



Pollinator in Soybean Update

Ohio Summary

Amy Raudenbush, John Barker, Lee Beers, Sam Custer,
Amanda Douridas, Mike Estadt, David Marrison, Eric Richer,
Patrick Beauzay¹ and Kelley Tilmon
The Ohio State University
¹North Dakota State University

An array of bee species visit soybean flowers and can enhance yield even though soybeans are self-pollinating. To determine pollinator species in Ohio soybean, a survey was conducted in 2016 at eight Ohio soybean fields. There were two objectives of this study. The first was to identify the diversity of bee species present in Ohio soybean fields from flowering to full pod. The second objective was to determine the distance into soybean fields that bees are foraging. Fields were planted with either conventional or organic soybeans. The minimum field size was 382 x 382m to ensure samples were collected at distance from field edges. To sample, a metal stake with a “bee bowl” collecting device mounted on it was posted at various intervals up to 250m into the field sampling was performed twice a week from beginning flowering (R1) through full pod (R4) (Figure 1). The height of the bee bowl was adjusted to canopy level throughout the monitoring period. At the end of the season, all samples were sorted and sent to North Dakota State University where they were identified by Patrick Beauzay.



Figure 1. Bee collecting device.

Results

Overall, 2,676 bees were collected and identified from fields located in Ashtabula (2 sites), Darke, Fulton, Knox, Licking, Logan and Pickaway counties. Bees were captured from flowering (R1) through full pod (R4) soybean developmental stages which ranged from July 1 to August 25, 2016 depending on the location (Table 1). Captures included 49 different species from five families (Table 2). The five families were Andrenidae (e.g., mining bees), Apidae (e.g., honey bees, bumble bees and longhorn bees), Colletidae (e.g., plasterer bees), Halictidae (e.g., sweat bees) and Megachilidae (e.g., leaf cutter bees). Furthermore, sweat bees were the most prevalent family, comprising 96% of the bees captured. Ohio's most widespread and common bee species in this study was *Lasioglossum hitchensi*, which comprised 36% of all of the bees captured. *L. hitchensi* is a native sweat bee that nests in the ground and was the most abundant species at all of the field locations, with an exception of the two sites in

Ashtabula Co. where *Lasioglossum versatum* and *Lasioglossum zonulum* were the most common bee species.

The number of bees captured by week from July 1 through August 26 is shown in Figure 2. Overall, Halictidae (sweat bees) were the most common family in the bee bowls each week. On average, the week ending July 22 had the highest number of bees collected (129.2), followed by the week ending July 29 (83.6). The lowest average number of bees was recorded for week ending August 19 (33.3). These results suggest that the highest bee activity in soybean is in the final two weeks of July; however, the total number of trap captures on any given date may be affected by temperature and weather (this information was not included in the data analysis).

The second objective, to determine the distance into soybean fields that bees were foraging, was addressed by placing bee bowls in soybean fields at 0m, 5m, 10m, 25m, 50m, 100m and midfield. Bees were collected from all field locations, including midfield, as early as the R1 soybean stage (beginning flowering). These results suggest that bees forage the entire soybean field soon after soybean plants begin to bloom. Overall, there was little variability in the number of bees collected in the bee bowl locations, ranging from 332 bees at 5m to 404 bees at 0m (field edge) (Figure 3).

Summary and Conclusions

In summary, throughout 6 weeks of monitoring bee activity in soybean, 2,676 bees were captured including 49 species from five families. All of the identified bee families included pollinators and although honey bees were not the majority of the bees identified, there were numerous other pollinator species. This information highlights the extensive diversity of pollinator species foraging Ohio soybean, and shows how soybean producers provide valuable habitat to support pollinators in the ecosystem.

Table 1. Summary of participating locations and bees collected

County	Total bees	Total families	Total species	# Weeks monitored	Start date	End date
Ashtabula 1	228	2	14	2	7/14	7/25
Ashtabula 2	400	2	14	2	7/18	8/2
Darke	261	2	15	5	7/7	8/15
Fulton	399	4	19	6	7/15	8/25
Knox	579	4	30	4	7/5	8/3
Licking	460	3	25	6	7/1	8/15
Logan	210	4	21	3	7/26	8/17
Pickaway	139	3	15	4	7/5	7/30

Table 2. Family, genus, species and number of each bee identified in the pollinator survey.

Family	Genus	Species	Number
Andrenidae	<i>Andrena</i>	<i>integra</i>	1
	<i>Calliopsis</i>	<i>andreniformis</i>	3
Apidae	<i>Apis</i>	<i>mellifera</i>	40
		<i>bimaculatus</i>	1
		<i>fervidus</i>	5
		<i>impatiens</i>	2
		<i>agilis</i>	1
	<i>Melissodes</i>	<i>bimaculata</i>	24
		<i>denticulatus</i>	4
		<i>trinodis</i>	3
		<i>virginica</i>	1
	Colletidae	<i>Hylaeus</i>	<i>affinis</i>
<i>mesillae</i>			7
<i>modestus</i>			1
Halictidae	<i>Agapostemon</i>	<i>sericeus</i>	1
		<i>virescens</i>	15
	<i>Augochlora</i>	<i>pura</i>	15
	<i>Augochlorella</i>	<i>aurata</i>	289
	<i>Halictus</i>	<i>confusus</i>	69
		<i>ligatus</i>	87
		<i>rubicundus</i>	3
		<i>Lasioglossum</i>	<i>admirandum</i>
		<i>albipenne</i>	33
		<i>anomalum</i>	1
		<i>bruneri</i>	170
		<i>coriaceum</i>	3
		<i>cressonii</i>	12
		<i>ellisiae</i>	1
		<i>ephialtum</i>	7
		<i>floridanum</i>	1
		<i>hitchensi</i>	957
		<i>illinoense</i>	3
		<i>imitatum</i>	2
		<i>laevissimum</i>	4
		<i>leucocomum</i>	1
		<i>leucozonium</i>	4
		<i>nigroviride</i>	1
		<i>nymphaearum</i>	3
		<i>paradmirandum</i>	10
		<i>perpunctatum</i>	4
		<i>pilosum</i>	25
		<i>pruinatum</i>	3
		<i>tegulare</i>	15
		<i>truncatum</i>	6
		<i>versatum</i>	293
		<i>zephyrum</i>	55
	<i>zonulum</i>	422	
Megachilidae	<i>Heriades</i>	<i>variolosa</i>	1
	<i>Megachile</i>	<i>brevis</i>	1

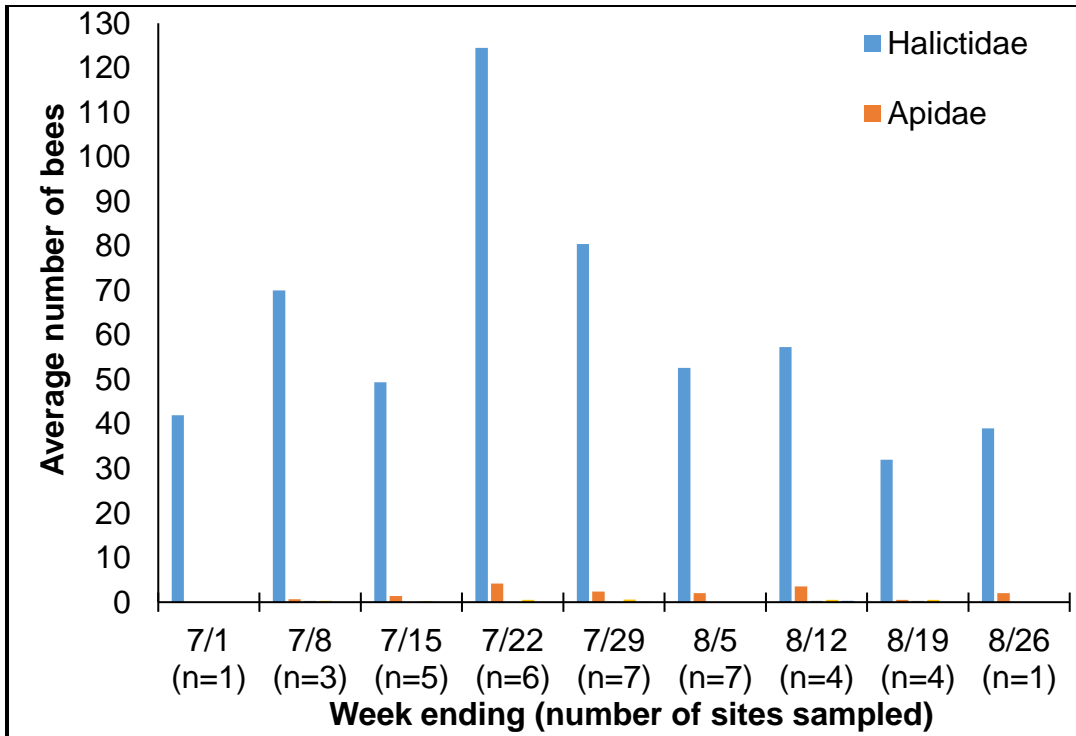


Figure 2. Average number of bees captured from the weeks ending July 1 through August 26. (n= number of locations that participated in the sampling during that week).

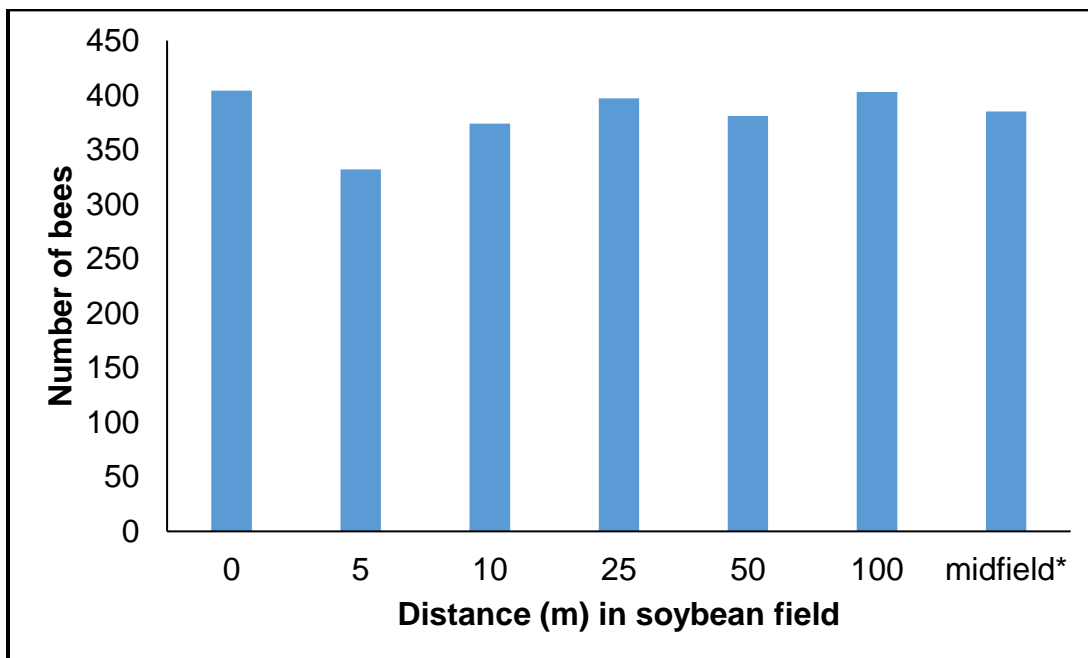


Figure 3. Total number of bees collected from bee bowls at various distances from the field edge (0m, 5m, 10m, 25m, 50m, 100m and midfield) July 1 through August 25, 2016.

*midfield was dependent on the size of the field and ranged from 191m to 250m from the field edge.