

# Urban Pollinator Community Abundance and Richness: Bridgeport, Connecticut



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## Aim and Scope

### Characterize the pollinator community at UB:

Urban pollinator communities are not well understood. This study seeks to identify common pollinator species and compare these findings with statewide records from both urban and natural spaces. Here we report bee species, diversity indices and seasonal variation between fly and wild bee populations.

### Estimate abundance of wild bee species at UB.

Surveys of urban biodiversity is generally higher than rural and agricultural systems, however native species are often displaced with non-native and invasive species. A typical consequence of urbanization is also the loss of native floral resources which can impact populations of specialists (pollinators who specialize in a specific plant-host) and generalists who can take advantage of the abnormal variety of plants. At the same time, urban areas have provided refuge for rare and exotic species.

### Estimate abundance of fly populations at UB.

Aside from bees, flies are also regarded as an important group of pollinators however the extent and efficiency of their pollinator services is little understood. Flies are one of, if not the most, abundant insect taxa found in urban areas. Thus, surveys of fly diversity and abundance could give insight into the overall biodiversity of an urban area. There are few studies which focus on fly and wild bee interaction, which could be a method to assess urban pollinator health.

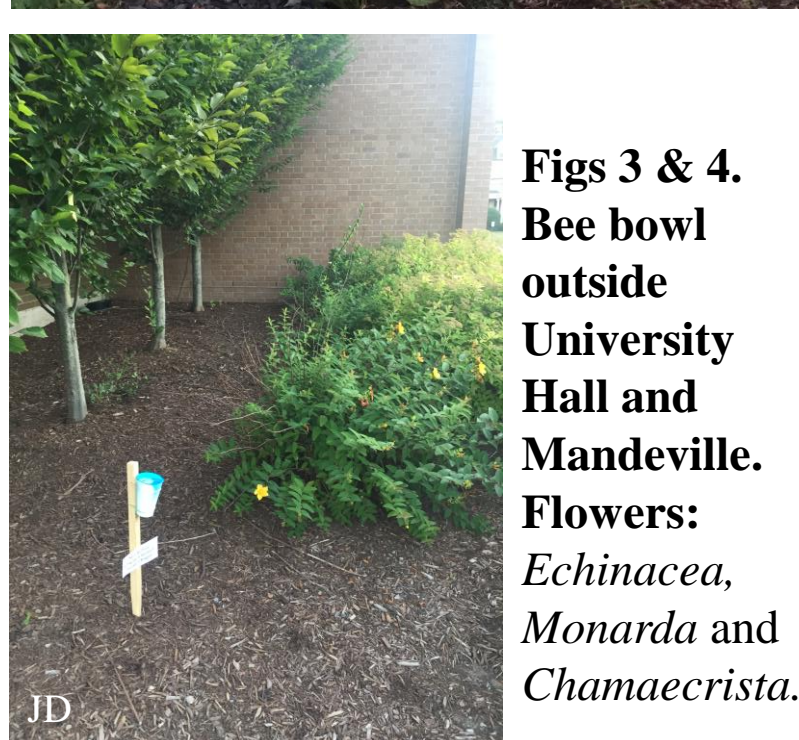


Figures 1 and 2: Male *Agapostemon* sp. (metallic sweat bee) in UB research garden [left]. Hoverfly (*Syrphidae* sp.) [right], note the bee-like features.



## Pan-trapping Protocol

- Nine alternating color cups (blue, white, yellow) filled with 1:1 Propylene glycol/Water mixture were placed around UB main campus: Bridgeport, CT.
- Eight samples were collected at two week intervals over 16 weeks from the middle of July to early November.
- Specimens of interest were tallied and split into the following taxonomic divisions for simplicity of study: Diptera excluding Syrphidae (all flies except hoverflies) [DeS], Apoidea (bees) [A] and Syrphidae (hoverflies) [S].



Figs 3 & 4. Bee bowl outside University Hall and Mandeville. Flowers: *Echinacea*, *Monarda* and *Chamaecrista*.

## General Taxa Survey

### Bee Specimens Separated by Season.

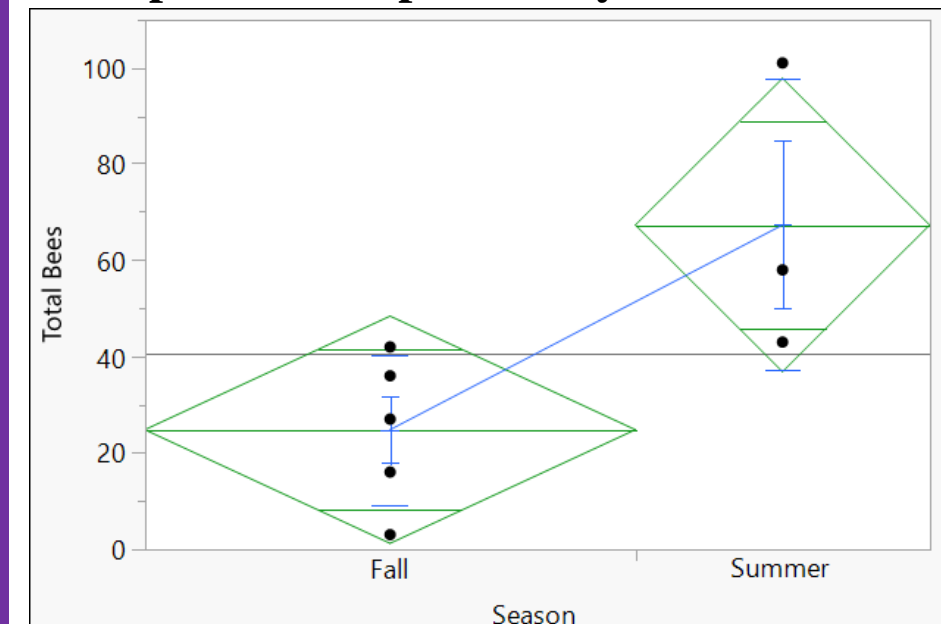
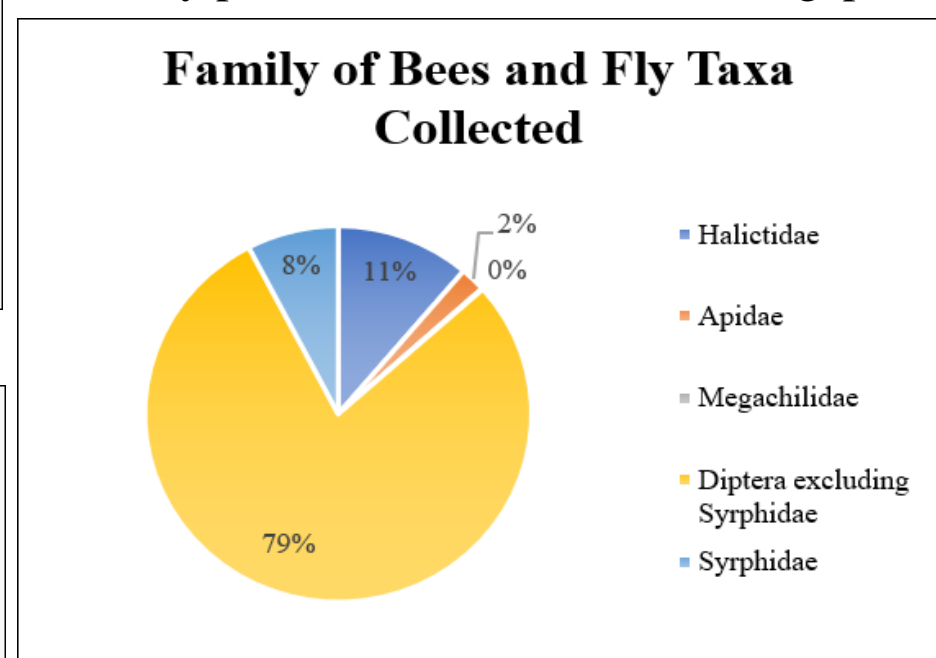
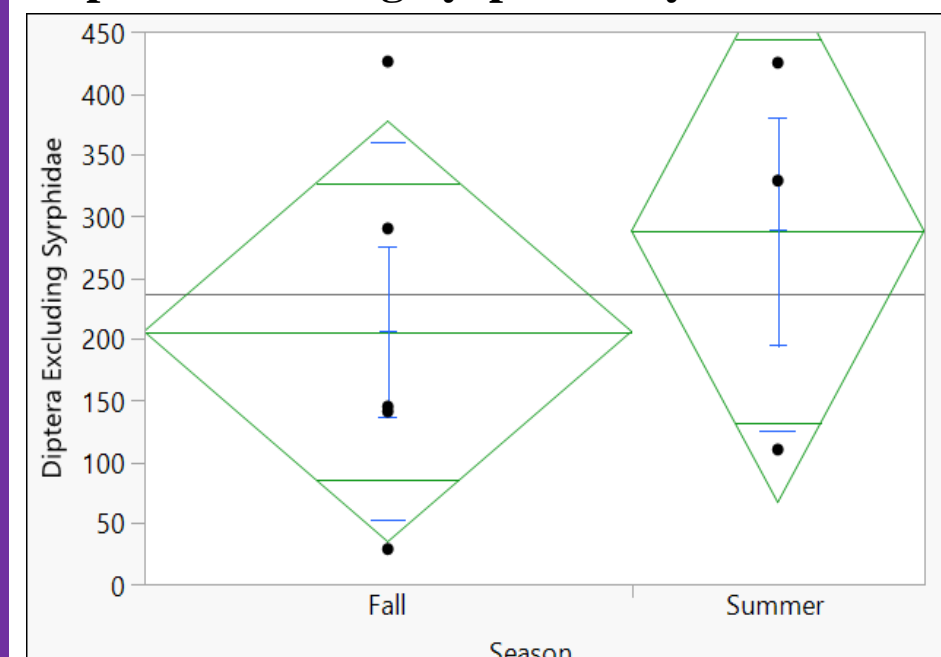


Figure 5. Pie diagram of collected bee families and fly taxa. Note: DeS was the most abundant of all taxa of interest. *Megachile rotundata*, a wood-nesting solitary bee, comprised 2 out of the 2,403 total specimens: a possible indicator for a greater need in diversity of woody plants in the south end of Bridgeport.

### Diptera excluding Syrphidae by Season.



Figs. 6 & 7. Anova analysis of Apoidea and DeS by season. Note the difference in bee abundance between seasons. It is interesting to note DeS abundance on the whole is relatively stable. The latter trend was also illustrated in the third taxonomic group: Syrphidae (not shown).

## Bee Flight Season and Total Abundance

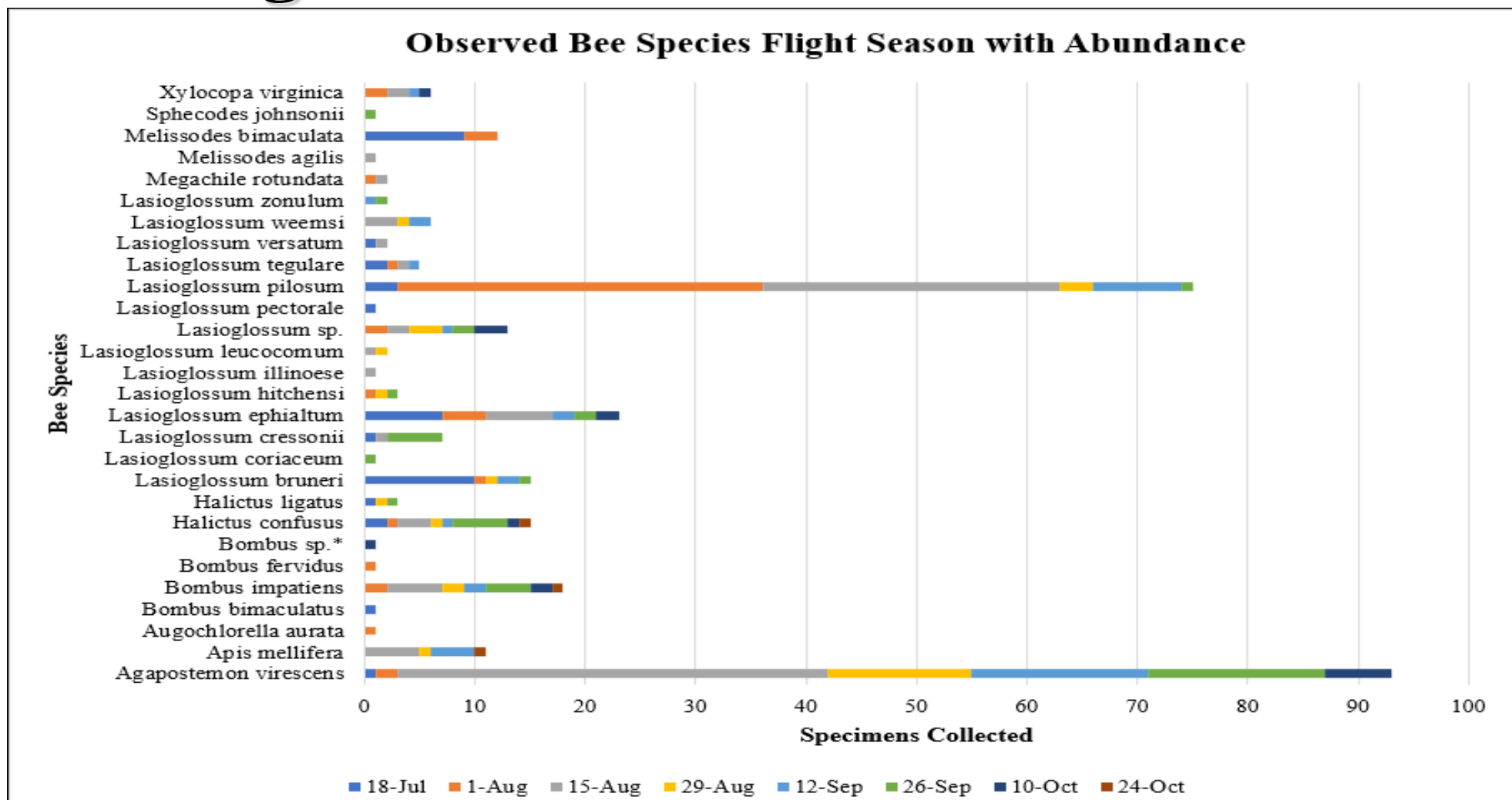


Fig. 8. UB observed flight season of collected bee species. *L. pilosum* and *A. virescens* were the most abundant bee species collected. *A. virescens* and *B. impatiens* were found in 7 and *L. pilosum* was found in 6 of the 8 samples. The trend of homogeneity and species turnover associated with urban environments can be clearly seen as compared with the bee flight season at SBM.

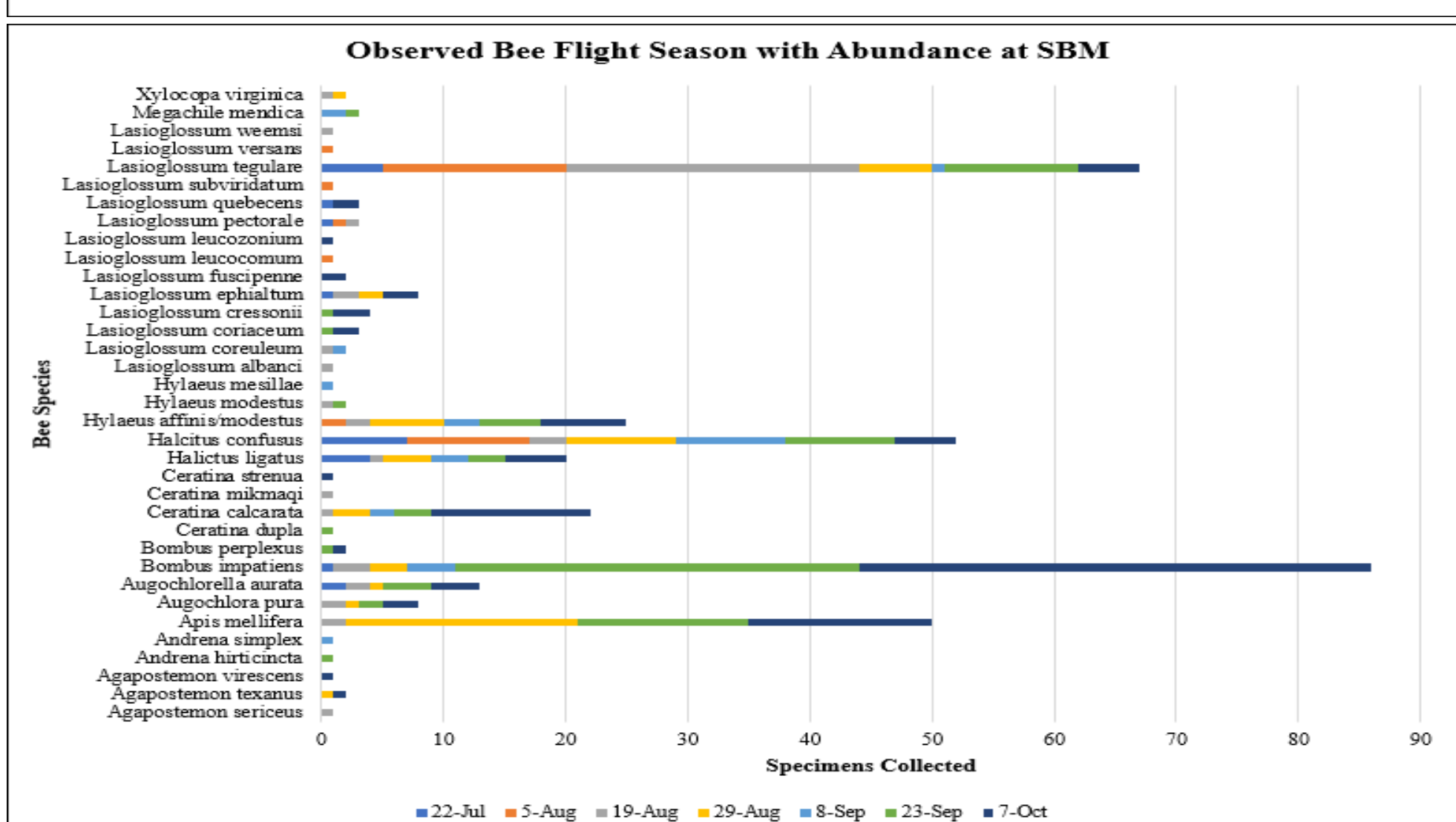


Fig. 9. SBM observed flight season of collected bee species. As opposed to the two dominant species found at UB, there are four species found in abundance.

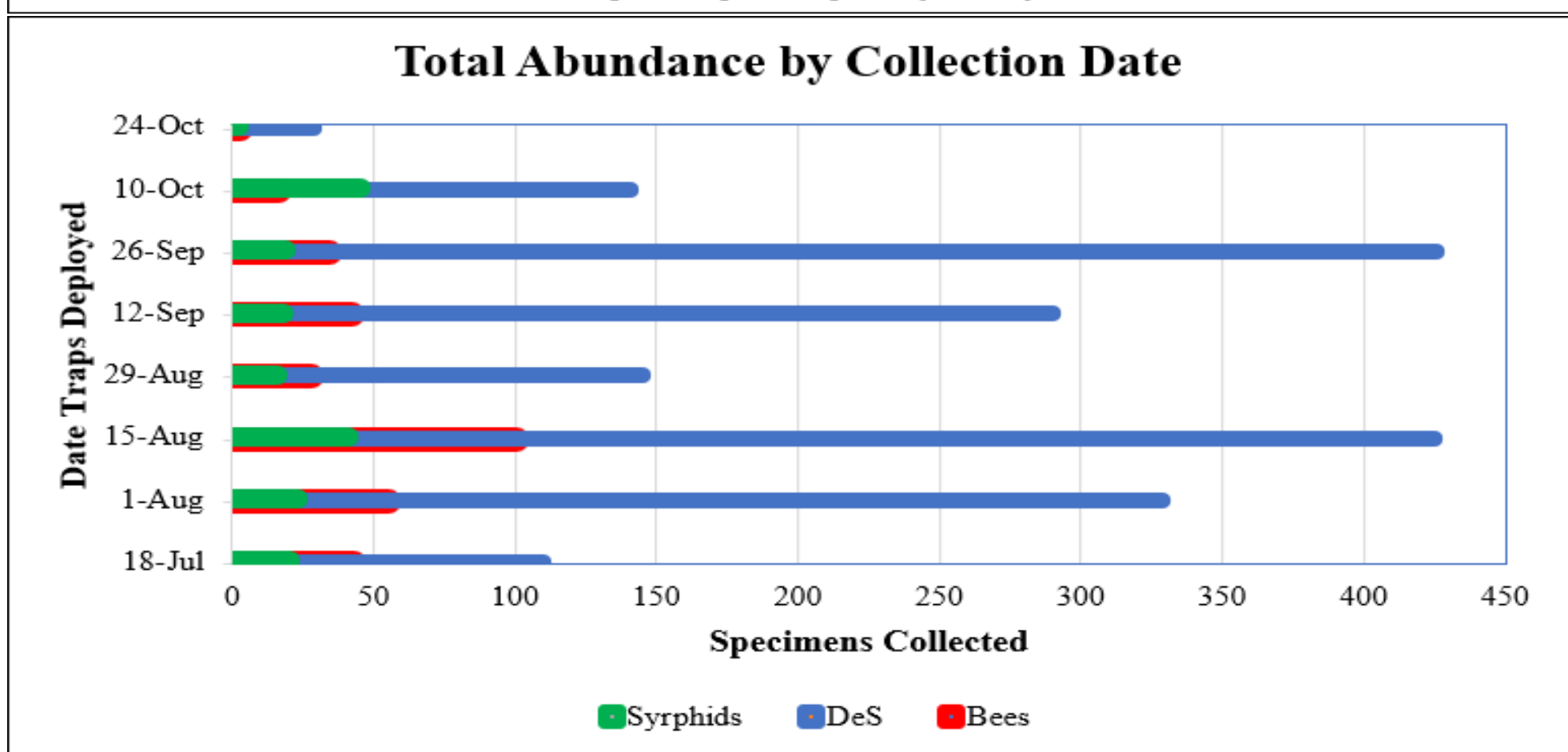
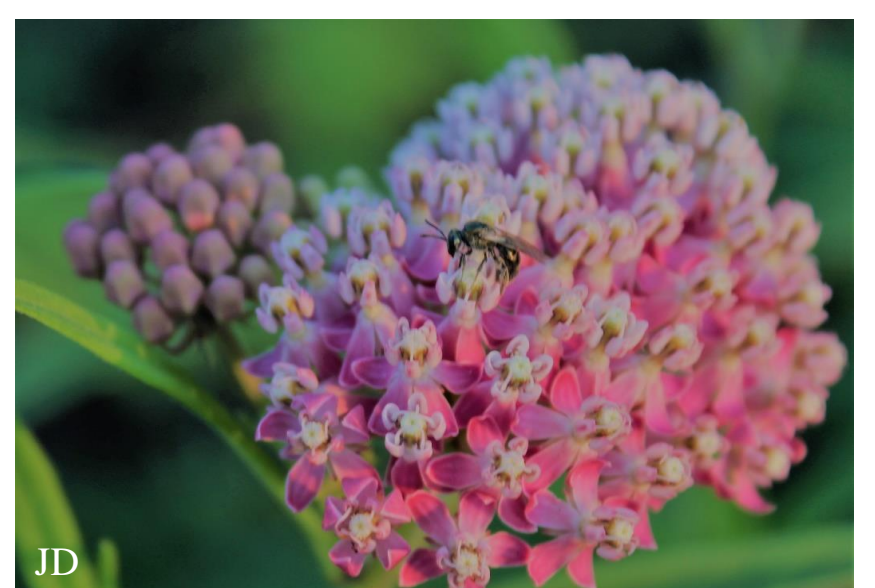


Fig. 10. Three groups of study: Syrphids, DeS and Bees. On 10 Oct. the number of collected syrphids were at least double all previous observations and outnumber collected bees.



Figs. 11 & 12. Monarch butterfly (*Danaus plexippus*), bumble bee (*Bombus* sp.) and great golden digger wasp (*Sphex ichneumonaeus*) [left]. Sweat bee (*Lasioglossum* sp.) [right]. All in UB's research garden on swamp milkweed (*Asclepias incarnata*).



## Diversity Indices

Shannon-Weiner and Simpson's Diversity Index Values.					
	Species Richness	Shannon's H	Shannon's E	Simpson's D	Simpson's E
Summer	24	2.08701	0.65669	5.14992	0.29561
Fall	18	2.09881	0.72614	5.32089	0.21458
Season Total	28	2.16612	0.65005	5.63302	0.20118
SBM	35	2.493134	0.701235	8.28614458	0.23674699

Fig 13. Shannon- and Simpson-Index. Simpson's D represents a measure of biodiversity of an area. Note, this value is higher in Fall than in Summer. Also, note species richness is higher in a natural space (SBM) than in urban (UB).

## Conclusions

- *Bombus fervidus*, a bumble bee species declining in the northeast and last recorded in CT in 2012, was collected at UB in 2018.
- *Lasioglossum zonulum*, a non-native species of sweat bee on the increase and only recorded twice in CT (2009), was collected at UB in 2018.
- Four non-native bee species were found on campus. Port cities could serve as entry points for exotic species
- There is a shift in late-season pollinator community composition.
- Lack of native flora could indicate a direct impact on pollinator community composition.

## Future Research

UB campus will be split into a 9-grid system to study spatial patterns of pollinator communities and plant start/end bloom time in each microhabitat. Taxonomic clarification will be expanded for other local pollinators such as flies, butterflies and wasps.

## Acknowledgements:

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