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Native Bee Pollination of Watermelon

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)

Pollination by bees is critical for a successful watermelon crop. While the European honey bee is often used effectively to pollinate watermelon (at 2 hives per acre), native bees are also significant pollinators. In fact, on some organic farms in Yolo County, California, native bees provide *all* of the pollination needed. On a bee-per-bee basis, they are more effective than honey bees. They forage earlier in the day and transfer pollen more efficiently than the introduced honey bee. Plus, in the right situation, they may be abundant on your farm. Here we describe the importance of native bees for watermelon pollination and how to increase their populations and your bottom line.

INS AND OUTS OF MELON POLLINATION

Watermelon is a cucurbit, a family of crops that includes cucumber, muskmelon, and squash. As with all cucurbits, watermelon has separate male and female flowers. Watermelon do not self-pollinate, not even seedless varieties. To ensure pollination, a bee must transfer large, sticky pollen grains from male to female flowers. Female flowers are open for six to seven hours on one day only and during this time they must receive 500 to 1000 pollen grains to produce a marketable melon. Delivering this much pollen requires several bee visits. If honey bees are present in sufficient densities, they can provide adequate pollination. However, native bees deliver much more pollen per visit. Heavily pollinated flowers make larger fruit of more uniform size and lower costs by accelerating the harvest period and reducing the number of picks.

NATIVE BEE POLLINATORS

At least 23 native bee species visit watermelon in Yolo County, CA. Our research demonstrates that most of the native bees that visit watermelon flowers deposit more pollen on each visit than do imported honey bees; although, if honey bees are present in sufficient densities, they can provide adequate pollination for the crop. The table below lists five of the best native pollinators of watermelon in Yolo County, CA. The bumble bees on this list nest in cavities either underground or in old rodent burrows. They are social insects and may

The five most important native bees for pollinating watermelon in Yolo County, CA	
Common name	Latin name
Yellow face bumble bee	<i>Bombus vosnesenskii</i>
California bumble bee	<i>Bombus californicus</i>
Squash bee	<i>Peponapis pruinosa</i>
Long-horned bees	<i>Melissodes</i> species
Sweat bees	<i>Halictus</i> species

have more than 200 workers in a nest. The other bees listed are ground-nesting solitary species. Sometimes, they nest together in large numbers, but each female works alone, digging tunnels underground in which she constructs cells to lay her brood.



Yellow-faced bumble bee
Photo by Mace Vaughan



California bumble bee
Photo by Mace Vaughan



Squash bee
Photo by Jim Cane, USDA ARS

NATIVE BEE HABITAT AND WATERMELON POLLINATION

Recent research has demonstrated that natural areas are vitally important for crop pollination by native bees. In a study conducted in Yolo County, 80 percent of organic farms located near wild habitat could have received *all* of their pollination from native bees. In this same study, only 50 percent of organic farms located far from natural habitat could have received all of the pollination they needed from native bees. And, native bees alone could *not* provide enough pollination for any of the conventional farms studied.

Some of the most important pollinator species never occurred on farms far from natural habitat. Nevertheless, although farms far from natural habitat might not be able to rely solely on native bees to provide *all* of their pollination needs, native bees still contributed, on average, 28 percent of pollination to conventional farms and 60 percent to organic farms.

WANT MORE POLLINATORS?

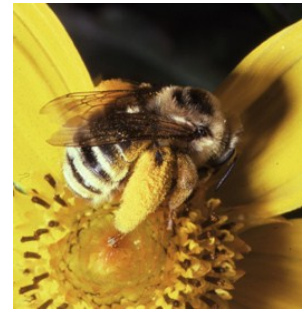
Learn to recognize and protect your native pollinator resources

The abundance of native bees is much less on farms far from natural areas because these farms lack nest sites or forage throughout the year. Supplying these habitat needs and reducing pesticide applications are the first steps to increasing crop pollination by native bees. Specifically:

- Bumble bees, among the best pollinators of watermelon, depend on cavities or old rodent burrows for their nests. Maximize your tolerance for rodents and/or install nest boxes.
- Other pollinators, such as some sweat bees, occur everywhere but are more abundant where underground nest sites and floral resources are available and protected from tilling. Protect or set aside untilled areas and ensure that some bare soil is visible.
- Squash bees depend wholly on cucurbit flowers to survive. They also nest underground and mostly occur on farms consistently growing squash year after year. Consistently plant a row of squash, in addition to watermelon.
- Eliminate the use of insecticides or, if they must be used, look for formulations that are least toxic to bees and apply them when *no* flowers are present in or close to your target fields.

Enhance pollinator habitat

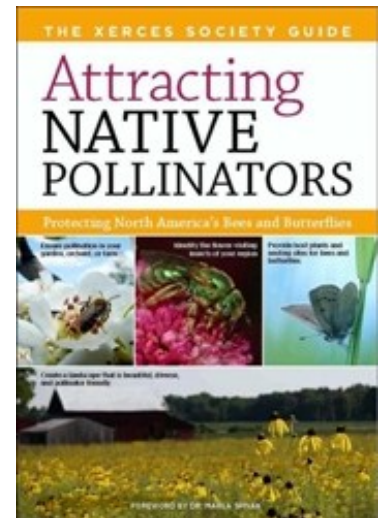
Even on farms with few natural areas close at hand, growers can provide habitat for native bees and may, over time, increase populations of these insects. For more detailed information on the simple steps that may be taken to protect native pollinators already living on your farm, or on how to provide 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).



Long-horned bee
Photo by Ed Ross



Sweat bee
Photo by Gary Braasch



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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