

Citizen science squash bee survey

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This factsheet will help you understand...

- The types of bees visiting Michigan cucurbits
- Management practices that may affect squash bees

Introduction. As part of a USDA Organic Research and Extension Initiative funded grant on organic cucurbit (squash, melon, cucumber, gourds, etc.) management Michigan State University’s Vegetable Entomology Laboratory is conducting a citizen science project to survey bees visiting cucurbit flowers. Our goal is to better understand cucurbit pollination, in particular the role of squash bees and the impact of crop management practices on their populations. The survey results from 2017 and 2018 are presented here.

How the surveys were conducted. MSU Extension Master Gardeners (EMGs) were engaged as citizen scientists to assist in data collection across the state. The primary platform used to conduct the survey was the Squash Bee Survey smart phone app (Figure 1), but paper and web browser versions were available.

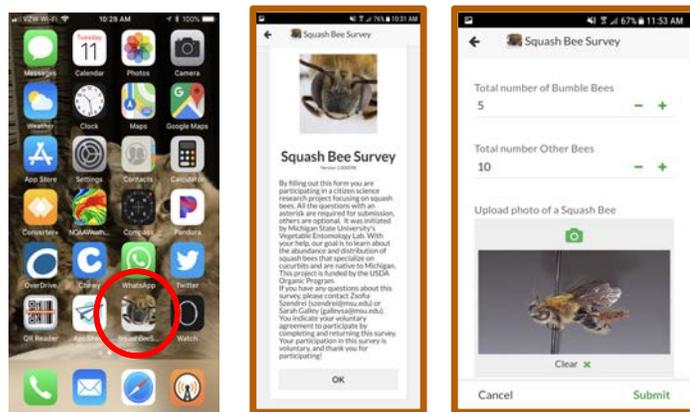


Figure 1. Screenshots from the Squash Bee Survey smartphone app.

EMG citizen scientists reported how squash crops were managed as well as the numbers and types of bees they observed visiting cucurbit flowers. Bees



were grouped into four categories: squash bees, honey bees, bumble bees, and other bees.

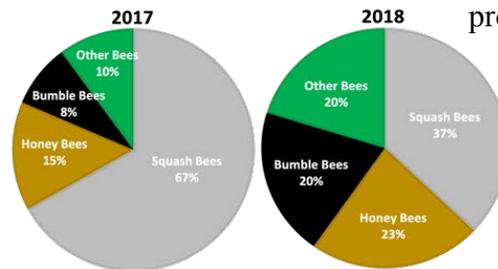
Figure 2. Squash bees spending the afternoon in a female flower



To train participants, webinars and face-to-face trainings across Michigan were held. Classroom sessions were combined with an outdoor lab to teach bee identification, conduct surveys, and report observations.

Figure 3. EMGs learning to identify and monitor squash bees.

Bees reported by county. Participants submitted a total of 59 surveys in 2017, and 84 in 2018. Twenty Michigan counties mostly in the lower peninsula, and 1 county in Indiana were represented. Squash bees were reported in 11 out of the 20 counties, honey bees in 12, bumble bees in 16, and other bees in 14. Although squash bees were reported in the least number of counties, they accounted for the greatest



proportion of bees observed during both years.

Figure 4. Percentage of each type of bee reported.

Impact of tillage on bees. Each survey submitted included the type of tillage that was used in the garden where the bee observations were made. The tillage types were categorized as “full tillage” (100 % cultivation), “reduced tillage” (partial cultivation), and “no tillage” (no cultivation). Most people reported using reduced tillage followed by no tillage and full tillage during both years. We compared the effect of the tillage methods

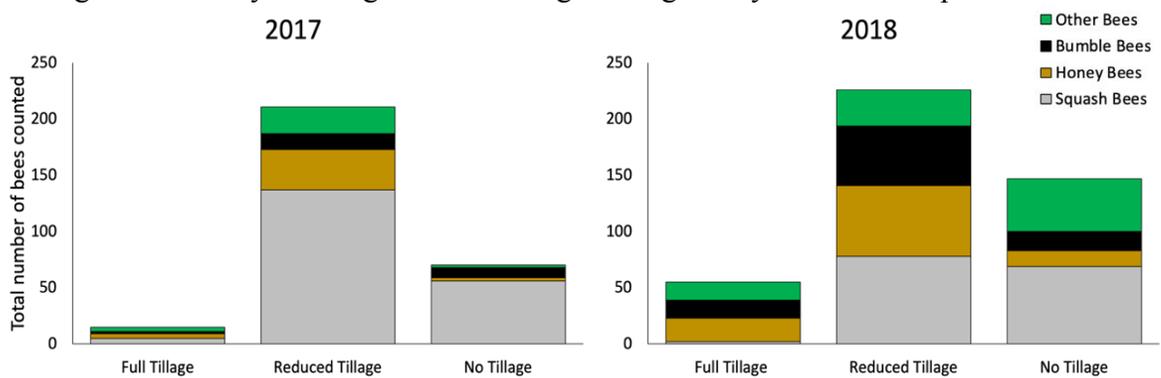


Figure 5. Differences in the total number of each type of bee by tillage method in 2017 and 2018.

used on the types of bees observed during 2017 and 2018 and found that **the overall number of squash bees observed per survey was significantly higher in reduced and no tillage gardens (Fig. 5).**

Impact of mulch. Participants reported the mulching practices used in the garden where bees were observed. Mulching practices were combined into two categories: “mulch” (plastic or plant material) or “none” (no mulch used). Results indicated that **the overall number of squash bees reported was significantly higher in the “mulch” category during both years (Fig. 6).** However, the majority of participants reported that mulch was used in the garden, which may affect these results.

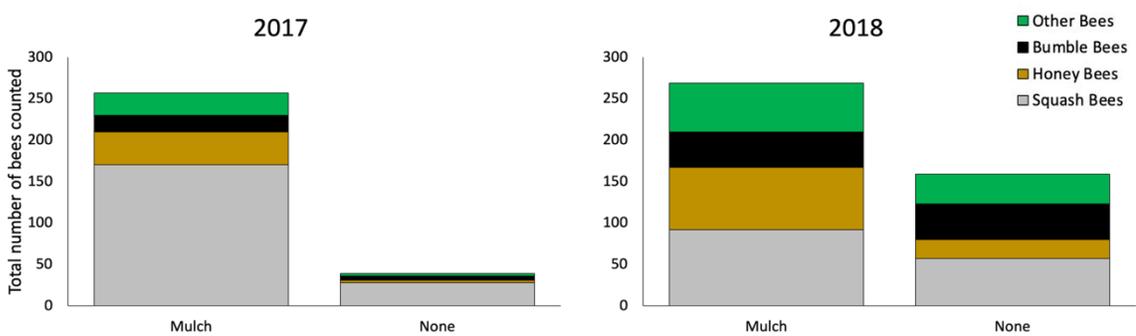


Figure 6. Differences in the total number of each type of bee reported by mulching in 2017 and 2018.

Summary

- More squash bees were observed in gardens using reduced or no tillage than those using full tillage in both 2017 and 2018, most likely due to reduced disturbance of the soil where they nest.
- More squash bees were observed in mulched gardens during both years, but this may have been affected by greater numbers of participants making observations in mulched gardens.
- Our findings suggest that growers can use mulch for common purposes such as weed suppression and disease management without deterring or inhibiting squash bee nesting in or near their squash plants.

To learn more about squash bees or participate in the survey in 2019 please visit:

- Project website: <https://vegetable.ent.msu.edu/squash-bee-project/>
- Learn about squash bee biology: <https://vegetable.ent.msu.edu/cucurbita-factsheet-3/>
- MSU Pollinator website: <https://pollinators.msu.edu>
- Follow us on Twitter: @msuvegent

To contact an expert in your area, visit msue.anr.msu.edu/experts, or call 888-MSUE4MI (888-678-3364).

