

### Background on squash bees

Squash bees (*Peponapis pruinosa*) are solitary, ground nesting bees that forage for pollen and nectar from flowering plants in the genus *Cucurbita* (summer and winter squash, pumpkins). Often nesting in untilled field margins or nearby unvegetated fields adjacent to squash crops, these bees provide critical pollination services to farmers growing cucurbit crops (see photograph 1).

Squash plants produce separate male and female flowers that require insect pollination for successful fruit development. Although honeybees and bumblebees will also visit squash flowers to some degree, it is not their preferred forage, leaving most of the squash pollination provided by squash bees. Squash bees collect both the nectar and the protein-rich pollen that is fed to their developing larvae. Squash bees also court and mate within squash flowers. Male bees can be found sleeping in the flowers that have finished blooming.

Squash flowers open in the early morning, and last only 5 - 6 hours, after which they will close and wilt, with the plant's next offering of open blooms provided the following morning. As a result, squash bee activity on the flowers is often at its peak shortly after the blooms have opened for the morning. Therefore it is important to conduct any observational or monitoring activities of these pollinators in the morning hours.

Farmers should keep in mind that squash bees are ground nesters who lay their eggs into caves built into open soil/sand, with a depth of approx 6 inches. Deep tilling and plowing will destroy these nests and interrupt the annual regeneration. Nests look similar to ant nests, but are generally more compact and lack ant traffic. If you find squash bee nests on your farm and want to preserve population, make leave soil horizons at depth of 5 inches and more undisturbed. Furthermore, squash bees tend to return to successful nesting sides in the next years.

### Squash bee identification

Squash bees can be confused with honey bees - they have similar size, similar form, similar coloration. Two features distinguish them:

1. Their abdominal colouring is a little stronger black and white, especially the males are fairly whitish. But with pollen sticking all over them, and shading, that can be tricky to see.
2. The hind legs of honey bees are flat, and honey is collected only in one little area where it clings. Squash bees have round hind legs that are much more hairy, and pollen sticks to the whole leg. Male squash bees don't need to collect pollen and have no hair on their hind leg.

What is much easier to spot are behavioral differences. Squash bees are ground-nesting and solitary bees. They hang out in pollinated squash flowers at night, and male squash bees linger in opening flowers during the early morning - and that is how you can catch them!

Here is a video that helps you distinguish squash and honey bees: <https://www.youtube.com/watch?v=a2UcgRx9ugE>

This video is for distinguishing male and female squash bees (for the advanced): <https://www.youtube.com/watch?v=7hk3E2NeABY>

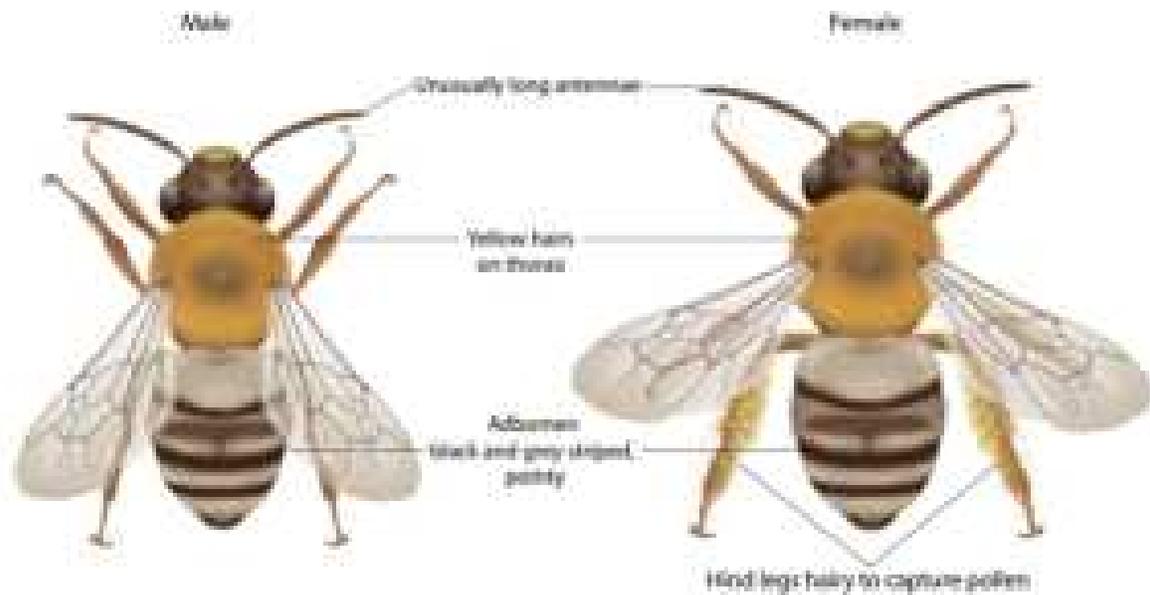
### Squash Bee Monitoring Protocol

To determine the presence and abundance of squash bees in *Cucurbit* fields will be accomplished using a replicated transect method. Because mating time for squash bees in this area is at its peak in early August, we will conduct our survey in the 2nd week of August, 2014. Also, because of the morning blooming of the flowers, observations will be conducted between 8:00-9:00 am when squash bee flower visitation is at its greatest.



USDA, from [commons.wikimedia.org](https://commons.wikimedia.org)

**Figure 1** — Squash bee *Peponapis pruinosa*



SOURCE: *The Pollination System of Pumpkin, Squash, Summer Squash, and Zucchini*.  
 By Susan Chan, M.Sc. Copyright Farms At Work (available at <http://farmsatwork.ca/>)

**Figure 2** — Male and female squash bees

1. Five transects (straight lines in the field from the edge into its centre) are identified and marked within a squash/pumpkin/zucchini field. Length and distance between transects will be determined by field size, but should be laid out so that observation has been distributed throughout the field area.
2. Environmental data to record:
  - (a) Date and location
  - (b) Observation start and end times.
  - (c) Temperature and weather (sunny, cloudy, precipitation, wind)
3. For each transect, 100 squash flowers will be observed. For each flower observation, we will determine:
  - (a) Squash bee presence/absence and the total number of squash bees per flower;
  - (b) Number of male and female squash bees. Females are larger and have hairy legs for pollen collection (see Figure 2 for male and female squash bee comparison).

!!! Beginners may not be able to distinguish male and female squash bees, it takes a bit of practice. In this case, you can still count the total number. For sexes, try your best and note down whether you feel comfortable with the distinction or not.

**IMPORTANT!**

**This experiment is best conducted during early hours (morning before 9:00 AM) and with warm and sunny weather. Also, if you don't see anything, that is also a good result - please send us your sheet anyway!**

Please send this page (even if you did not see any!) and, if you filled it out, the pollinator habitat assessment, to this address:

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# SQUASH BEE MONITORING - DATA SHEET

Name of Farm: \_\_\_\_\_

Monitoring date: \_\_\_\_\_

Observer: \_\_\_\_\_

Observation site Name (Field ID): \_\_\_\_\_

### Record before start:

Observation time      Time start observation: \_\_\_\_\_  
Weather at start:      Shade Temp (°C) : \_\_\_\_\_  
                                 Wind (Beauford Force) : \_\_\_\_\_  
                                 Sky (underline) : Clear / partly cloudy / bright overcast

Transect ID	Observation duration	Number of flowers visited	Squash bee count		
			Males	Females	Total

### Record after end of observation:

                                 Time end observation: \_\_\_\_\_  
Weather at end:      Shade Temp (°C) : \_\_\_\_\_  
                                 Wind (Beauford Force) : \_\_\_\_\_  
                                 Sky (underline) : Clear / partly cloudy / bright overcast