



Michigan Apple Pollination



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Apples Need Pollination

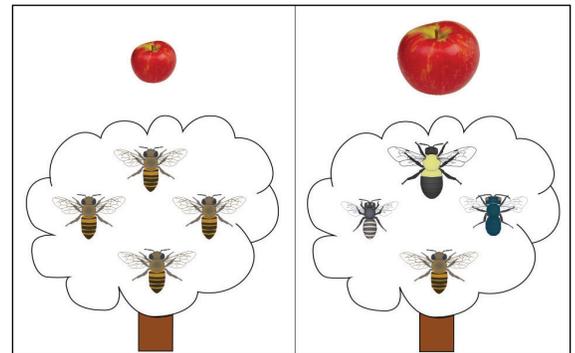


Apples require cross-pollination between different apple cultivars or crabapples to set fruit. While only 2-5% of all apple blossoms are needed to set fruit to produce a commercial crop – the rest are hand- or chemically thinned – **full pollination of these blossoms is essential for producing large, well-formed fruit**. Blooming Michigan apple orchards are attractive to honey bees and over 40 species of wild bees. All of these different kinds of bees visit apple flowers to collect pollen and nectar to feed their young and in the process provide pollination services.

Integrated Crop Pollination: combining strategies to improve pollination

Wild bees can be abundant and active pollinators in many MI orchards, especially those located near woodlots and fencerows that have flowering trees, shrubs, and other wild flowering plants. These natural areas help support wild bees by providing food when the crop is not in bloom. They also provide safe nesting opportunities for wild bees by providing a refuge outside of the cropping area.

Many Michigan apple growers rent managed honey bees to supplement wild bee pollination. Apple growers that rent honey bees benefit from having wild bees in the orchard too; **orchards visited by many different kinds of bees have higher fruit set than those visited by one kind of bee**. Different species of bees tend to visit flowers at different times of the day and may be active at different times through bloom.



Apples visited by many different kinds of bees (see tree on right) have higher seed and fruit set, and produce larger, better-formed fruit than apples visited by fewer kinds of bees (see tree on left) (Blitzer et al. 2015).

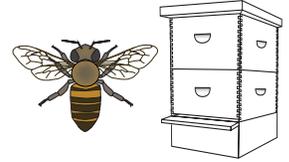


Cool, rainy, and windy spring weather can lead to poor pollination. A number of wild bees are tolerant of temperatures 5-10°F lower than the honey bee and are able to stay more active under cool and windy conditions than honey bees. **Having a diverse set of pollinators active in your orchard can ensure consistent pollination from the beginning to the end of crop bloom.**

Left: A mining bee (far left) and two honey bees visiting apple blossoms in northern Michigan. Photo: Emily May.

Meet the Pollinators

Honey Bees (*Apis mellifera*) can be managed or rented for apple pollination, and tend to be the most abundant pollinators of Michigan apples. Honey bees provide many active pollinators per hive; on any given day, a 6-8 frame colony will have roughly 15,000 – 20,000 pollinating bees. Hives are typically stocked at a rate of one hive for every 2-5 acres when the crop reaches 5-10% bloom and removed from fields at petal fall.



Wild Bees visit apple flowers in many orchards, especially those near woodlots or other natural habitat. Researchers found over 40 species of wild bees visiting MI apple flowers. The more different kinds of wild bees an orchard has, the better the fruit set.



Mining Bees (*Andrena* spp.) are the most common wild bee visitors to Michigan apples. Mining bees are solitary, ground-nesting bees that are very efficient apple pollinators. There are more than 10 species that actively pollinate apple blossoms in Michigan. Early-blooming woody plants that bloom right before or right after apple bloom help support these bees.



Sweat Bees (*Halictus* and *Lasioglossum* spp.) are the second most common wild bee visitors to Michigan apple flowers. They are smaller than honey bees and nest in the ground. Some species are solitary and some are semi-social, building up their populations over the summer months. For the semi-social sweat bees, flowering habitat that blooms throughout the growing season can help increase their abundance locally.



Mason Bees (*Osmia* spp.) are solitary and nest above ground in natural and manmade cavities. They use mud to separate nest cells and are not typically common in Michigan apple orchards, due in large part to a lack of nesting sites. Setting out nesting materials attractive to mason bees, such as hollow reeds or cardboard tubes, can increase their abundance locally.



Bumble Bees (*Bombus* spp.) queens can be found visiting apple blossoms during bloom, but are usually not very abundant. Bumble bees are native social (i.e. colony-forming) ground nesting bees, but unlike honey bees, queens emerge from overwintering in early spring and must start a new colony of workers from scratch. Flowering habitat that blooms later in the season can help increase queen production for the following season.

Three Practices to Support Bees

1 Protect natural habitat around orchards and add additional flowering plants

Natural areas provide flowering resources and nesting sites that support wild bee pollinators. Flowering plants provide pollen and nectar for bees and their offspring. In the early season, flowering trees such as willows, maples, and red buds are especially important. More diverse nutrition helps bees stay active and healthy.

2 Minimize pesticide risks to pollinators

Use integrated pest management (IPM) to make targeted pest management decisions. Avoid spraying during bloom. If sprays are needed, spray after dusk or before dawn when bees are not active in the orchard, and avoid tank mixes. Whenever possible, select pesticides that are less toxic to bees.

3 Communicate with your beekeeper

Set up a contract to define the expectations of both parties and notify your beekeeper if spraying the orchard.

Additional Resources

Integrated Crop Pollination
<http://projecticp.org>

Michigan Pollinator Initiative
<http://pollinators.msu.edu>

MSU Extension: Apples
<http://apples.msu.edu>

Conserving Native Bees on Farmland
<http://bit.do/wildbeesMI>

Wild Pollinators of Eastern Apple Orchards
<http://bit.do/wild-bees-apples>

Minimizing Pesticide Risk to Bees in Fruit Crops
<http://bit.do/E3245>

Integrated Pest & Pollinator Management for Apples
<http://bit.do/ippm-apples>

Bees of the Great Lakes Region and Wildflowers to Support Them
<http://bit.do/greatlakesbees>