

Improve Your Yields With Pollinator Management

Pollinator management is an important component of successful orchard fruit production. This fact sheet is designed to assist fruit growers with maximizing honey bee productivity by understanding more about honey bee biology and ecology.

The European honey bee (*Apis mellifera*) is indispensable to agriculture because of the pollination services it provides.



Peggy Greb USDA-ARS

Honey bees are polylectic bees, meaning they forage for nectar and pollen on numerous types of plants. Individual foragers exhibit flower fidelity; therefore once a flower of a specific plant is visited, the bee will continue to forage on the same species of plant, in some cases for days. Honey bee hives can also be transported, which makes honey bees useful to many different growers.

The biology and behavior of the honey bee makes them uniquely capable pollinators. Which is why this single insect is responsible for over \$15 billion in pollination services.

Pollination Requirements

Pollination requirements vary because every orchard is different. It is also worth noting that not all honey bee colonies are of equal quality and the population of native pollinators differs depending on the location. However, there is general information which is helpful to consider.

Honey bee flight is temperature and light dependent. Here are the typical guidelines for springtime foraging temperatures:

55—60°F Minimal foraging
60—65°F Moderate foraging
65°F and above Maximum foraging

Honey bees will not forage below 55°F. If your crop is often in bloom at low temperatures, creating habitat for native pollinators or utilizing alternative pollinators may be beneficial.

The table below provides general guidelines for how many honey bee colonies are needed in an orchard. ***Please note that an orchard may need more or fewer colonies depending on local conditions.**

Table 1. Number of colonies needed per acre of orchard

Apples	1-3 colonies
Apricot	1 colony
Cherry	1-2 colonies
Peach	1 colony
Pear	2 colonies
Plum	1 colony



Keith Weller USDA-ARS

Improper use of pesticides can reduce the foraging effectiveness of both honey bees and native bees

Best Practices for Pesticides

Protecting bees from pesticide poisoning is critical. It is important to consider that bees do not have to die from exposure for there to be negative effects on pollinator productivity.

- Read and strictly follow the pesticide label (it is the law)
- If a pesticide is toxic to bees, consider using a less hazardous alternative
- Dusts and wettable powders tend to be more hazardous to bees than emulsifiable concentrates and granular formulation
- Apply pesticides when bees are not actively foraging (i.e. when temperatures are below 55 degrees or during the evening)
- Whenever possible avoid applying pesticides when flowers are in bloom (this includes weeds)
- If weeds are in bloom and need to be removed, mow them or use an herbicide which is not harmful to bees
- If you are renting hives, communicate your spraying schedule with the beekeeper so that bees can be moved if necessary

Determining the Quality of Honey Bees



The quality of bees used to pollinate an orchard is important to assess and cannot be determined by outward appearances, such as the condition of hive bodies. Ask the beekeeper to open the hives when it is warm enough and inspect at least 10% of hives so that an evaluation of quality can be determined.



DISEASE & PESTS

Colonies which are infected with disease are less productive foragers. Hives infected with American foulbrood should not be tolerated and should never be rented. Other diseases such as European foulbrood, Parasitic Mite Syndrome, Nosema, chalkbrood and sacbrood can be tolerated at low levels. However it can be difficult to diagnose these diseases if one does not have beekeeping experience. If you would

like to determine if the hives you are renting are infected with disease, you can request an inspection from a UDAF Apiary Specialist or your county's bee inspector.

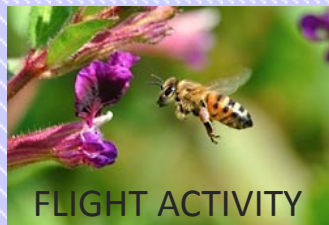


COLONY STRENGTH

The State of Utah does not have colony-strength regulations for honey bees involved in commercial pollination. Therefore it is recommended that the grower and beekeeper use Oregon and Washington State standards as guidelines for assessing strength of hives rented and corresponding payment.

Grade A Colonies for Orchard Fruit: A laying queen with at least 6-8 deep frames covered with bees (or approximately 14,400-19,200 bees) and at minimum 4 frames well filled with brood (about 600 square inches). A colony of this size is considered to be of adequate pollination value.

Grade B Colonies For Orchard Fruit: A laying queen with at least 4 1/2 deep frames covered with bees (or approximately 10,800 bees) and at minimum 450 square inches of brood. A colony this size is considered of inferior pollination value.



FLIGHT ACTIVITY

If it is not possible to open the hives flight activity can be used as a rough indication of colony quality. If a hive has more than 100 incoming bees per minute at 65° F, the colony is likely a good pollinator unit. Bee populations in the field can also provide loose estimates of foraging activity. A minimum of 8—12 bees should be visiting a fruit tree in a 30 second period.

Photo Credits Top: Katie Lee, Bee Informed Partnership Middle: Stephen Ausmus, USDA-ARS Bottom: Jim Eklund, USDA-ARS

References: Brittain, C., William, N., Kremen, C. and Klein, A-M (2013) *Synergistic effects of non-Apis bees and honey bees for pollination services*. Proc. R. Soc. B 7 March 2013 vol. 280 no. 175420122767
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Placement of Hives

It is useful to consider proper hive placement that maximizes flight and forage activity. This planning will prove beneficial, especially under marginal weather circumstances.

Colonies should be grouped in small clusters of 4 to 8 hives and distributed throughout the orchard. The hives should be in a sunny location that is shielded from wind. Low-lying spaces that collect cool, moisture-saturated air should be avoided.

Hives should not be placed directly on the ground but instead be on stands at least 6-12 inches high.

Alternative Pollinators

There are many non-Apis bees commercially available for orchard pollination. Research has indicated that increasing pollinator diversity can synergistically improve honey bee productivity. Below are some resources about alternative pollinators:

USDA Bee Biology and Systematics Laboratory

<http://uaes.usu.edu/htm/farms-and-facilities/usda-bee-biology-and-systematics-laboratory/>

Orchard Bee Association

<http://www.orchardbee.org/>

This fact sheet was prepared by the

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