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Native Bee Pollination of Cherry Tomatoes

Prepared by the Xerces Society for Invertebrate Conservation

(This fact sheet is based on research conducted by Claire Kremen, Neal Williams, Sarah Greenleaf, and Robbin Thorp)

Studies demonstrate that tomatoes pollinated by native bees produce larger and more numerous fruits. Honey bees do not pollinate tomatoes because they cannot get the pollen and the flowers do not produce nectar. With no reward, honey bees will not visit the flower. Many native bees, however, know the trick to extracting tomato pollen and are, therefore, valuable pollinators. Here we describe the benefits of native bees for tomato pollination and how to increase their populations and your bottom line.

INS AND OUTS OF TOMATO POLLINATION

Although the tomato plant is self-fertile, flowers must be vibrated by wind or bees in order to release pollen for fertilization. To achieve the most effective pollination, the flower must be vibrated at a specific frequency to release the pollen. Honey bees are unable to vibrate the tomato flower in this way, but bumble bees and other native species can.

Studies show that visitation by native bees increases fruit set by approximately 45 percent in Sungold cherry tomatoes, relative to wind pollination. Bee visitation also results in larger tomatoes. On average, the weight is nearly doubled. When native bees visit and vibrate these flowers, they not only cause the pollen to release, but they also often cross-pollinate the plants. This data suggests that the extra yield caused by bee visitation is due to both of these factors.

NATIVE BEE POLLINATORS

Recent studies found five native bee species visiting Sungold cherry tomatoes on organic farms in Yolo County, CA. Of these, the most important visitors are the yellow-faced and California bumble bees and the mud bee.

Bumble bees are social insects. The two species on this list nest in cavities either underground or in old rodent burrows. The queens start new colonies early each spring and by mid-summer may have more than 200 workers in a nest.

The mud bee is a solitary species that constructs its underground nests in flat ground to vertical banks of bare soil. Lone females excavate small cells three to seven inches below ground in which they deposit pollen and nectar. They

then lay a single egg before closing up the cell and moving on to build and provision another cell. Mud bees may nest in large aggregations, with hundreds of females constructing nests in a single area.



Yellow-faced bumble bee
Photo by Mace Vaughan



California bumble bee
Photo by Mace Vaughan



Mud bee
Photo by Mace Vaughan

The three most important native bees for pollinating tomatoes in Yolo County, CA

Common name	Latin name
Yellow face bumble bee	<i>Bombus vosnesenskii</i>
California bumble bee	<i>Bombus californicus</i>
Mud bee	<i>Anthophora urbana</i>

NATIVE BEE HABITAT AND TOMATO POLLINATION

According to studies, bumble bees were more abundant on organic farms close to oak woodlands, chaparral, or other areas of natural habitat. They were rarely found on farms greater than 400 yards from natural areas. Because bumble bees start their colonies so early in the spring, they need abundant early-flowering plants, such as willows and manzanita, to supply their queens with pollen and nectar. The abundance of mud bees did not vary consistently with wild habitat. However, any area close to a farm that supplies bare ground or exposed banks of soil could provide important nesting sites for these bees.

WANT MORE POLLINATORS?

Learn to recognize and protect your native pollinator resources

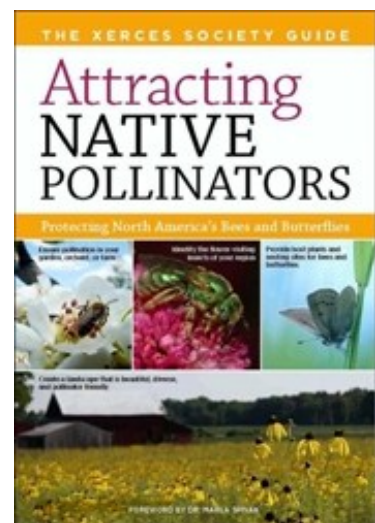
You may be benefiting from wild bee visitors to your tomatoes! To find out, walk slowly down a row of tomatoes (at a rate of about one yard per minute). If you spot one or more bees per minute at the flowers (or one bee per ten yards) you are probably getting benefits of up to 45 percent greater fruit set and 100 percent greater fruit weight relative to a farm with no bees. Listen carefully, and you'll hear the bees "buzz" the flowers to get the pollen out. You can easily learn to recognize the large, fuzzy black-and-yellow bumble bees. The mud bee is just slightly smaller than a honey bee, but is a much faster flier and is colored black and grayish-white. It makes a high-pitched buzz both when it gets the pollen and also when it's flying.

Generally, the abundance of native bees is much less on farms far from natural areas because these farms lack enough nest sites or forage throughout the year. In addition, nearby pesticide use likely has a devastating impact on native bee populations. To protect or provide habitat for tomato pollinators:

- Provide an abundance of native flowering plants in the farm landscape.
- Bumble bees depend upon old rodent burrows, so maximize your tolerance for rodents in the landscape and/or install bumble bee nest boxes around your farm.
- For mud bees, maximize the amount of untilled ground around fields and ensure that patches of bare soil are visible. Also look for and protect any vertical banks of exposed soil where erosion is not a major problem.
- Minimize insecticide use. If insecticides must be used, look for formulations that are least toxic to bees and apply when *no* flowers are present.

Enhance pollinator habitat

Even on farms with few natural areas close at hand, growers can provide habitat for native bees and may, over time, increase populations of these insects. For more detailed information on the simple steps that may be taken to protect native pollinators already living on your farm, or on how to provide habitat for native bees, please see *Attracting Native Pollinators: Protecting North America's Bees and Butterflies* or *Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms*. Both are available from our website (the latter as a free-to-download PDF).



For more information about providing for the habitat needs of native bees on farms and elsewhere, please contact the Xerces Society for Invertebrate Conservation or visit our website.

(855) 232-6639

www.xerces.org

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