

Beginner's Guide to Common Native Bees

Quick Facts

- Not all bees make honey.
- Most bees are solitary and do not live in hives.
- Bees use pollen and nectar as a food source.
- Most bees are not aggressive, meaning they rarely sting.

Introduction

Utah is a superb place for beginning bee enthusiasts. Over 1,000 species of native bees exist in Utah (Cane, 2015). Southern Utah alone has approximately the same number of bee species as the entire eastern U.S. coast. There are many reasons for appreciating bees and encouraging their presence in the landscape. Specifically, bees are key to a sustainable environment as they are essential pollinators of food and fiber crops. Bees can also be appreciated for their striking diversity in color and size. This fact sheet highlights the different bee species that you may see in Utah.

Identification

It can be difficult to distinguish bees from other insects (including bee mimics) that are very similar in appearance. The following characteristics can distinguish bees from other insects:

1. Two pairs of attached wings.
2. Pollen-carrying hairs (scopa) on the abdomen or hind legs (females only).
3. Long tongues.

Figures 1a and 1b show basic female bee anatomy. Familiarity with bee anatomy described in this document will give novice bee enthusiasts the experience needed to transition to more technical guides. Male bee anatomy is similar to that of females with a few differences. Male bees are usually smaller than females, have longer antennae, lack a stinger, and often have white or yellow facial hair.

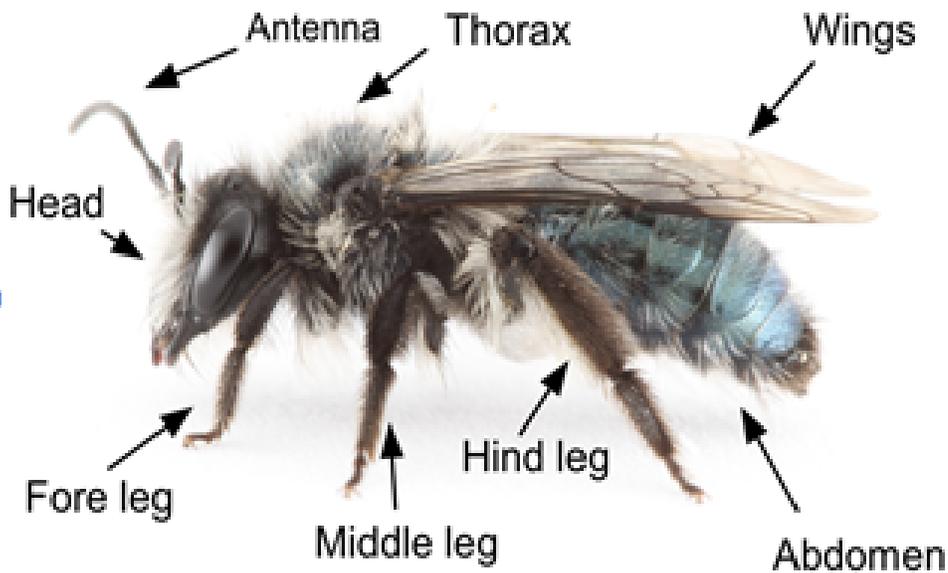


Fig. 1a.



Fig. 1b.

Figure 1. Female Bee Anatomy and Head Detail. (a) A female bee with arrows indicating the head, thorax, abdomen, legs, wings, and antennae. Photo by Joseph Wilson, Utah State University. (b) Female bee head, with arrows labeling the compound eyes, antennae, mouth, and ocelli. Photo by Allan Smith-Pardo, USDA APHIS PPQ, Bugwood.org.

Bee Identification Equipment

Several extremely useful items used in bee identification include:

- 10–30x hand lens

- Butterfly/insect net
- Mason jars or plastic vials
- Ruler

These items (as shown in Figure 2) can be purchased online and used to safely capture and examine bees for a short period. Bees should be released in the area where they were found. Remember, bees are relatively fragile, and they should be handled with caution to ensure the safety of both the bee and humans involved. Also, use this fact sheet and additional guides shown in the references section to help you identify bees to species.

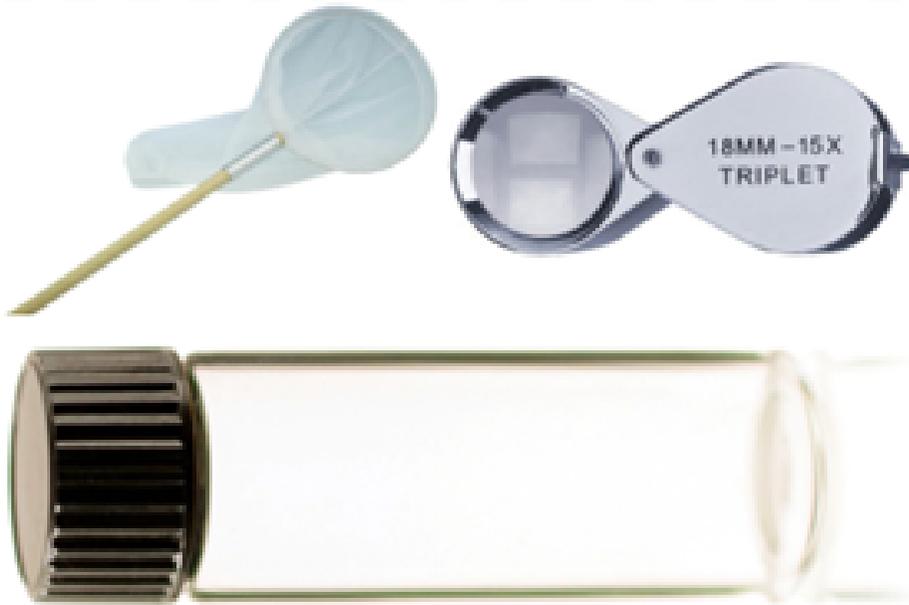


Figure 2. Identification Equipment. A butterfly net (top left), hand lens (top right), and specimen vial (bottom) are pictured.

Solitary Cavity Nesting Bees

Solitary bees nest primarily in wood cavities underground, such as abandoned beetle burrows. The female will nest in the structure and divide it into several cells. Each cell contains a single egg that hatches into a larva. The larvae feed on pollen in the cell until they develop into adults and emerge from the nest. Some species line their nest with leaves or even floral petals they cut from nearby plants (Figure 3).



Fig. 3a.



Fig. 3b.

Figure 3. Leafcutter Bee Nesting Habits. (a) Leaf damage caused by female leafcutter bee. Photo by Kimberly Steinmenn, University of California, Bugwood.org.(b) Leaf lining of a nest cell extracted from a wood nest cavity. Photo by Whitney Cranshaw, Colorado State University, Bugwood.org.

Leafcutter Bees (*Megachile* spp.)

Leafcutter bees cut circular pieces from leaves which they use to line nest cavities as seen in Figure 3a. The leaf cuttings do not harm the plant but may affect the plant's overall appearance. Leafcutter bees are important pollinators of legumes, such as alfalfa, clovers, and lupines.

Key features: Small to medium in size ($\frac{1}{4}$ – $\frac{1}{2}$ inch). The females have black, slick bodies with stripes. They carry pollen on their underbelly rather than on their hind legs (see Figure 4b).

Nesting behavior: Nesting sites are built in existing holes of many materials, such as soil, trees, plant stems, and artificial materials (referenced in Figure 4a). Female leafcutter bees line the nest cavity with circular leaf fragments that they cut from surrounding vegetation. Females divide the nest into cells and stack them toward the entrance. Each cell contains a single egg.

Seasonal activity: April–October, with peak activity in July.



Fig. 4a.



Fig. 4b.

Figure 4. Leaf Cutter Bees and Nest Entrances. (a) A Female leafcutter bee (*Megachile* sp.) is photographed resting on a human-made nest block. Several open nest cavities and four sealed nests are also pictured. Photo by Whitney Cranshaw, Colorado State University, Bugwood.org.(b) A female leafcutter bee (*Megachile* sp.); note the pollen packed hairs (scopa) on underside of the abdomen. Photo by Joseph Wilson, Utah State University.

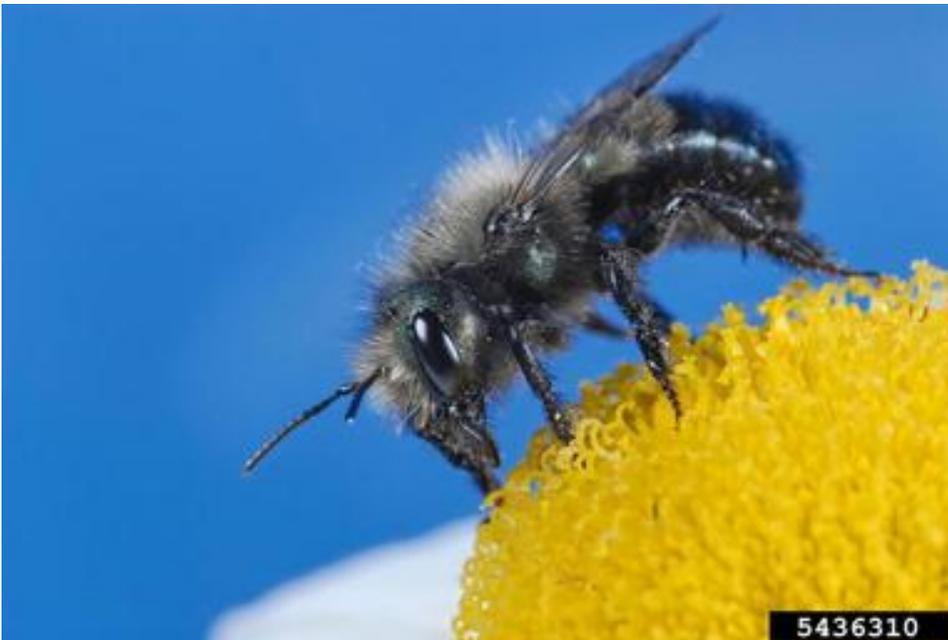
Mason Bees (*Osmia* spp.)

Mason bees, or orchard bees, are exceptionally good at pollinating fruit trees.

Key features: Small to large bees ($\frac{1}{4}$ – $\frac{3}{4}$ inch) that are robust with wide bodies and heads. In Figure 5a, a female mason bee can be seen foraging for pollen and nectar. The blue orchard bee, *Osmia lignaria*, is deep metallic blue and carries pollen on its underbelly.

Nesting behavior: Nesting sites are found in wood—often beetle holes. An example of a mud-capped nest entrance can be seen in Figure 5b.

Seasonal activity: March–June, with peak activity in April.



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Fig. 5a.



Fig. 5b.

Figure 5. Female Mason Bees and Nest. (a) Female mason bee (*Osmia* sp.) foraging for pollen and nectar. Photo by Joseph Berger, Bugwood.org. (b) Two female mason bees (*Osmia* sp.) building nests in an artificial nest block. Photo credit: Scott Famous, DoD, Bugwood.org.

Wool Carder Bees (*Anthidium* spp.)

Male wool carder bees are territorial, often attacking other bees to defend their favorite patch of flowers.

Key features: They are a mid-sized bee ($\frac{1}{2}$ inch) but have yellow and black abdominal stripes that resemble wasps as seen in Figure 6a. Wool carder bees can be distinguished from wasps by their stocky shape and hair. They also carry pollen on their underbelly, see figure 6b.

Nesting behavior: Wool carder bees get their name from the female's behavior of collecting woolly plant hairs, such as lamb's ear, to build their nest. Females allow multiple males to mate with them multiple times for them to gain access to the best nectar sources, i.e., males exclude access to flowers in their territory unless the visiting bee is a potential mate. It is usually the last male to mate with her that fertilizes the eggs.

Seasonal activity: May-September, peak activity is in July.



Fig. 6a.



Fig. 6b.

Figure 6. Wool Carder Bees (*Anthidium* spp.), Both Sexes. (a) Male wool carder bee (*Anthidium* sp.) as seen from behind. (b) A side view of a female wool carder bee (*Anthidium* sp.) including her scopa on the abdomen. Both photos by Joseph Wilson, Utah State University.

Large Carpenter Bees (*Xylocopa* spp.)

Carpenter bees are important pollinators of sunflowers, daisies, and other disk-shaped flowers. Their short mouthparts make it difficult for them to pollinate deep, trumpet-like flowers. Instead, they are known to tear the flower's side to rob the nectar.

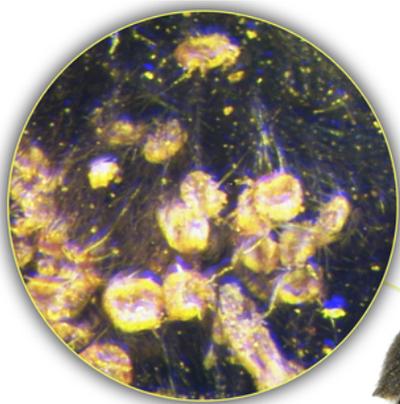
Key features: Females are very large ($\frac{3}{4}$ inch), black, and shiny as seen in Figures 7a and 7b.

Nesting behavior: Carpenter bees have short, powerful mouthparts, which they use to chew nests into wood, including manufactured structures.

Seasonal activity: April–October, with peak activity in April.



Fig. 7a.



Sennertia segnis



Xylocopa californica

5549344 Fig. 7b.

Figure 7. Large Carpenter Bees (*Xylocopa spp.*). (a) A large carpenter bee female (*Xylocopa* sp.) Photo by Joseph Wilson, Utah State University. (b) A dorsal view of the abdomen and wings of a large carpenter bee female. Photo by Pavel Klimov, USDA APHIS PPQ, Bugwood.org.

Small Carpenter Bees (*Ceratina spp.*)

Small carpenter bees are generalist pollinators, meaning they are good at pollinating many flowers.

Key features: Small carpenter bees are typically $\frac{1}{4}$ inch in length and are shiny with dark metallic to black bodies as seen in Figure 8a. These are sometimes mistaken for sweat bees.

Nesting behavior: Females chew through the tip of a stem to construct a nest. In Figure 8b, a female is photographed at her nest site. Nesting site preference is often associated with pre-cut, pithy, or semi-hollow stems. The females construct nests which are approximately 1–7 cells deep (Ali et al., 2016) within the stems. Females have been observed protecting the nest entrance until all offspring emerge (Malyshev, 1936; Daly, 1966).

Seasonal activity: June–September, with peak activity in July and August.



Fig. 8a.



Fig. 8b.

Figure 8. Female Small Carpenter Bees (*Ceratina* sp.). (a) A female small carpenter bee (*Ceratina* sp.). Photo by Joseph Wilson, Utah State University. (b) A female small carpenter bee (*Ceratina* sp.) resting on a rose stem, a likely nest entrance. Photo credit: Hectonichus, Wikimedia Commons, commons.wikimedia.org.

Native Social Cavity Nesting Bees

Bumble bees are the only group of eusocial cavity nesting bees in North America. In other words, they are the only native bees with queen and worker castes in the nest. Honey bees are not native bees; find information about them under **EXOTIC BEES**.

Bumble Bees (*Bombus* spp.)

Bumble bees are important pollinators of native plants, especially at higher elevations. They are good pollinators for vegetables and crops grown in greenhouses, due in part to their ability to tolerate cooler temperatures and longer hours of activity. Bumble bees also have a less aggressive nature and better sense of direction.

Key features: Most species are large ($\frac{3}{4}$ –1 inch) but some are stout, medium-sized bees ($\sim\frac{1}{2}$ inch). Bumble bees are very hairy and yellow with black, orange, or white bands. In Figure 9b, the hairy abdomen is evident. Compare the bumble bee abdomen to the large carpenter bee abdomen in Figure 7b to distinguish the two groups. Bumble bees carry large amounts of pollen on their hind legs (Figure 9a).

Nesting behavior: Bumble bees are considered social cavity nesters since they build colonies and use abandoned rodent holes and other pre-existing burrows to nest. Colonies last for only one season. A bumble bee queen will leave the colony before winter to mate and hibernate while the rest of the hive dies off.

Seasonal activity: March–November, with peak activity in July and August.



Fig. 9a.



Fig. 9b.

Figure 9. Bumble Bees (*Bombus* spp.). (a) Female Hunt's bumble bee (*Bombus huntii*) with pollen-packed scopa. (b) Female golden northern bumble bee (*Bombus fervidus*). Both photos by Joseph Wilson, Utah State University.

Solitary Ground Nesting Bees

Every female solitary ground nesting bee builds her own nest underground, but she often builds nests near others. Many ground nesting bees show a preference for certain floral resources.

Mining Bees (Family: Andrenidae)

Mining bees are especially common in dry areas, and many species depend on only a few closely related varieties of flowers for pollen and nectar (Eaton et al., 2007).

Key features: Small to medium in size ($\frac{1}{4}$ – $\frac{1}{2}$ inch) with black or brown heads, pale hairs on thorax, hairy face between the eyes, and abdomens that often have white stripes (see Figure 10a).

Nesting behavior: Nests are underground in thin or patchy lawns. In Figure 10b, the nest entrance is easily seen due to the presence of a small mud mound or turret.

Seasonal activity: March–September, with peak activity in April.



Fig. 10a.



UGA5210087 Fig. 10b.

Figure 10. Mining Bee Images. (a) A female mining bee (*Andrena* sp.). Photo by Joseph Wilson, Utah State University. (b) The entrance to a mining bee nest. Photo by Whitney Cranshaw, Colorado State University.

Polyester Bees (*Colletes* spp.)

Polyester bees received their name from the nest liner they produce—one of the first discovered bioplastics.

Key features: A mid to large bee ($\frac{1}{2}$ – $\frac{3}{4}$ inch) with black, grey, or brown coloration as shown in Figure 11a and 11b. Polyester bees are often difficult to distinguish from some species of mining bees.

Nesting behavior: Females dig nest burrows lined with a waterproof secretion from their abdomen. This liner protects eggs from drowning and prevents nectar and pollen spoilage (Hefetz et al., 1979).

Seasonal activity: March–May and August–October, with peak activity in April and September.



Fig. 11a.



Fig. 11b.

Figure 11. Polyester Bees. (a) Female polyester bee (*Colletes* sp.) with grey coloration. Photo by Joseph Wilson, Utah State University. (b) Polyester bee (*Colletes* sp.) with greyish-brown coloration. Photo credit: Hectonichus, Wikimedia Commons, commons.wikimedia.org

Digger Bees (*Anthophora* spp.)

Digger bees burrow into dry soil using their jaws and legs. They like to hover low to the ground and fly very fast. They are not aggressive toward humans or pets.

Key features: Digger bees are often large (~¾ inch), hairy, and usually grey with bold stripes as seen in Figure 12a, and their wings are proportionally smaller than other bees (see Figure 12b).

Nesting behavior: Nests are made in the ground, often in large groupings. Many species create a mud chimney around the entrance to the nest (Eaton et al., 2007).

Seasonal activity: March–October, with peak activity from April–June.



Fig. 12a.



Fig. 12b.

Figure 12. Digger Bees. (a) Digger bee (*Anthophora* sp.) as seen from above. Photo by Joseph Wilson, Utah State University. (b) Digger bee (*Anthophora* sp.) foraging for nectar. Photo by Teresa Amarillas, inaturalist.org.

Sweat Bees (Family: Halictidae)

Sweat bees are known for the striking green coloration found on many species. As their name implies, sweat bees are attracted to perspiration.

Key features: Sweat bees are small to medium ($\frac{1}{4}$ – $\frac{1}{2}$ inch) in size. The head and thorax are often bright metallic green or black. The abdomen is typically solid green, red-orange, or alternating yellow and black stripes as seen in Figure 13a and 13b.

Nesting behavior: Nesting sites are often clustered, shared by slightly social females.

Seasonal Activity: March–October, with peak activity from June–August.



Fig. 13a.



Fig. 13b.

Figure 13. Sweat Bees (*Halictus spp.*). Photos by Joseph Wilson, Utah State University.
Long-Horned Bees (Tribe: Eucerini)

Long-horned bees are important pollinators for squashes, pumpkins, melons, sunflowers, and other native wildflowers. Long-horned bees can be seen throughout the day resting in squash blossoms as imaged in Figure 14b.

Key features: Long-horned bees are medium to large ($\frac{1}{2}$ – $\frac{3}{4}$ inch) in size, hairy, usually brown or gray, and have very long antennae. Their eyes are light gray or blue, and they have pale stripes as seen in Figure 14a.

Nesting behavior: Females dig relatively deep tunnels as nesting sites. While considered solitary, they sometimes share nest entrances.

Seasonal activity: May–September, with peak activity in July and August.



Fig. 14a.



Fig. 14b.

Figure 14. Long-Horned Bees. (a) Long-horned bees (*Melissodes* spp.), male (left) and female (right). Photo by Joseph Wilson, Utah State University. (b) Long-horned bee (*Peponapis* sp.) resting on a squash leaf. Photo by Rogelio Tapia, inaturalist.org.

Cuckoo Bees (*Nomada* spp.)

Cuckoo Bees are kleptoparasites. The larvae are hatched in other bee's nests, eating the pollen and other resources provided by females of other species.

Key features: Cuckoo bees are small- to medium-sized ($\frac{1}{4}$ – $\frac{1}{2}$ inch), slender, and wasp-like as shown in Figure 15a. Their bodies are not hairy, and they have no scopa, i.e., pollen-carrying structures (see Figure 15b).

Nesting behavior: Female cuckoo bees hover near other species' nest where they lay their eggs.

Seasonal activity: April–August, with peak activity in April and May.



Fig. 15a.



Fig. 15b.

Figure 15. Cuckoo Bees. (a) A yellow wasp-like cuckoo bee (*Nomada* sp.). Photo by Joseph Wilson, Utah State University. (b) This cuckoo bee (*Nomada* sp.) lacks pollen collecting hairs on her hind legs. Photo credit: Maticus, inaturalist.com.

Exotic Bees

Not all bees found in Utah are native. Some have been introduced from other regions like Eurasia. Non-native bees are also known as exotic bees. Many of the groups described in this guide include native and exotic species. To find out more about exotic bees, visit the [Exotic Bee Guide](#).

Western Honey Bee (*Apis mellifera*)

The western honey bee (*Apis mellifera*) is also known as the European honey bee and is probably the most well-known exotic species in the United States. Honey bees are often misidentified by amateur bee enthusiasts due to their variable patterns and colors.

Key features: Honey bees are medium-sized bees (~½ inch) with hairy heads and thoraxes. Abdomens may or may not have stripes, and their colors range from orange to black. Figure 16a shows an example of a honey bee worker. Three features distinguish honey bees from native look-alikes: (1) Honey bees lack tibial spurs on the hind legs; (2) Hairs are present on the compound eyes; (3) The front of the abdomen forms a right angle and is not rounded.

Nesting behavior: Nests are constructed in cavities such as attics, tree hollows, and rock cavities. Figure 16b shows an example of a human-made Langstroth hive. Honey bee nests can be massive with bees numbering in the tens of thousands.

Seasonal activity: Early spring to fall (March–November) where the weather permits.



Fig. 16a.

**Fig. 16b.**

Figure 16. Honey Bee and Hives. (a) A western honey bee (*Apis mellifera*) female worker. Photo by Joseph Wilson, Utah State University. (b) Two human-made hives for honey bees; each hive houses a queen and tens of thousands of workers. Photo by Andree Walker Bravo, Utah State University.

Bee "Mimics"

Some flies mimic bees in appearance and/or habit. Flies tend to have short, stubby antennae, large eyes near the front of the head, and a single pair of wings. Flies also have a broader abdomen and thorax. As seen in Figure 17a, hover flies are common bee mimics and are often confused with solitary bees and some bumble bees. Wasps are more closely related to bees than flies, and some wasps can also be mistaken for a bee. Wasps are nearly hairless except for sparse hairs on the face or body and always lack pollen baskets (scopa). They usually have a shiny or glossy appearance and typically have thin waists (Figure 17b). Many wasps are carnivorous, so if you see a bee-like insect that is attracted to meat or table scraps, it is usually a wasp.

**Fig. 17a.**



Fig. 17b.

Figure 17. Insects That Mimic Bees. (a) Hover fly (*Syrphini* sp.). (b) Yellowjacket, (*Vespula* sp.). Both photos by Joseph Wilson, Utah State University.

Human Impacts

As we have shaped our environment to suit our needs, we have inadvertently fragmented bee habitat, and introduced diseases, parasites, and competition from exotic bees. Human activities impact native bees in many ways. While some species have benefited from these changes, many bee species are in decline, and some are at risk of becoming endangered. For example, declining populations have been observed in 28% of bumble bees, 50% of leafcutter bees, and 27% of mason bees (Black et al., 2015; Young et al., 2015). If populations of pollinators continue to decline, our food supply could be severely impacted. Fruit production would be seriously affected, and propagation of many vegetables would become difficult.

Creating a Positive Impact for Native Bees in Your Landscape

You can have a positive impact on native bees by growing pollinator-friendly plants, incorporating bee-friendly cultural practices into the landscape, and providing nesting sites.

Some bees specialize in pollinating specific plants, so incorporating those plants into your garden will attract them to your yard. More information about bee-friendly gardening is available in this guide: [Gardening for Native Bees in Utah and Beyond](#).

Utah State University also provides a fact sheet on bee-minded pesticide use, found at [Reducing Pesticide Poisoning of Bees](#), and a guide about landscaping practices that support nesting in your yard, found at [Gardening and Landscaping Practices for Nesting Native Bees](#).

Providing nesting blocks can also attract pollinators to your property. They can be purchased or easily made at home. Learn more about making bee nesting blocks in the United State Department of Agriculture (USDA) guide, "[Build a Nesting Block](#)," or the Michigan State University bulletin titled, "[Building and Managing Bee Hotels for Wild Bees](#)." Be sure to monitor nesting blocks throughout the summer and clean them each winter.

References and Further Reading

- Abrams, J., & Eickwort, G. C. (1981). Nest switching and guarding by the communal sweat bee *Agapostemon virescens* (Hymenoptera, Halictidae). *Insectes Sociaux*, 28(2), 105–116. doi:10.1007/bf02223699
- Ali, H., Alqarni, A. S., Shebl, M., & Engel, M. S. (2016). Notes on the nesting biology of the small carpenter bee *Ceratina smaragdula* (Hymenoptera: Apidae) in Northwestern Pakistan. *Florida Entomologist*, 99(1), 89–93. doi:10.1653/024.099.0116
- Cane, J. H. (2015). *Gardening and landscaping practices for nesting native bees* [Fact sheet]. Utah State University Extension.
- Daly, H. V. (1966). Biological studies on *Ceratina dallatorreana*, an alien bee in California which reproduces by parthenogenesis. *Annals of the Entomological Society of America* 59, 1138–1154.
- Eaton, E. R., & Kaufman, K. (2007). *Kaufman field guide to insects of North America*. Houghton Mifflin Company.
- Hefetz, A., Fales, H. M., & Batra, S. W. (1979). Natural polyesters: Dufour's gland macrocyclic lactones form brood cell laminesters in collettes bees. *Science*, 204(4391), 415–417. doi:10.1126/science.204.4391.415
- Malyshev, S. I. (1936). The nest habits of solitary bees: A comparative study. *Eos* 11, 201–309.
- Michener, C. D. (2007). *The bees of the world*. Johns Hopkins University Press.
- Spring, M. L. R., & Gardiner, M. M. (2019, January 22). *How to identify and enhance Ohio's wild bees in your landscape* [Fact sheet]. Ohio State University.
- Vaughan, M. (2015). *Farming for bees: Guidelines for providing native bee habitat on farms*. Xerces Society for Invertebrate Conservation.
- Ward, K., Cariveau, D., May, E., Roswell, M., Vaughan, M., Williams, N., Winfree, R., Isaacs, R. & Gill, K. (2014). *Streamlined bee monitoring protocol for assessing pollinator habitat*. Xerces Society for Invertebrate Conservation.
- Wilson, J. S., & Carril, O. J. M. (2016). *The bees in your backyard*. Princeton University Press. doi: 10.1515/9781400874156
- Young, B. E., Schweitzer, D. F., Sears, N. A., & Ormes, M. F. (2015). *Conservation and management of North American mason bees*. NatureServe.

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Cody Zesiger, USU Extension Assistant Professor; Elizabeth Cohen, USU Extension Assistant Professor; Hannah Jarvis, USU Extension undergraduate intern; Lori Spears, Professional Practice Associate Professor; Ricardo Ramirez, USU Associate Professor

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