THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

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Pumpkin Pollinator: Biology and Behavior of the Squash Bee

***Peponapis pruinosa* (Say)**

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Ohio ranks second among pumpkin producing states with approximately 8,900 acres of pumpkins and squash planted in 2007. These are important cash crops completely dependent on bee pollination for adequate fruit production. Growers usually employ honey bees or bumble bees to ensure pollination. However, the native squash bee, *Peponapis pruinosa (Hymenoptera: Apidae)* also known as the 'eastern cucurbit bee' is common wherever cucurbits occur; from northern Mexico throughout most of the continental United States. It spread with the development of agriculture becoming a common and abundant pollinator specialist that exclusively utilizes squash, pumpkins, and other cucurbits in its life cycle. This bee has a competitive advantage over honey bees in that they are slightly larger, more rapid in flight, and begin pollen collecting activity earlier in the day. Unfortunately many growers are not aware of this specialist pollinator and in many cases spend thousands of dollars annually to rent honey bees which may be redundant pollinators. In Ohio, a 2007 survey of growers found that less than 1% were aware that native bees pollinated squash and pumpkins and none had heard of the squash bee (Goodell unpublished).

Biology: The squash bee is a solitary bee producing only one generation per year. Nests are built by individual females in the soil within or adjacent to plantings of *Cucurbita* spp. These bees are solely dependent upon *Cururbita* spp. for pollen. They are well adapted for collection of the large pollen grains of cucurbits and their diurnal flight period is synchronized with the opening of the flowers. In Ohio, adult squash bees usually appear in July, timing their emergence to flowering of summer squash, morning glory, cucumber, and melons (cantaloupe) but not pumpkins. After 2 to 3 weeks of pre-nesting behavior during which time adults are able to disperse and feed on nectar and pollen, nest build-

Solitary Nest Site

ing activity begins. By that time pumpkin flowers are available and pollen is readily obtainable for provisioning nests. Females construct nests 12 to 22 centimeters below the soil surface within the cucurbit fields and along undisturbed or uncultivated field margins. Nests usually have 4 to 5 cells containing larvae which are provisioned with pollen by females. Larvae overwinter as pre-pupae in the nests, and metamorphose into adults in early summer. These new adults emerge from the ground nests in July. Females may construct more than one nest in a season. Male activity in the morning generally lags behind the time when females commence their foraging activity and often males may be found sleeping in the closed flowers of the previous day.

Identification: Adults range in length from 11 to 14 millimeters and in breadth of abdomen from 4 to 5.5 millimeters, black in coloration with pale yellowish to tan hairs covering most of the head and thorax. The abdomen is black with whitish bands.

A survey conducted by SPAS (Squash Pollinators of the Americas Survey) found that on 20 sites in 11 states surveyed, the squash bee *P. pruinosa* was present in all but one site, ranging in numbers from 10 to 120 bees per 100 flowers sampled (Cane et al. 2008). Observations of flower visitation by bees at 3 cucurbit farms in northeastern Ohio found that visitation by *P. pruinosa* far outnumbered that of other Hymenopteran pollinators (Figure 1) (Williams et al. 2008, unpublished).

Recent crashes of honey bee populations have emphasized the need to expand our knowledge of and options for pollination. The sustainability of modern agriculture depends on aligning crop production practices with the ecological needs of pollinators. Therefore, studies identifying specific pollinators and their associated crops are critical to our ability to determine which specific farm management practices promote sustainability and genetic diversity of these species and which are detrimental.

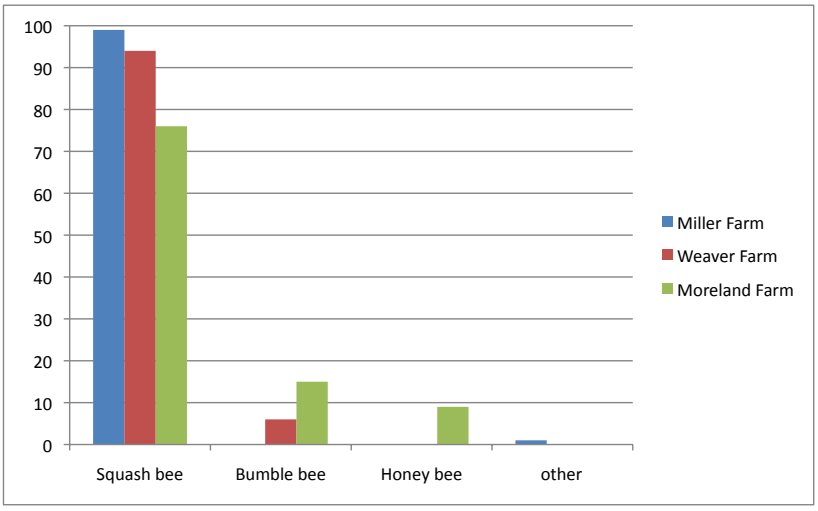

Figure 1. Percentage of bee visitations to pumpkin flowers Wayne County, Ohio, 2008.

The effect of farm management practices is likely to be species specific for diverse groups such as bees because of their different nesting requirements, diet breadths, foraging and dispersal ranges, and seasonal patterns of activity. This realization highlights the need for a better understanding of the ecology and population biology of valued agricultural pollinators. Growers armed with this information can make better day-to-day decisions concerning the use of pesticides, crop selection, till versus no-till and landscape management all of which can impact current and future pollinator populations.