Comparing native bee pollinators of two common wildflowers in parks and prairies of the Chicago region

Christine R. Askham[1,2] Rebecca K. Tonietto [1,3] Katherine E. Ellis[4]
1-Chicago Botanic Garden, 2-Gustavus Adolphus College, 3- Northwestern University, 4-Kalamazoo College

Introduction

In Illinois, less than 1% of native tallgrass prairie remains (Panzer 1998), and this remaining habitat is highly fragmented throughout the state. Although much emphasis is put on plant conservation, less attention tends to be given to equally as important insect species. Without insect pollinators these plant communities would be unable to create seeds and maintain habitats. Paul R. Neal (1998) claims the restoration plans created by considering both pollinator and plant needs are more likely to result in long term species persistence.

Considering bees and flies are the principal pollinators in temperate zones (Cane 2001), a deeper understanding of habitat needs of native bees is crucial for habitat conservation. Panzer (1995) speculates that less than 25% of prairie and savanna-inhabiting insects of the Chicago region are remnant-dependent. Because bees can live in areas where resources are spatially discontinuous (Cane 2001) alternative habitats such as parks and green roofs have potential for supplying resources necessary for native bees.

Because bees are attracted to different flower types in order to exploit various resources, it is necessary to understand which flowers planted in parks and greenroofs will maximize native bee conservation efforts.

Objectives

Compare native bee visits between *Penstemon* spp. and Asteraceae species in prairies and parks in the Chicago region.

Study Species

***Penstemon* species**
Family: Scrophulariaceae/Plantaginaceae
Tube-shaped and two-lipped corolla, infertile stamen, prominent staminode.
Provide nectar and pollen.

Figure 1. *Penstemon digitalis*

Asteraceae family
Head inflorescence with both disk and ray florets. Pollen emerges in a circular row, with all pollen in row emerging on same day.
Provide nectar and pollen.

Figure 2. *Heliopsis helianthoides*

Methods

- Total of 14 sites (6 prairies, 6 parks, 2 greenroofs)
- All sites contained an Asteraceae and *Penstemon* species
- Observations made 3 times per site.
- Fifteen minute observation periods of each type made at 9:00, 10:30, 12:00, and 13:30
- Recorded bee id code and number of visits to flower.

Table 1. Key used for native bee grouping.

Identification code	Abdomen size (mm)
Apis	
Bombus	
Xylocopa	
large	> 8
Small	0-8

Figure 3. Map of all sites in Chicago, IL region. Prairies yellow, parks green, greenroofs red.

Results

- A Generalized Linear Model (GLM) was performed with a Poisson distribution using plant type as a predictor.

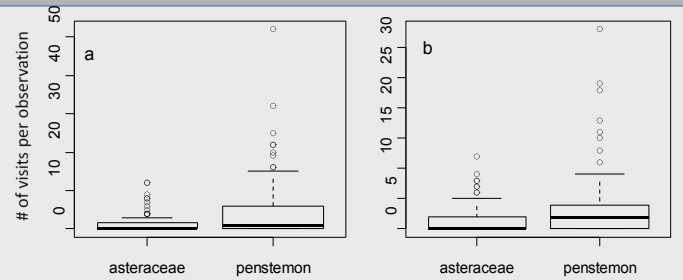

Figure 4. Total bee species visited *Penstemon* species significantly more than Asteraceae species at both **a) prairies** (p= <.001, AIC= 1311) and **b) parks** (p=<.001, AIC=1009).

- At prairies within ALL bee types significantly more visits were made to *Penstemon* species.
  (*Bombus:* p<.001, AIC=684.5, *Apis:* p<.001, AIC=584.5, large: p<.001, AIC=754.6, small: p<.001, AIC=600.7, *Xylocopa*: p<.001, AIC=138.8)
- At parks
  --Significantly more *Penstemon* spp. visits from *Apis* (p<.001, AIC=584.5) and small bees (p<.001, AIC=480.7)
  --Significantly more Asteraceae visits from large bees (p <.05, AIC=521)
  --No significant differences from *Xylocopa* spp. and *Bombus spp.*

Discussion

- Planting species known to attract bees (such as *Penstemon* spp) is an effective native bee conservation method (Matteson 2008).
- Large bees in parks preferred Asteraceae, therefore, other flowers should be present at sites with *Penstemon* spp.
  --Floral diversity at sites is crucial, as some bees are specialists (Matteson 2008).
- *Penstemon* spp. observed have an early and short flowering season. Other species must be present at a site/park to support late season pollinators.

Further research

Preliminary studies on two greenroofs recorded only one small bee visiting *Penstemon* spp, while 21 bees were observed visiting Asteraceae. This study needs to be continued and compared to park and prairie data.

Figure 5. Observing in a field of *Penstemon digitalis* at Midewin Tallgrass Prairie.

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