

# COOPERATIVE EXTENSION

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## Blue Orchard Bee – Fruit Tree Pollination Made Easy

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The blue orchard bee (*Osmia lignaria*) is a native pollinator of early spring flowers, built to order for home gardeners in Nevada with fruit trees. As an adult, this small, shiny black bee is a more effective pollinator than the immigrant honey bee and is much easier and safer to handle (Fig. 1). It does not swarm, seldom if ever stings, does not pose a risk to the gardener or the neighbors, and does not require all the equipment and labor associated with producing honey.

Small resident populations already exist in Northern Nevada. In this publication, we discuss how to encourage them to live in a yard and how to manage them properly so that they will pollinate early flowering fruits.

Gardeners love this bee. It is so well behaved and singularly focused on its business few know it is around unless they purposely seek it out to watch it. The blue orchard bee is non-aggressive in nature and will not attack singly or in a swarm. Its sting is a rarity even for those who work or play for a long time next to busy nesting sites. This makes caring for blue orchard bees relatively safe. However, those individuals who are highly allergic to insect stings should avoid its nesting areas.

The blue orchard bee is a much more efficient pollinator than the honey bee for early fruits such as apples, pears, plums, cherries and peaches. However, they are short-lived compared to the honey bee. The adults die during the first half of June, immediately after they finish laying their eggs. The honey bee lives on

through the summer to pollinate later blooming flowers.



Figure 1. Two blue orchard bees at work pollinating apple blossoms.

The blue orchard bee may visit an average of 1600 flowers a day, pollinating over ninety percent of the blooms. Comparatively, the honey bee visits 700 flowers, pollinating less than fifty percent of those. Many apple cultivars have blossoms so shaped that the honey bee, foraging for nectar, can land on a petal, extract nectar, and never touch the anther that bears the pollen. The blue orchard bee always lands on the flower's pistil and among its anthers as it forages for pollen. The bee, covered with pollen, then takes it to the next flower, pollinating it. The honey bee concentrates on one tree per round trip to fill its non-spilling pollen baskets. The blue orchard bee flits from tree to tree literally soaking up pollen with its fat, hairy body and

then sloppily distributing it in a cross-pollinating frenzy from flower to flower. The blue orchard bee starts its morning work at about 55 °F, just the temperature at which apple pollination begins. The honey bee starts flying at warmer temperatures. In comparison to the blue orchard bee, honey bees are only part-time workers. In addition, the blue orchard bee provides an ever more critical alternative to the honey bee. Populations of honey bees have significantly decreased as a result of foulbrood diseases and infestations by the exceptionally virulent varroa and tracheal mites.



Figure 2. The blue orchard bee is an excellent pollinator for early fruit crops.

The blue orchard bee is native to North America. It builds solitary nests of mud in nesting holes, unlike the social honey bee that lives in a hive with an egg-laying queen, larvae, drones and workers. Although blue orchard bees live and work alone, they prefer to live near neighbors of their kind when nesting areas allow it. They do not bore their own holes but must find holes already prepared such as abandoned beetle holes in the ground, trees and wood. Natural nesting holes are often scarce, especially in yards. Gardeners can entice blue orchard bees to move into their yard simply by creating nesting sites for them—drilling holes in blocks of wood and placing the blocks around the yard or setting out bundles of unwrapped, paper soda straws (Fig. 3). Professional beekeepers encourage growth of blue orchard bee populations by providing additional nesting holes near fruit producing crops. Home orchardists should do likewise.

Begin by boring 5/16 inch diameter holes at least 3 1/2 inches deep in a large block of wood.

**Deeper holes, five to six inches deep, produce more female bees.** Make the holes about 3/4 inch apart. Since there are hundreds of species of solitary bees that make good pollinators, including 1/4 inch and 3/16 inch diameter holes will accommodate a wider diversity of pollinators. Large diameter, paper soda straws bundled together make excellent nests. **Do not use plastic straws.** Many bees will not nest in them. It is reported that the bees have less disease such as chalk brood, a disease of bees associated with contaminated nesting materials, when straws are used compared to wooden blocks. Of course, mixing large and small diameter straws in the nest may encourage other native solitary bees to use the nest too. This may extend the time bees pollinate garden flowers as other solitary bees may work later in the season. Fill a small box or container with paper straws so that their ends are open to the environment. Cut the top off a two-quart plastic soda bottle and put the straws in it. If the plastic container is cut longer than the straws, the nest will stay dry when it rains or snows. Long straws may be cut; the bee typically stocks only four to six inches of the nest.

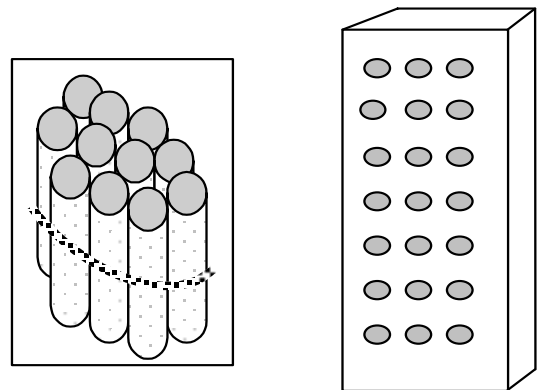


Figure 3. Blue orchard bees accept a variety of nesting materials including drilled wood blocks and bundles of large, paper (not plastic) soda straws.

While in the nest, eggs, larvae and pupae of solitary bees are attacked by pests and diseases. As the bees emerge from the nest at varying times and the females breed and begin nesting immediately in vacated holes, there probably never is a time when a block is empty of either the emerging adults or the newly laid eggs. This makes it difficult to clean and sterilize active nesting blocks without killing some of the bees. Wooden blocks are soaked in a weak

chlorine solution, five to ten percent household bleach, or heated in an oven at 200 to 250 °F to kill the pests. To keep the females from building nests in an old nest block or bundle of straws, place the nest in an enclosed box with two or three 5/16 inch holes in it. Put the nests in a box before mid-March. The emerging adults will find their way out of the box, but the egg-laying females will have difficulty finding the nest and will provision holes with nectar and pollen in new blocks or bundles placed nearby (Fig. 4). Once the old blocks are empty, they can be cleaned and sanitized. Old bundles of straws should be disposed of in the trash or burned to eliminate the source of diseases and pests.

From mid-March through May, place the nests near early flowering fruit and ornamental plants to encourage the greatest number of bees to occupy and work in your yard. Place each block with the entrance to the holes facing south or east to catch the morning sun. Protect them from rain and wind when possible. Starter blocks, already occupied with blue orchard bee pupae, may be obtained by mail order. Always order from a reputable company that ships only permitted, disease and pest free, true to name bees. One block may be adequate to start the colonization of a landscape with pollinators. At the beginning of the season, each hole can contain up to three females or more. As they build nests, each female may occupy five to seven holes. More blocks should be added each season to meet their needs and encourage the population to increase.

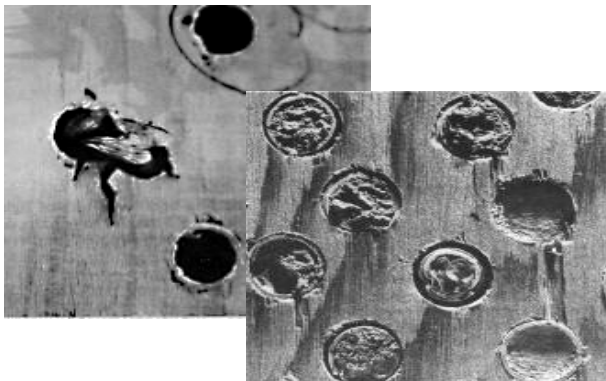


Figure 4. A bee entering a hole and several nesting holes sealed with mud.

Pictures from WSU King County Cooperative Extension, publication 156 by R. Bekey, E.C. Klostermeyer, K. Skeels, updated by D. Pehling.

Studies have demonstrated that commercial orchards can be fully pollinated by 250 female

blue orchard bees per acre. Small yards may only need 5-10 female blue orchard bees to meet the demand for pollination. No backyard is too small to house a thriving population, assuming pollen and nectar are nearby in April and May.

Females emerge, mate, and begin gathering nectar and pollen to store in either natural or man-made nests. Each female deposits one egg on a mound of pollen and nectar and seals it within a chamber constructed of a thin wall of mud. She repeats the process about five times per hole and then seals the hole with a ¼ inch thick wall of mud at the entrance. The eggs soon hatch into larvae that feed on the pollen and nectar. After several weeks, each larva weaves a tough, well-insulated cocoon for protection against the long season ahead. By September, the larva inside the cocoon molts into an adult bee to wait for spring.

In late March or early April, when temperatures consistently rise above 50 °F over several days, the bees begin to chew their way out through the cocoon and adobe walls. Male eggs are selectively laid near the entrance of each hole. Males emerge first and are ready to mate with the females as soon as they exit. The males are immediately able to fly while the females are less mobile at first, which facilitates breeding by the waiting males. The male bees die soon after mating.

A female uses five to seven nesting holes where she lays about 35 eggs before she dies in late May or early June. The female makes up to 36 trips to fill each cell with pollen and nectar and up to 12 trips to seal off each cell with mud. Although the bee forages up to a quarter mile for pollen, nectar and mud, it is best if the nests are established within 200 feet of these resources. This ensures a successful population of bees the next season.

The blue orchard bee is an excellent pollinator that makes a great difference in the set of early flowering fruits in northern Nevada gardens when spring frosts do not kill the blossoms. These docile, hard working bees are born for the job and none do it better.



**Caution:** Many insecticides are lethal to pollinators, both domesticated honey bees and wild bees including blue orchard, leafcutter, alkali, and bumble bees. To protect these pollina-

