Competition between honey bees (Apis mellifera) and native bees: an investigation in urban community gardens in St. Louis, Missouri

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Introduction

- Urban areas boast high bee abundance
- Community gardens provide habitat for bee species in cities
- Urban areas have limited and patchy floral resources
- Habitat patchiness = higher competition among bees
- Can be exacerbated by the presence of managed honey bees
- Honeybees provide pollination, but are non-native and often outcompete native bees for resources
- Little is known about bee competition in urban areas, or how the presence of managed honeybees impacts resource competition

Question 1: What behaviors are utilized by competing bees while foraging for floral resources in urban community gardens?

Hypothesis 1: Bees will utilize a variety of behaviors including pollen robbing, attacking, and chasing in order to win a resource.

Question 2: Do competitive interactions between honey bees and wild bees increase in the presence of managed bee colonies?

Hypothesis 2: Presence of honey bee colonies near a habitat will directly impact the rate and intensity of competitive interactions between honey bees and native bees.

Results

Who’s most aggressive?
Number of initiated competitive behaviors varied between species. However, honeybees were not significantly more aggressive than any other bee species.

Which behavior is best?
Bee species performed competitive behaviors at varied rates across sites: (A=BH, B=Laf, C=13th) indicating the influence of habitat on behavior.

Strike first or bee struck first
Bees that instigated an interaction were significantly more likely to win, and remain on the floral resource.

Methods

- Observed bees in three urban community gardens sample sites in St. Louis, MO
  - LAF: No managed bees on site
  - 13th: No managed bees on site
  - BH: 4 Honeybee colonies on site
- Filmed patches of flowers frequently used by both native bees and honey bees weekly from June-September
- Used BORIS software to extract behavioral data including the type of interactions, the species involved, who instigated, interaction duration, floral species
- Utilized Poisson Distributions to understand if competitive behavior varied significantly between species

Conclusions and Future Directions

- Results were not what we hypothesized as we expected there to be more interactions in the presence of managed honey bee colonies
- Behavior is clearly shaped by the environment
- It is energetically costly to compete, but being the instigator offsets this
- Behaviors varied between species and could be related to body size
- The relationship between managed honey bees and wild pollinators is complex
- More research is need to understand how these behaviors may affect pollination services

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