

**Background:**


- Flowering plants are often visited by an array of insect pollinators.
- Pollinator effectiveness (PE) is the per visit contribution to a plant’s reproductive fitness.
- PE is often measured by number of pollen grains transferred and number of seeds set (i.e. quantity measures)<sup>1</sup>
- However, the quality of the pollen transferred is likely to also impact plant reproductive fitness especially in small fragmented populations where there is high mate limitation and inbreeding<sup>2</sup>

**Research question:**  
How do native bees differ in their pollinator effectiveness in a fragmented prairie perennial?

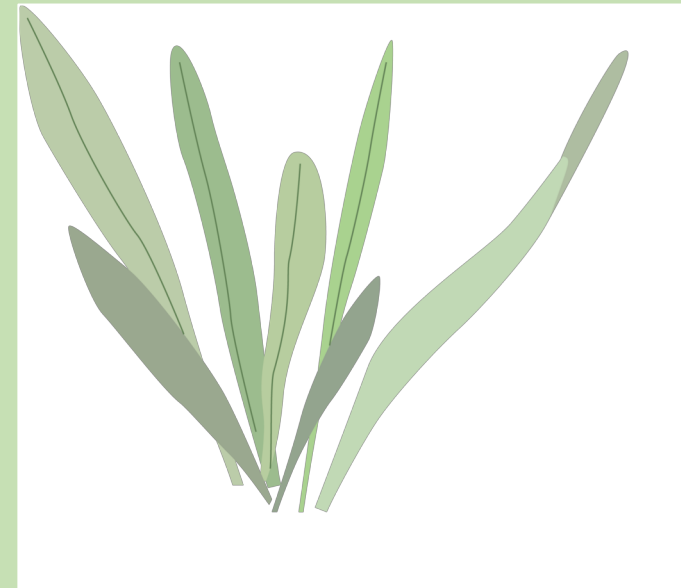
-Quantity of pollen: measured by number of ovules fertilized by a single bee.

-Quality of pollen: measured by diversity of pollen donors carried on a single bee.

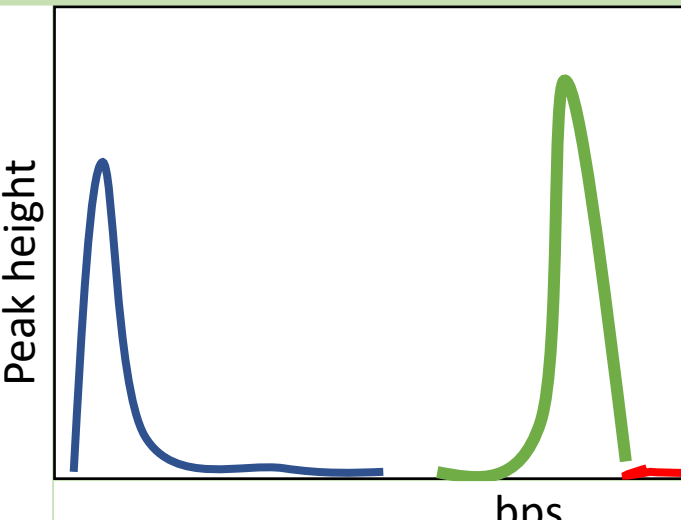
**Methods:**



1. Pollinators were visiting *Echinacea angustifolia* flowering heads in western Minnesota



2. Bees were caught and cooled and “wiped” on 9 receptive styles. Number of fertilized ovules was recorded.



3. Seeds were grown and DNA extracted, genotyped using 10 microsatellites<sup>3</sup>.



4. Paternity found from seeds from wipe, using CERVUS program.

5. Analysis performed using a glm in R.

**Discussion:**

- There was a difference in quantity of pollen deposited but not quality of pollen deposited by a single bee.
- Andrena helianthiformis*, a composite specialist, carried more *Echinacea* pollen but did not carried more pollen donors than other native bee taxa.
- These data highlight the importance for examining both quantity and quality of pollen carried by insect pollinators.

# Native bees vary in quantity but not quality of conspecific pollen carried.

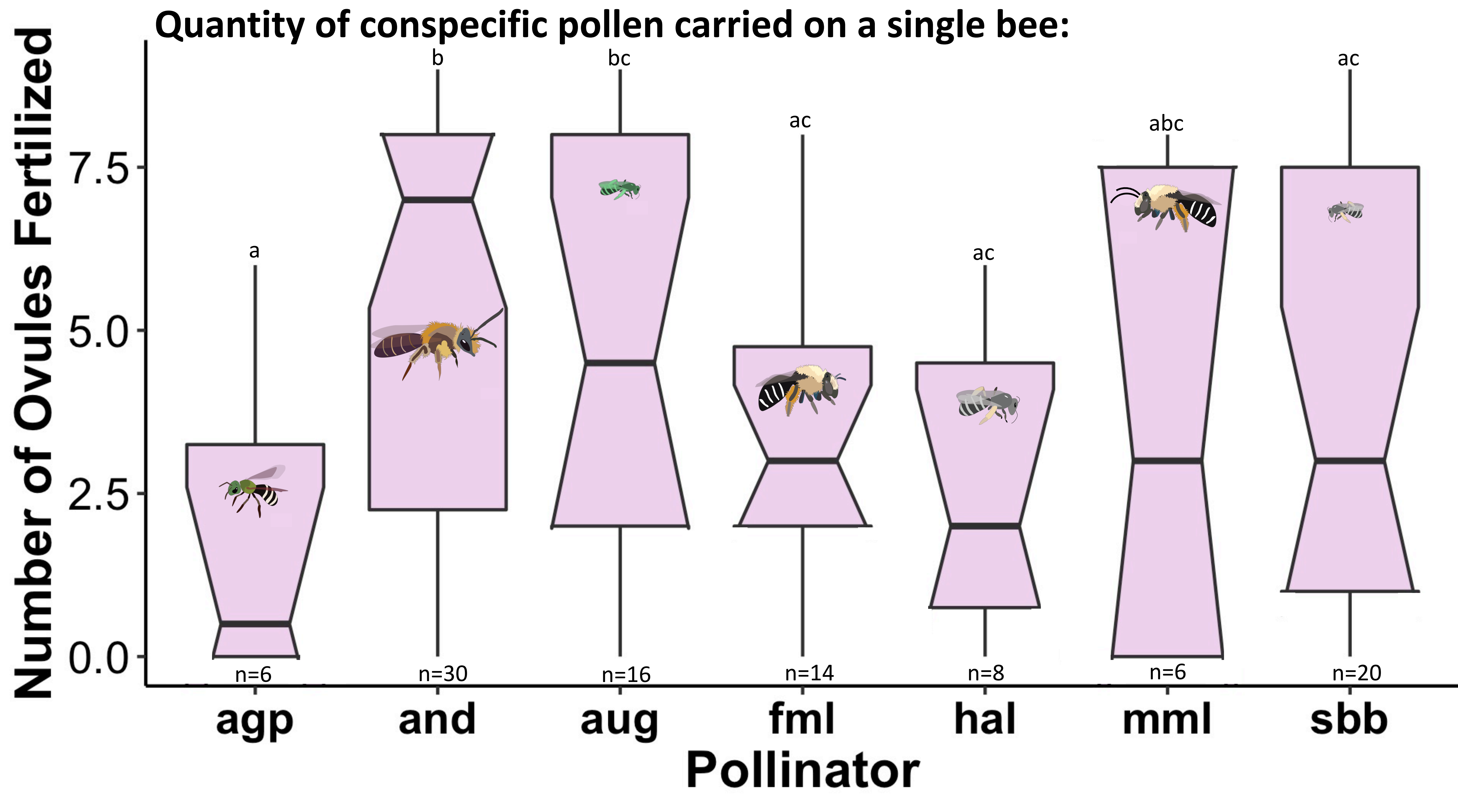


Figure 1: Number of ovules fertilized by each pollinator wipe (n= 100, ANOVA: df=95, p= 0.007).

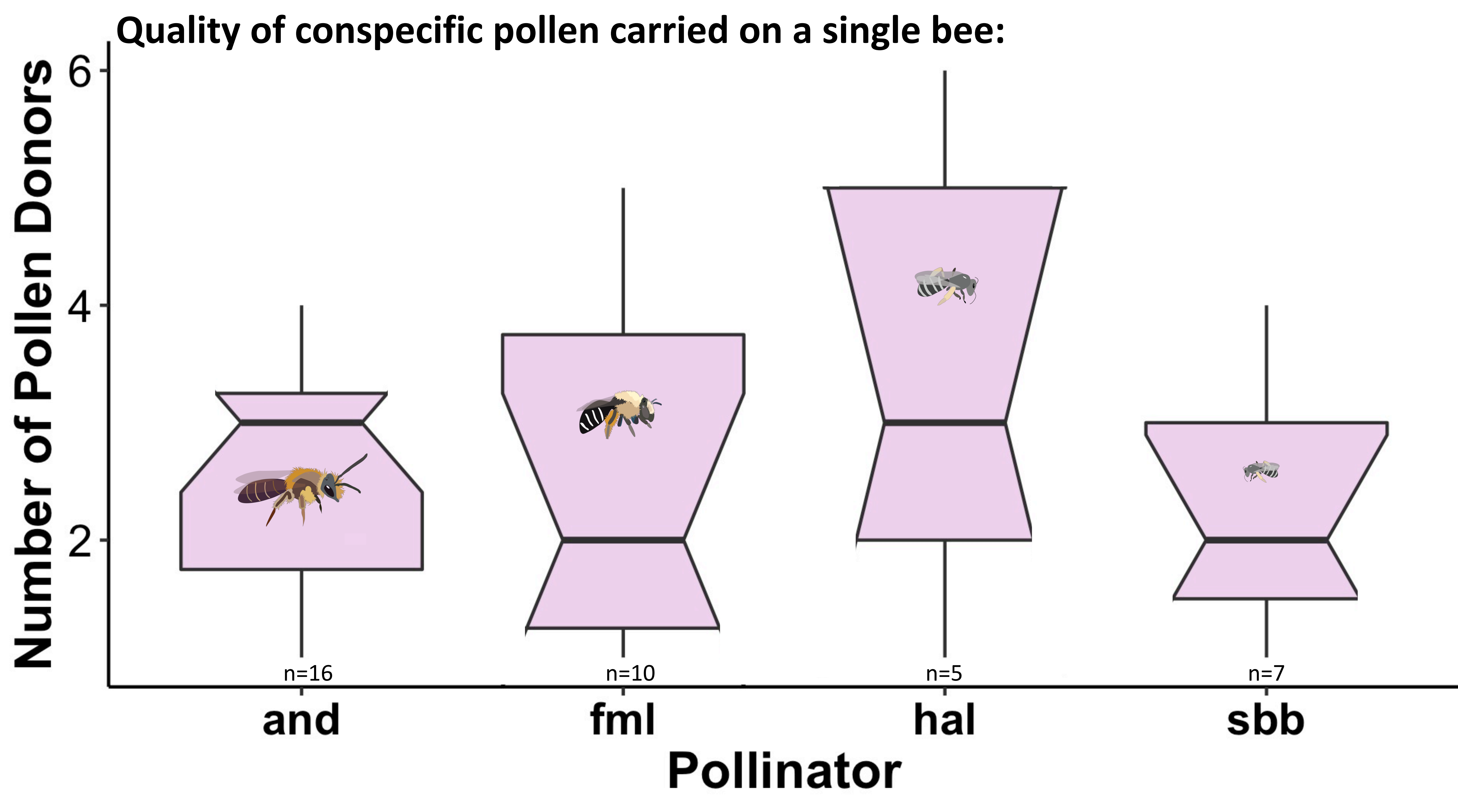


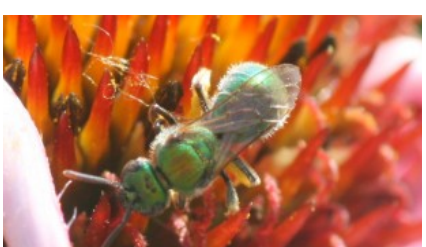






Figure 2: Number of pollen donors represented in each pollinator wipe (n=38, ANOVA: df=37, p= 0.996).

Pollinator	Description <sup>4</sup>
 <i>Agapostemon virescens</i> (agp)	Generalist, common early in <i>Echinacea</i> ’s flowering season. (11mm)
 <i>Andrena helianthiformis</i> (and)	Composite specialist, common throughout <i>Echinacea</i> ’s flowering season. (13-15 mm)
 <i>Augochlorella aurata</i> (aug)	Generalist, common throughout <i>Echinacea</i> ’s flowering season. (5-7 mm)
 Female <i>Melissodes</i> (fml)	Multiple species, generalists and some specialists found throughout <i>Echinacea</i> ’s flowering season. (10-15mm)
 <i>Halictus</i> (hal)	Multiple species, generalists found early <i>Echinacea</i> ’s flowering season. (7-10mm)
 Male <i>Melissodes</i> (mml)	Multiple species, generalists and some specialists found throughout <i>Echinacea</i> ’s flowering season. (10-15mm)
 Small Black Bees(sbb)	Multiple species, generalists found throughout <i>Echinacea</i> ’s flowering season. (6-8mm)



Citations:  
1: Valverde et al. 2013. *New Phytologist* 10.1111/nph.15743  
2: Page et al. Under review. *American Journal of Botany*  
3: Ison et al. 2013. *Applications in Plant Sciences* 89. 3732/apps.1300049  
4: Ison et al. 2018. *Oikos* 10.1111/oik.04882

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