



Pollinators

Activity 1: Pollinator Introduction

Identify which insects are visiting vegetable plant flowers.



KEY WORDS

Pollination: The transfer of pollen to a plant to allow for fertilization.

Pollinator: An insect or other animal that transfers pollen from one plant to another to allow for fertilization.

Pollen: A fine powdery substance consisting of microscopic grains discharged from the male part of a flower or from a male cone. Each grain contains a male gamete that can fertilize the female ovule, to which pollen is transported by wind, insects or other animals.

SUPPLIES NEEDED

- Smartphones with applications that can identify insects (e.g., iNaturalist, Google Lens, etc..)

Alternate Supplies

- A book or photos of common insects in the region





Pollinators Pollination Investigation

How Do You Do This?

1. Visit a place with several flowering vegetable species.
2. Spend time looking at the flowers to observe the insects that are visiting them.
3. Use the phone app, book or photos to identify the insects that are visiting the different flowers. Take notes on which insects are observed on which flowers.
4. Discuss what you found with fellow learners.

Common Bees of Michigan (continued on the next page)

Common Bees of Michigan					
Honey bees <i>Apis mellifera</i> - Our primary managed pollinator. Honey bees are native to Europe.			Green sweat bees Four types of green bees occur in Michigan in spring and summer. Some nest in logs others in the ground.		
Bumble bees <i>Bombus</i> spp. - Easily recognized, bumble bees are important native pollinators.			Dark sweat bees <i>Lasioglossum</i> spp. and <i>Halictus</i> spp. - Easily missed, but these are both abundant and diverse native bees.		
Long-horned bees <i>Melissodes</i> spp. - These bees, named for the long antennae of males, mostly visit composite flowers in summer.			Masked bees <i>Hylaeus</i> spp. - Small, wasp-like bees that nest in small stems. Females carry pollen back to the nest internally.		
Cuckoo bees <i>Nomada</i> spp. - Wasp-like bees commonly seen flying near the ground looking for miner bee nests.			Cellophane bees <i>Colletes</i> spp. - Line cells of their nests with a cellophane-like material. They nest in the ground.		
For information on bee friendly native plants and how to support pollinators visit: www.nativeplants.msu.edu www.xerces.org					
Michigan State University, Department of Entomology All text and photos by Jason Gibbs				"spp." indicates multiple species in Michigan	



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Common Bees of Michigan

Mason bees

Osmia spp., *Hoplitis* spp. and *Heriades* spp. - Managed *Osmia* pollinate orchard crops. Occur mostly in Spring.



Cuckoo sweat bees

Sphecodes spp. - Invade the nests of other sweat bees. They are easily recognized by their black and red color.



Leaf-cutter bees

Megachile spp. - Cut or masticated leaf pieces in the construction of their nests. Nest in cavities or in ground.



Wool-carder bees

Anthidium spp. - Most common species are accidental introductions from Europe. They line nests with plant hairs.



Carpenter bees

Xylocopa virginica - Common in urban areas. Excavate nests in dead wood. Males have yellow faces.



Miner bees

Andrena spp. - Diverse and abundant, mostly in Spring. Ground-nesting and often specialize on particular flowers.



Dwarf carpenter bees

Ceratina spp. - Very abundant throughout the summer. They nest in old stems and visit a variety of flowers.



Squash bees

Peponapis pruinosa - Solitary ground-nester, only visits the flowers of squash and related crop species.



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Bee Identification





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Insects that Look Like Bees (continued on the next page)

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EXTENDING KNOWLEDGE >> CHANGING LIVES

E1914 (reviewed April 2024)

Insects That Look Like Bees

Everyone knows that bees love to visit flowers, but not everything you see visiting flowers or buzzing around the garden is a bee. In fact, many insects imitate bees to avoid unwanted attention from predators such as birds.

Whether you call them bee mimics, wanna-bees or yellow stripey things, most of them are beneficial helpers in our yards and gardens. Learning how to identify the insects that look like bees will help smart gardeners know and protect these vital pollinators.

Flies

Some flies, especially hover flies and bee flies, can be mistaken for bees because their body form, yellow and black color, fuzzy hairs, buzzing sounds and behaviors mimic bees. Flies have only two wings (forewings) because their hind wings are reduced to knoblike balancing organs called halteres (Figure 1, red circles). In contrast, bees have four wings (two forewings and two hind wings).

Flies have large compound eyes that occupy most of the head, while bees have narrow compound eyes on the sides of the head. Most bee-like flies have short antennae, while bees have longer, cylindrical antennae.

Some flies, especially bee flies, are quite hairy and similar to honey bees (Figure 2), bumble bees and other native bees. Flies also hover and move quickly from flower to flower while foraging. Unlike bees, flies do not have a stinger and are not a threat to gardeners.

Hover flies (Family: Syrphidae) (Figures 1 and 3) resemble bees in coloration, behavior and size. Many hover flies are $\frac{1}{4}$ to $\frac{1}{2}$ inch long and have large heads with reddish or marbled black eyes, two clear wings and yellow-black patterns on the abdomen. Some hover flies are quite hairy, while others are not.

Hover flies buzz like bees and are important pollinators. They use sponging mouthparts when feeding on pollen and nectar. Some hover fly larvae are key predators of soft-bodied insect pests, such as aphids, and provide free biological control of garden pests.

Bee flies (Family: Bombyliidae) (Figure 4) are about $\frac{1}{4}$ to $\frac{1}{2}$ inch long and have stout bodies covered with yellow, black and/or brown hairs. Some species have transparent wings, while others have wings with dark patterns.

The bee fly uses a long proboscis (tongue) for feeding on pollen and nectar in flowers. Because their bodies are hairy, they can carry and transfer a large amount of pollen to flowers.

Moths

Hummingbird clearwing moths or hawk moths (Family: Sphingidae) (Figure 5) are approximately 1 to 1½ inches long, with a robust body. Front wings are narrow, elongated and clear, with black or brown borders and a wingspan of 1½ to 2 inches. These moths look more like hummingbirds than bees.

These moths feed using a long proboscis (tongue) to siphon the nectar. At twilight, hummingbird moths often flit from one flower to the next. Flowers that are most attractive to hummingbird moths are light colored (white) with a strong scent, such as garden phlox.

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Figure 1. Hover fly with few hairs.
(Veronica Calles-Torrez, NDSU)



Figure 2. European honey bee with many hairs.
(Veronica Calles-Torrez, NDSU)



Figure 3. Hover fly.
(Veronica Calles-Torrez, NDSU)

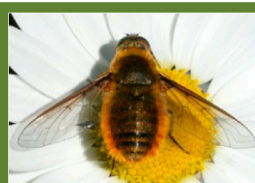


Figure 4. Bee fly.
(David Cappaert, Bugwood.org)

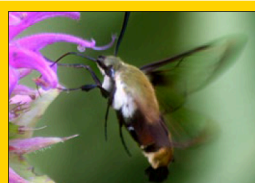


Figure 5. Hummingbird clearwing moth.
(David Cappaert, Bugwood.org)

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Wasps

Wasps appear less hairy than most bees (Figures 2 and 6). Using a microscope, you can see the hairs of wasps are simple (not branched), while hairs of bees are branched. Most bees have special pollen-collecting hairs or baskets on their hind legs (Figure 6). Leafcutter bees collect and carry pollen on hairs underneath their abdomens.

Both wasps and bees have four developed wings and two long segmented antennae. Wasps also have an elongated body with a distinctly visible narrow "waist" (Figure 7), a constriction between the thorax and abdomen. In contrast, bees have a more robust body and the waist is not readily visible. The colors and patterns of wasps are typically brighter and more diverse than bees.

Paper wasps, yellowjackets and bald-faced hornets are social wasps that nest in colonies and frequently visit and pollinate flowers. Another benefit of these wasps is that they are important predators of caterpillars (or insect pests) in gardens.

Paper wasps (Family: Vespidae) (Figure 7) are approximately 1 inch long, with black, yellow, brown or sometimes orange markings. Their paper nests occur in sheltered areas, such as under house eaves, inside open pipes or tree branches. Paper wasps are not as aggressive as yellowjackets and bald-faced hornets, and only attack if they or their nest is threatened.

Yellowjackets or hornets (Family: Vespidae) (Figure 8) are approximately $\frac{1}{2}$ to 1 inch long, with a yellow face except for the black eyes, black antennae, and yellow and black bands on the abdomen. Yellowjackets usually nest in the ground and will defend their nest aggressively.

Bald-faced hornets (Family: Vespidae) (Figure 9) are about $\frac{3}{4}$ to 1 inch long and have black with light yellow to white markings and a white tip at the end of abdomen. Their large paper nests are easy to see in tree limbs and sometimes in roof peaks. Bald-faced hornets are very aggressive and sting repeatedly if you get too close to their nest.

Cicada killers (Family: Crabronidae) (Figure 10) are solitary wasps that are large ($\frac{3}{4}$ to 2 inches long) with a yellow face, red eyes and a black abdomen with yellow bands. Wings are brown and legs are red. Most solitary wasps have a short tongue so they prefer flowers with shallow nectar reserves.

As its name implies, the cicada killer preys on cicadas, and then provisions its nests with the prey as a food source for developing larvae. These wasps do not have the nest guarding instinct of other wasps and bumble bees. Although cicada killers are not aggressive, females do have stingers and can sting when threatened.

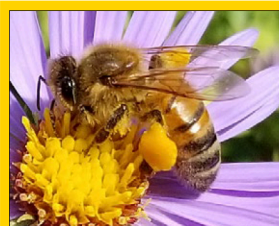


Figure 6. Honey bee collecting pollen from aster flower. Note the pollen basket on its hind legs.
(Veronica Calles-Torrez, NDSU)

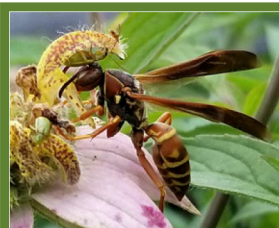


Figure 7. Paper wasp. Note the waist between the thorax and abdomen.
(Veronica Calles-Torrez, NDSU)

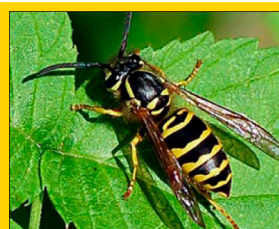


Figure 8. Eastern yellowjacket.
(Jon Yuschock, Bugwood.org)

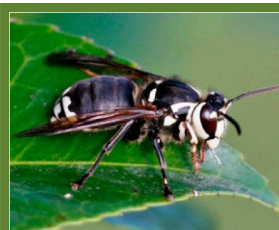


Figure 9. Bald-faced hornet.
(Johnny N. Dell, Bugwood.org)

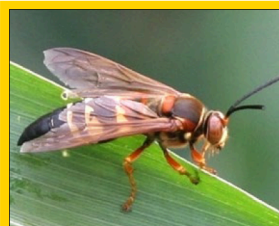


Figure 10. Cicada killer wasp.
(Johnny N. Dell, Bugwood.org)



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What Does it Mean for My Farm?

Discuss observations with co-learners:

- Which pollinators have you observed on your farm?
- Do you feel that you have a high or low number of pollinators in your space?
- What have you noticed about the diversity of pollinators in your space?
- What might you do to increase the number of pollinators on the farm?



RESOURCES FOR ADDITIONAL LEARNING

- [Vegetable Pollinator Stewardship Guide](#)
- Insect Pollination of Crops
- [Insect Pollination of Cultivated Crop Plants](#)
- [Pollinator Champions](#) online course
- [Managing Alternative Pollinators](#)
- [Five steps to protect bees from pesticides](#)

