

Comparing richness and abundance of beneficial insect taxa across sites and trapping methods in Allen County, Ohio.

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INTRODUCTION

- Insects provide ecosystem services like pest control and pollination. Loss of insect diversity jeopardizes these services.
- To prevent decline, first we must know the abundance and distribution of insect populations.
- Our research investigates three beneficial insect groups:
 - Bees** (Anthophila) - pollinators of crops and native plants (Fig 1A).
 - Robber flies** (Asilidae) - predators of small insects, including pest species (Fig 1B).
 - Hover flies** (Syrphidae) - predators as larvae & pollinators as adults (Fig 1C).

QUESTIONS

- Are water bowl traps or malaise traps better for detecting the different beneficial insect taxa?
- How does insect diversity differ between habitats?



Figure 1. From left to right: *Augochlora pura*, *Tipulogaster glabrata*, *Toxomerus marginatus*



Figure 2. Map of malaise trap site, malaise trap (above), and bowl trap (right). Malaise Trap photo by Marie Walton (inset), Bowl Trap photos by MaLisa Spring

MATERIALS & METHODS

- Malaise traps passively intercept, but do not attract insects in flight.
 - Two malaise traps were set in Allen County, Ohio, an agricultural field and a prairie/forest. We collected weekly 10 Jun – 31 Aug 2021.
- Water bowl traps passively catch insects attracted to flowers.
 - Bowl traps were set at one site in Allen County, Ohio, weekly from 22 May - 23 Sep 2020.
- Specimens were identified using a stereomicroscope and keys^{1,2,3,4,5}.
- Shannon Diversity Index was calculated: $H = -\sum(p_i) \cdot \log(p_i)$, where p_i is the proportion of individuals of a species.

RESULTS

- Malaise and bowl traps captured similar numbers of specimens (779 and 709, respectively).
- The prairie/forest site had higher abundance across all taxa (Fig 3).
- Shannon Diversity was higher for bees and hover flies in the agricultural field (Fig 4).

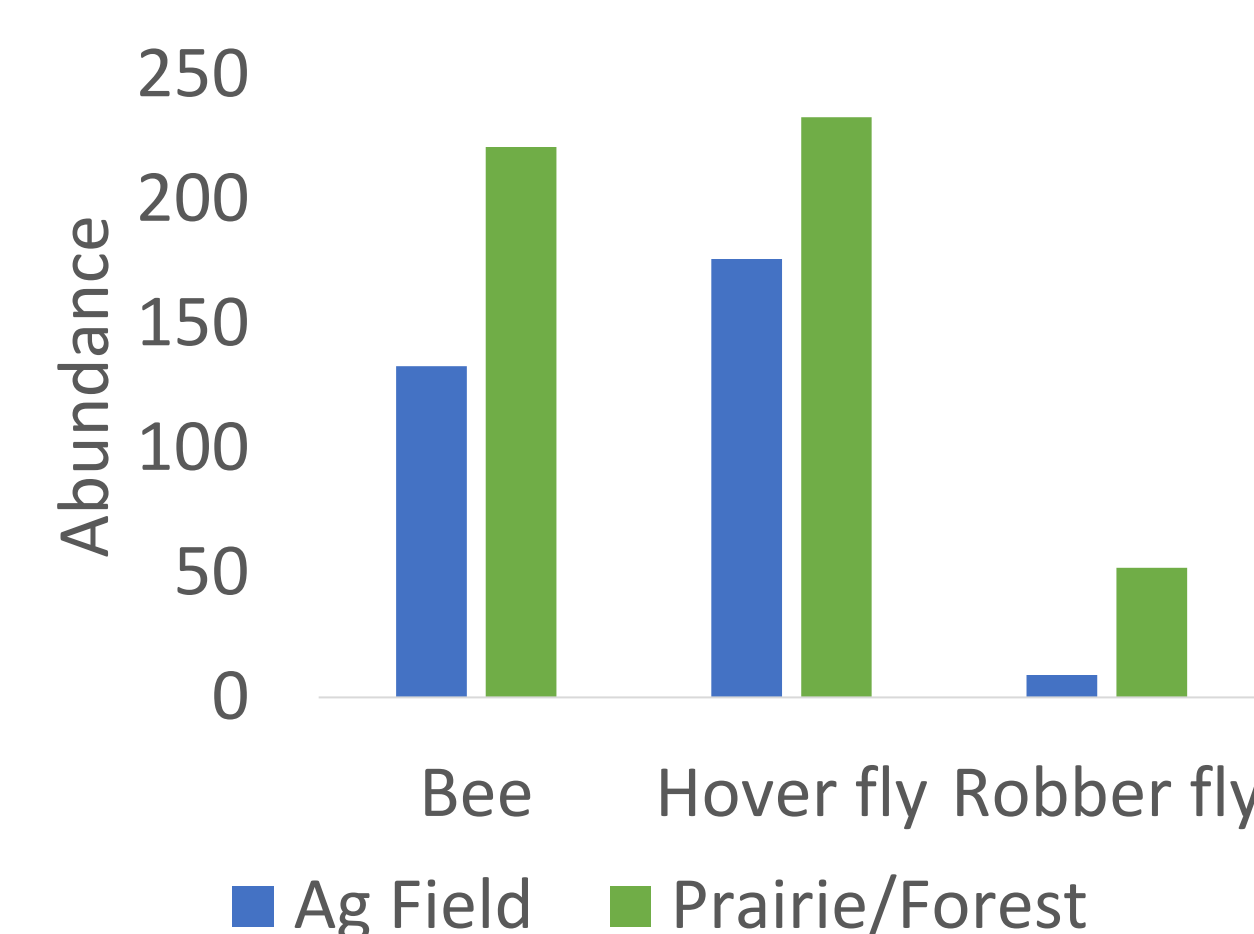


Figure 3. Abundance by site with malaise traps

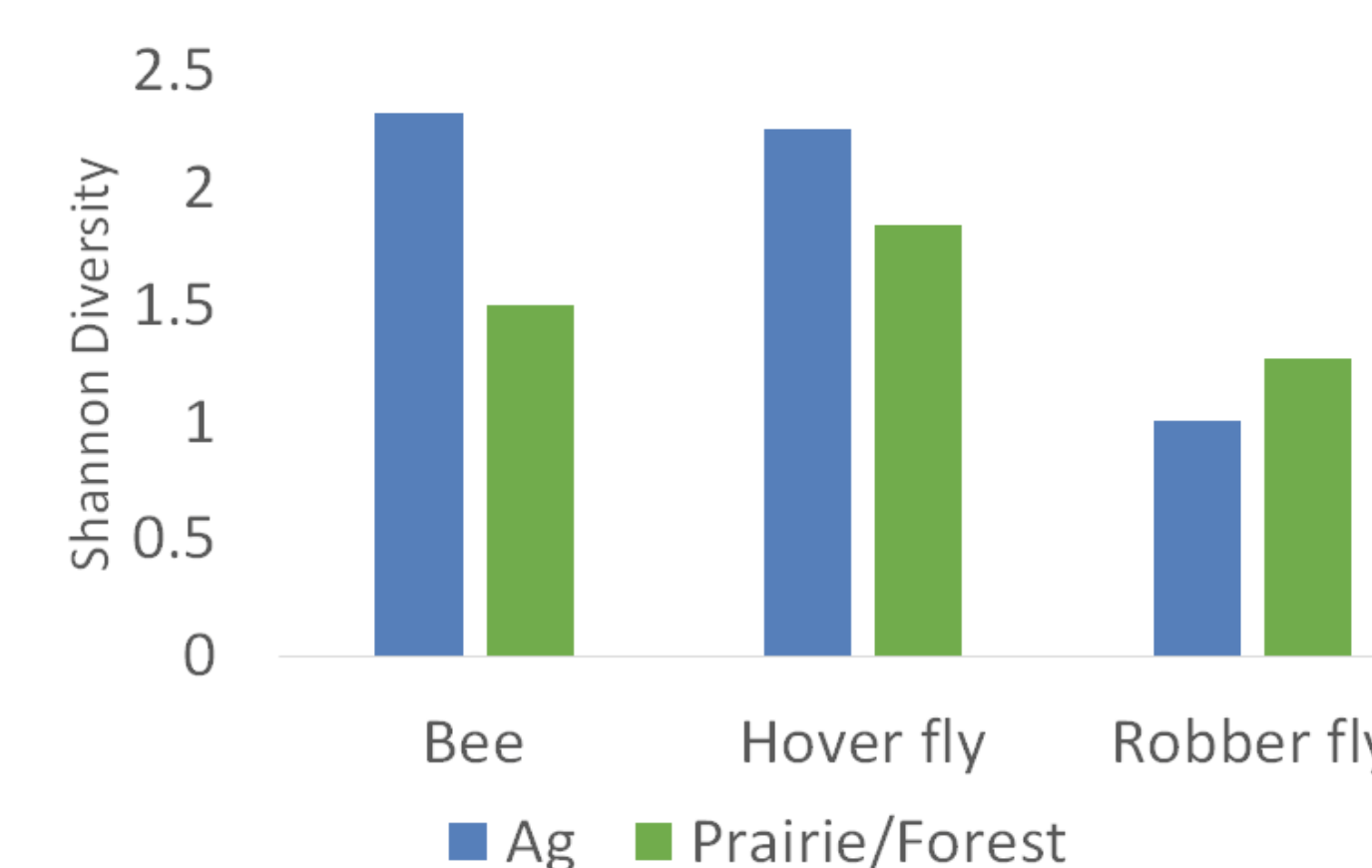


Figure 4. Shannon Diversity by site with malaise traps

- We found 15 unique beneficial taxa in the agricultural site, 21 in the prairie (including a state record parasitic bee), while the sites shared 23 species (Fig 5).

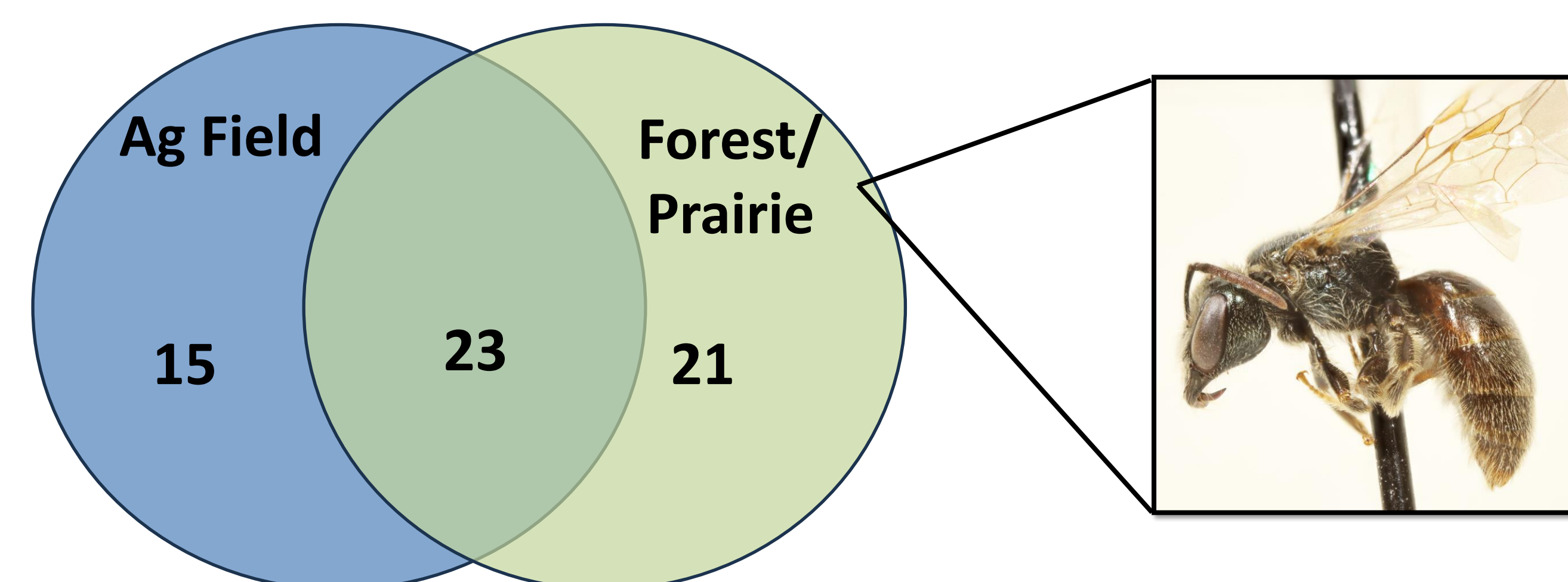


Figure 5. Venn Diagram of combined species richness between malaise trap sites. *Lasioglossum cephalotes* (right) was a state record and found at the prairie site.

- Water bowl traps caught more bee species, but fewer hover fly species, and fewer robber fly species than malaise traps (Fig 6).
- The most abundant species caught in malaise traps were *Augochlora pura*, *Tipulogaster glabrata*, and *Toxomerus marginatus* (Fig 1).
- The most abundant species with bowl traps were *Lasioglossum hitchensi*, *Atomosia puella*, and *Toxomerus marginatus*.

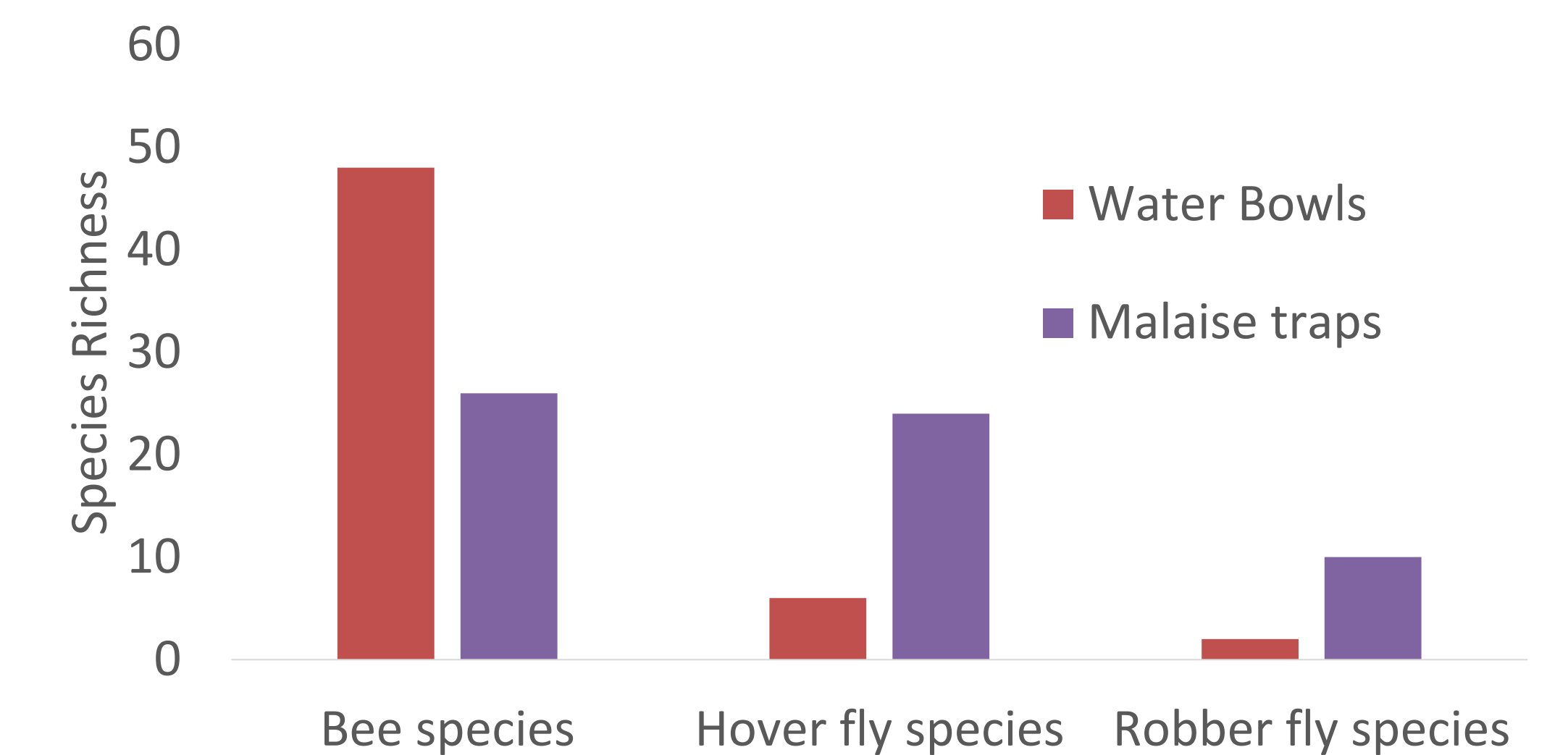


Figure 6. Comparison of richness by sampling method

DISCUSSION

- Lower abundance of taxa in agricultural fields than prairie may reflect fewer available niches, and increased exposure to pesticides.
- Shannon diversity incorporates species evenness. In agricultural fields, bees and hover flies had similar abundances per species. In prairie sites, a few bee and hover fly species dominated, reducing evenness. Higher Shannon diversity in agricultural sites reflects these patterns.
- Different trapping methods yielded different results for the beneficial insect taxa.
- In order to sample beneficial taxa most effectively, we recommend a combination of these trapping methods.

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