at petal fall.⁹ 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.

After blossoms open, they release pollen for about four days. When temperatures are above 55°F, pollen is released when the anthers split open, or dehisce. This happens in progression over this period, with not all anthers opening at once. Typically, the pollen that is released each day is collected by bees by mid-afternoon. The pollen-receiving structure, the stigma surface, is receptive to fertilization for about five days after a blossom opens. However, fertilization is most successful when pollination occurs during the first few days that a flower is open.

Bees, both pollen and nectar collectors, concentrate on recently opened blooms. In one study, about 90% of all bee visitations were confined to flowers that have pollen. With adequate weather and bee activity, essentially all pollen will be collected from individual flowers within about four days after they have opened. Conforming to this, past work shows that during favorable pollination weather, almond flowers remain receptive to cross-pollination up to about four to five days after opening. Cooler weather, below 55–60°F, will lengthen the period of pollen collection and flower receptivity, and will delay petal fall.

Petals normally remain on flowers past the receptive period for cross-pollination, but once the pollen is depleted, bee visitation to flowers drops off substantially, and the remaining few visitors concentrate on collecting nectar. Nectar collectors are not efficient pollinators. These bees typically descend on the petals, probe for nectar at the base of flowers, and rarely pick up or transfer pollen. In contrast, pollen-collecting bees descend on the top of anthers and transfer pollen to the stigma surface, which is necessary for fertilization.

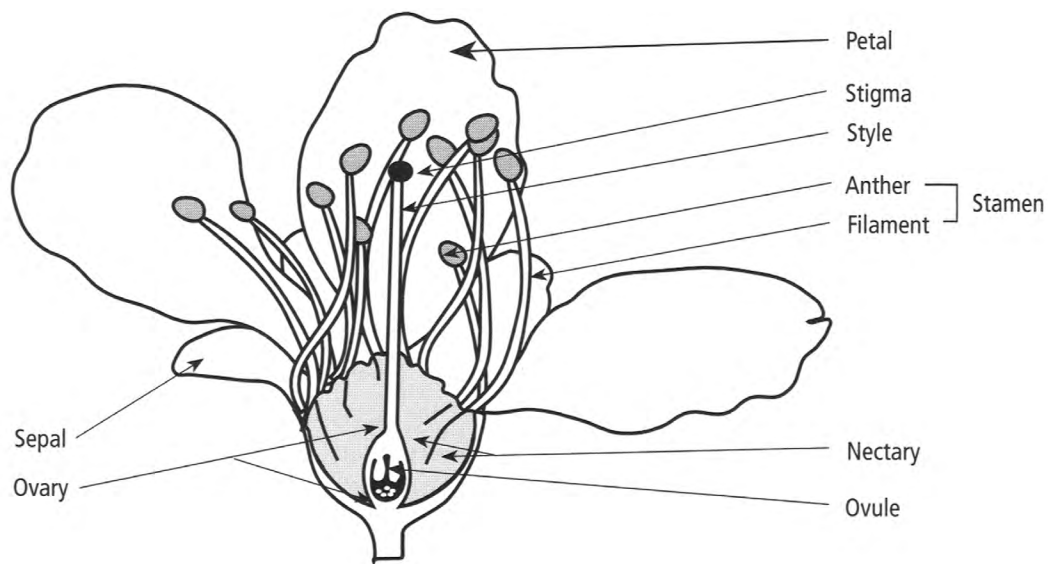


Pollen-collecting bees land on the top of anthers and transfer pollen to the stigma surface, resulting in fertilization.



Both pollen and nectar collectors concentrate on recently opened blooms. After blossoms open, they release pollen for about four days.

⁹Mussen, E. 2014. *When to leave almond orchards*. UC Apiaries newsletter, Mar./Apr. 2014.



*Fig. 2. Diagram of a Mission variety almond flower. For fertilization to be initiated, pollen from the anthers must be transferred to the stigma surface. When no anthers have pollen, the style turns from green to brown and the stigma and style are no longer receptive to pollination, and thus fertilization.
 (©1996 Regents of the University of California. Almond Production Manual, used by permission. Illustration adapted from USDA Agricultural Handbook 496 – S.E. McGregor).*

It is fairly simple to determine if flowers have pollen and are receptive to cross-pollination. In newly opened flowers, most if not all anthers have not opened and are plump, yellow but not fuzzy. Anthers with pollen appear yellow and fuzzy, and for about four days, there will be a mixture of opened (dehiscid) and unopened anthers. It is best to check for pollen in the morning before honey bees finish foraging all pollen available for that day. Older anthers without pollen are dry and light brown. Also in older flowers: When no anthers have pollen, the style (the tube below the stigma surface) turns from green to brown, and the stigma and style are no longer receptive to pollination.

When 90% of the flowers on the latest-blooming variety are at petal fall and no pollination is taking place, it is in the best interest of the bees to have beekeepers remove the colonies, regardless of the presence of petals or of nectar-foraging bees. Unfortunately, even if bee removal timing may be included in the pollination agreement, keep in mind that beekeepers can't always be available — or don't have an alternative location to move the bees to.

Once bees have been removed, it is still recommended to check with the county agricultural commissioner before making pesticide applications. Bees may still be foraging in neighboring orchards or in other crops nearby. Check with the county agricultural commissioner prior to the use of any insecticide.

ADDRESSING SUSPECTED PESTICIDE-RELATED HONEY BEE LOSSES

It is in the best interests of beekeepers and growers to immediately report suspected pesticide-related bee incidents to the local county agricultural commissioner's office. Here are some signs and symptoms to look for:

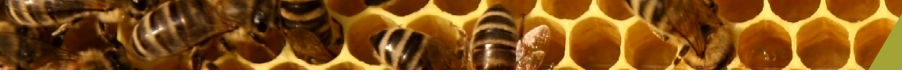
- Excessive numbers of dead and dying adult honey bees in front of hives;
- Dead brood at the hive entrance and dead newly emerged workers;
- Lack of foraging bees on a normally attractive blooming crop;
- Stupor (i.e., dazed, unconscious); paralysis; jerky, wobbly or rapid movements; spinning on the back;
- Disorientation and reduced efficiency of foraging bees;
- Immobile or lethargic bees unable to leave flowers;
- Bees unable to fly and crawling slowly as if chilled; and
- Queenless hives.

In reporting a suspected incident to the local county agricultural commissioner's office, include notes describing the previous health of the colony, prevailing wind, EPA registration number from the suspected pesticide label, name of the suspected pesticide and, in your opinion, how the bees may have been exposed. Photos or videos can also be included.

Beekeepers should also report pesticide treatments that have been applied to the hives and other pertinent details.

Preserving at least 2 ounces of adult bees, brood, pollen, honey, nectar or wax by immediately freezing in labeled, clean containers may be helpful if the incident warrants lab analysis.

Do not disturb the hives or site, pending an investigation.



WHAT TO EXPECT IN AN INVESTIGATION

Suspected honey bee pesticide-related incidents are investigated by the local county agricultural commissioner, aided at times by the California Department of Pesticide Regulation, to determine if there were any problems associated with the use of a pesticide.

Evidence gathering will include pesticide use information to determine which pesticides were used in the orchard where the hives were placed. The surrounding area will be surveyed to consider pesticide applications to blooming crops and orchards or weeds where the bees may have been foraging. The beekeeper will be asked about any pesticide treatments made to the hives to protect against various hive pests. Samples of the bees and surfaces of the identified hives may be obtained for analysis of pesticide residues.

If a beekeeper expresses concern that their bees may have been affected by pesticides, a report needs to be submitted by the beekeeper and/or the grower or other involved parties listed on the Honey Bee BMP Communication Chain (on pages 4 and 5) to the county agricultural commissioner's office. Only if suspected bee incidences are properly investigated can accurate information and real data be obtained. Without an investigation, it becomes a matter of opinion and supposition.



The area surrounding affected hives will be inspected in cases of suspected honey bee pesticide-related incidents.

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

Also Available:

Honey Bee Best Management Practices Quick Guide for Almonds

Applicator/Driver Honey Bee Best Management Practices Quick Guide for Almonds (in English and Spanish)



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