

Pollinator Planting Effect on Nesting Performance of *Megachile rotundata*



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Question: Do urban prairie restorations realistically benefit pollinators?

Background

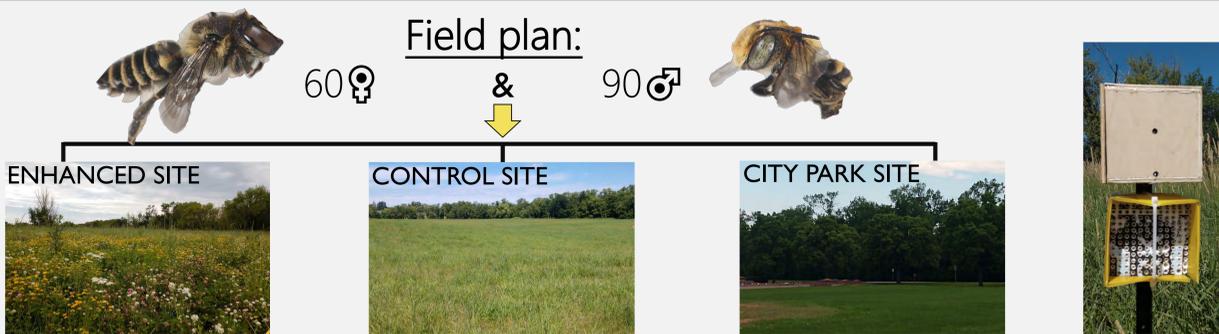
Why care:

- o Bees play a huge role in plant pollination
- o ↑ global decline in wild & commercial pollinators
 - Lack of adequate nutrition exacerbates the myriad of other stressors⁽¹⁾
- o To help pollinators, a nationwide movement is establishing millions of acres of pollinator plantings
 - providing a diverse/abundant forbs to sustain pollinators
- o By stabilizing floral resource availability, planting should directly support bee fitness and offspring health

Fixing it:

- o Several studies^(1,2,3) support urban areas as appropriate habitat for different bees
- o Our study assesses whether floral enhancements in urban areas increase reproductive success of *Megachile rotundata* (ALCB: alfalfa leaf cutting bee)
 - *M. rotundata* world's most intensely managed solitary bee⁽⁴⁾
 - *M. rotundata* is a sentinel bee, meaning it is alert to the surrounding and will alert us⁽⁴⁾
 - ALCB naturally emerge/nest during hot summer days
 - Females mate once, soon after emergence → consume nectar/pollen as their first eggs mature
 - Within a week females begin constructing/provisioning cells sequentially

Hypothesis: Greater availability of floral resources will increase nesting success of the sentinel *Megachile rotundata*



Methods

Field plan:

- o 5 triads: enhanced refuge, natural refuge, city park (Fig. 1)
- o Released 60 females & 90 males
 - Via emergence boxes at night (10-12pm)
- o Nest box placed at center of each site
- o Surveyed flowers within a 100m radius

Nesting success:

- o Check nesting activity weekly
- o Pull completely nests weekly
- o Store nests at 29°C (1 week)
- o X-ray straws for establishment & offspring

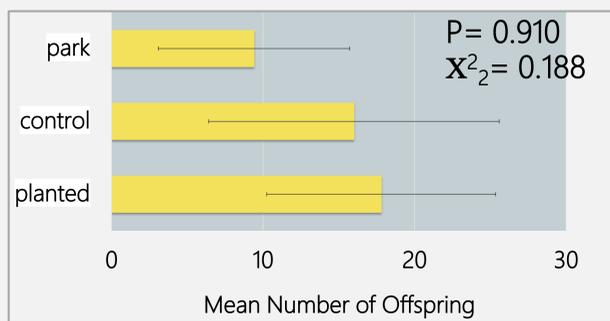


Figure 2: Reproductive success at different site treatments

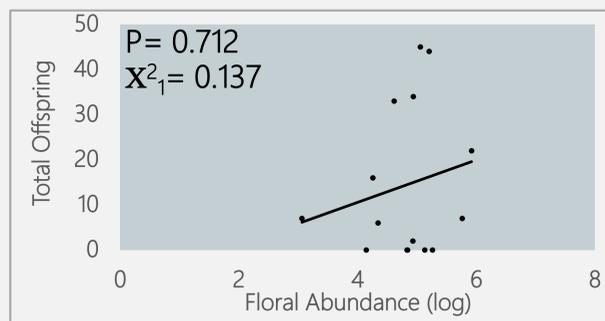


Figure 4: Floral abundance affects on total offspring counts

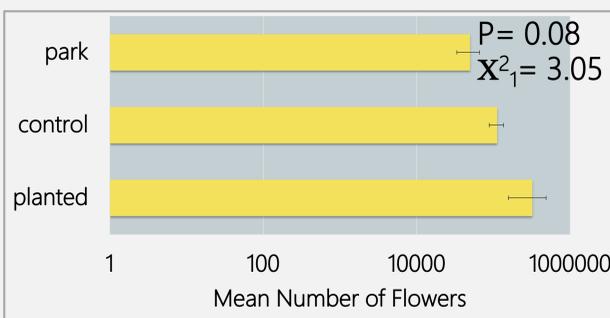


Figure 3: Floral resources at different site treatments

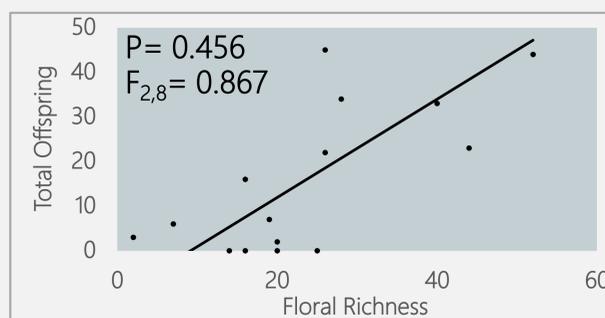


Figure 5: Floral richness affects on total offspring counts

Results

- o Reproduction did not vary with different site treatments (Fig. 2).
- o Pollinator plantings did not have an obvious benefit for pollinators due to similar floral abundance (Fig. 3).
- o With greater floral abundance, total offspring increased, but not significantly (Fig. 4)
- o With greater floral richness, total offspring increased, but not significantly (Fig. 5)
- o This study shows that floral abundance does not influence reproduction success of the *M. rotundata*.

Figure 1: Map of the Red River with all sites labeled with a specific symbol for a triad

Conclusion

- o Given these results, we are left to wonder if other variables, such as seasonal flooding of the Red River, or management of the sites could have had a negative affect on the study.
- o Poor female nest establishment was also noted, and releasing more bees may have a positive impact on gaining more nests.
- o Floral richness had a noteworthy impact on the total offspring count and causes questions for further research

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References: ¹Anderson, E. C. & Minor, E. S. Vacant lots: An underexplored resource for ecological and social benefits in cities. *Urban Forestry & Urban Greening* 21, 146–152 (2017). ²Anderson, E. C. & Minor, E. S. Vacant lots: An underexplored resource for ecological and social benefits in cities. *Urban Forestry & Urban Greening* 21, 146–152 (2017). ³Banaszak-Cibicka, W., Ratyńska, H. & Dylewski, L. Features of urban green space favourable for large and diverse bee populations (Hymenoptera: Apoidea: Apiformes). *Urban Forestry & Urban Greening* 20, 448–452 (2016). ⁴Pitts-Singer, T. L. & Cane, J. H. The Alfalfa Leafcutting Bee, *Megachile rotundata*: The World's Most Intensively Managed Solitary Bee. *Annual Review of Entomology* 56, 221–237 (2011).