



Pollinators

1. Honey Bees

(Scientific name: *Apis mellifera*;
Family: Apidae; Order: Hymenoptera)

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Why Bees Are Better Pollination is the transfer of the pollen (male gametes) from one flower (often from a different plant or a different variety) onto the stigma (female part) of another flower. Many plants require pollination because pollen from the same variety do not cause fertilization, termed 'self infertile'. These plants rely on insect for pollination and they include apples, pears, cherries, blueberries and cranberries. In other plants, cross-fertilization produces better fruit and seeds. Many insects that visit flowers can transfer pollen, such as bees, wasps, ants and flies. Bees are far better than other insects because of several factors. First, they depend on flowers not only for nectar as the energy source, but also for pollen as their protein source. This causes them to forage for pollen, resulting in better pollen transfer. Secondly they have specialized morphology to enable pollen transfer and collection. Their hairs are branched (plumose), enabling pollen to be trapped in hairs. They also have specialized pollen baskets on their hind legs enabling them to carry two large loads of pollen, one on each leg. For comparison, wasps only forage occasionally on flowers because they are meat eaters so they have no demand for pollen, their hairs are straight, not as effective in carrying pollen and they have no pollen baskets.



Two pollen foraging honey bee workers returning home. Pollen pellets are carried on special structures called pollen baskets on hind legs.

Pollen pellets harvested from bees using a pollen trap. Notice each pollen pellet is quite pure in color due to flower constancy. Photos by Zachary Huang

Why Honey Bees For honey bees, their behaviors also make them even better than other bees. Honey bees have 'flower constancy' or fidelity, that is they tend to visit the same type of flowers on a single trip or a single day. This makes them more efficient because they do not visit plant A and then switch to plant B. They use dance communications to enable others in the nest to find the same food sources quickly, recruiting a large foraging force to the same crop if it is a profitable source of nectar or pollen. Bees can transfer pollen to one another inside the hive, resulting in better pollen mixing from different trees or varieties. The most important factor for honey bees as an ideal pollinator is the fact that they are managed and have a large population. What other insects do we have, that one can precisely move into an orchard when needed, with a number as large as 30-60 thousand members?

Importance of Honey Bees to US Agriculture The most important function honey bees provide for us is the pollination service they provide for fruits, vegetables, wild flowers and garden plants. The most recent estimate put the value of crops requiring pollination by honey bees around \$14 billion per year in the US. In Michigan, many fruits and vegetables that rank in the top 10 nationally in production (apples, cherries, blueberries, peaches, pears, strawberries, cucumbers and squash) all depend on honey bee pollination, for either fruit setting or better yield and quality. The total value of these crops is estimated to be \$290 million per year. With the production of honey (7.6 million pounds, valued at \$5.7 million) and other products (pollen, beeswax and propolis), the total contribution of bees to Michigan economy is easily over \$300 million per year.

Invasive Pests of Honey Bees Throughout the US, besides the roughly 3 million managed colonies, there used to be quite a large number (perhaps over a million) of feral (unmanaged) honey bee colonies, living inside tree holes, under rocks, or in other types of cavities. However, two mite pests changed that situation forever. Tracheal mites (*Acarapis woodi*) were detected in 1984 in US and varroa mites (*Varroa destructor*, formally called *V. jacobsoni*) in 1987. Since then nearly all feral colonies have died because of varroa mites. Managed colonies rely heavily on chemicals to keep this mite under control. In 1998, another pest, the small hive beetle (*Aethina tumida*) was discovered, probably introduced around 1995 from South Africa. This pest is now causing damages to colonies and stored honey in honey houses in FL, GA and other southern states. We must be vigilant in guarding against more invasive pests of honey bees from entering the US.

Disclaimer: This fact sheet is for information only. Mention of products does not indicate endorsement. Prepared by Zachary Huang, Department of Entomology, Michigan State University, East Lansing, MI 48824, USA. email: bees@msu.edu.

url: <http://cyberbee.msu.edu/column/pollinator/beesaspollinators.pdf>