ESA2019 LOUISVILLE

9: The potential of gender ratio in mason bees (*Osmia spp.*) as an indicator of ecosystem health

Tuesday, August 13, 2019
04:30 PM - 06:30 PM
Kentucky International Convention Center - Exhibit Hall

Background/Question/Methods

Bees are considered keystone organisms within the ecosystem, pollinating both crops and wild plants. The genus *Osmia* (mason bees) are effective pollinators due to their morphological features, specialist foraging preferences, and the propensity to easily deposit collected pollen on recipient flowers. Although a variety of factors are involved, different land use practices, such as the use of pesticides, frequent mowing and increased urbanization have been suggested to contribute to the decline of bee communities. During periods of environmental stress, female *Osmia* allocate energy and resources to producing more male offspring than female. Even though *Osmia* tend to shift from mostly males to mostly females over the season, their overall sex ratio may be affected by their surrounding habitat conditions. In addition, this phenomenon may impact *Osmia* populations if future generations continue to produce fewer reproducing females. Therefore, in order to evaluate *Osmia* sex ratios as an indicator of ecosystem health, bees of genus *Osmia* were sampled from 2016 to 2018 using pan traps and sweep netting at six sites in Southeastern Massachusetts and sexed by counting antennal segments and by general morphology. Specifically, we hypothesized that male to female ratios will be lower in rural sites compared to urban sites.

Results/Conclusions

ArcGIS analysis was used to characterize each study site as rural (<8% impervious land cover; three sites) or urban (>30% impervious land cover; three sites). Results show a significant effect of month on male to female ratio in each year (Cochran-Mantel-Haenszel, M^2 = 31.749, df =2, p<0.01), with the overall percent male for all sites over all three years being 74.6%, 19.2% and 0% for May, June and July, respectively. This indicates that male *Osmia* forage earlier in the season while the females appear to forage later in the season. Although there was no effect of site on *Osmia* sex ratios, there was an effect of site on total female abundance ($H_{5,90}$=*7.94, p=0.03*). This suggests that female *Osmia* total abundance may be also a good indicator of ecosystem health, especially, when the sample size is small. Continued monitoring of *Osmia* populations may reveal if this is normal year-to-year changes or indicative of a long-term trend. In this sitting, a comprehensive understanding of *Osmia* sex allocation and more frequent sampling within the flight season may be necessary to determine if *Osmia* sex ratios can be used as an indicator of ecosystem health.

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