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Sown and Unsown Floral Resources Both Support Bee Abundance

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Introduction

- Decrease in wild bees are linked to loss of prairie and floral resources.¹
- The USDA's Farmers Service Association started a pollinator habitat initiative called CP-42 within the Conservation Reserve Program (CRP).
- Program goals include preservation of wildlife and maintaining native landscapes.
- We evaluated success of the program by measuring vegetation density and pollinator habitat quality, along with bee abundance in June and July of 2019.
- We measured bee abundance and compared it to floral resources of planted (sown) species and unplanted (unsown) species.
- This comparison shows if current seed mixes are promoting pollinators better than weeds.



Fig. 1 (From L to R) Alyssa Burgert, Kate Sinnott, Pryce Johnson, Ervina Tabakovic, Allison Eagan, Emma Simpson, Corinne Myers

Research Questions

- Does floral abundance affect bee abundance?
- Do sown and unsown flowers affect bee abundance differently?
- Do some floral species have greater effects on bee abundance?
- Are CP-42 seed mixes utilizing the most effective floral resources?

Methods and Materials

We surveyed vegetation density at 18 CRP sites. We also surveyed bees and floral resources at half of the locations. All sites were CP-42 plantings in their third year of growth and were located within a 60-mile radius surrounding Cedar Falls, IA.

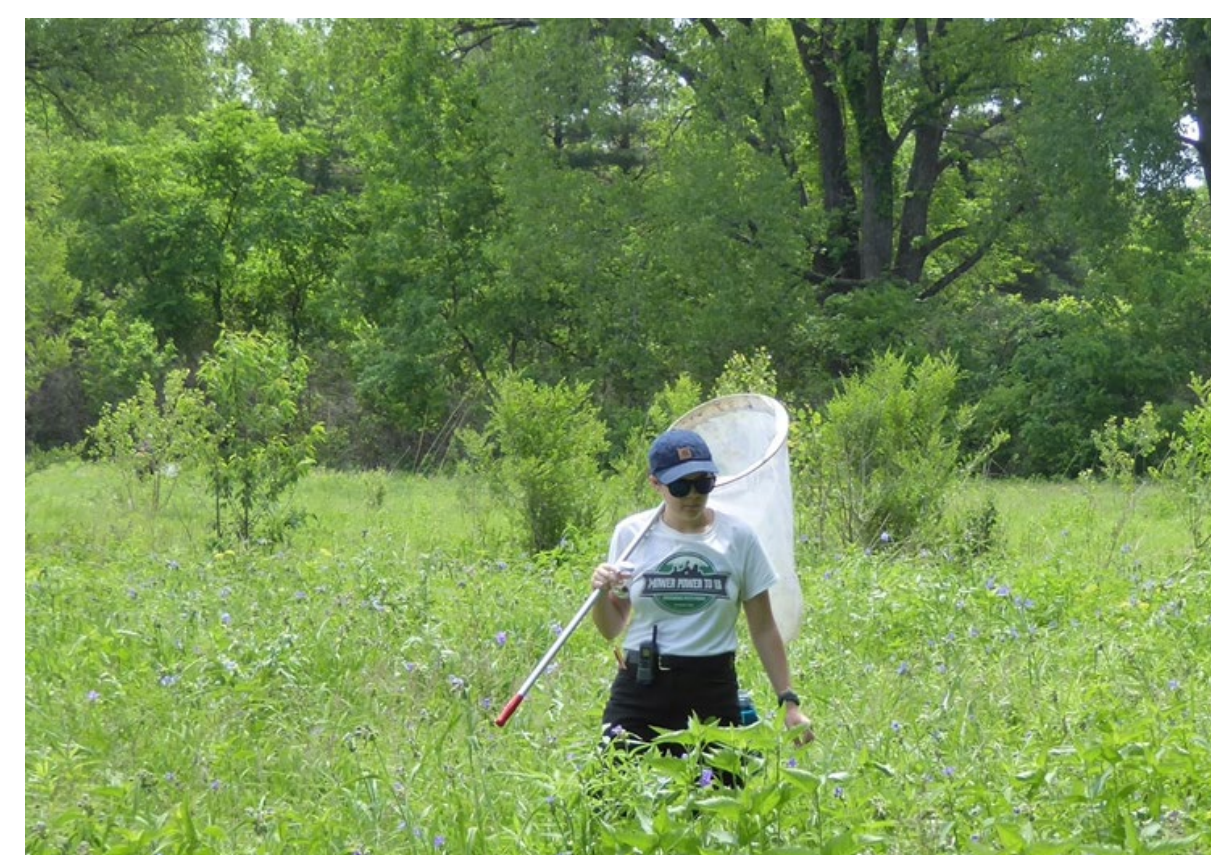


Fig. 2 (Left)
Pryce Johnson conducting a bee survey



Fig. 3 (Right)
An example of a quadrat used for floral surveys

Bee Surveys: Using the ArcGIS program, four 2500m² square plots were randomly generated at each site. Within each generated plot, a researcher would start a 15-minute stopwatch, pausing the timer to collect bees from flowers using a sweep net. The floral resource used by each specimen was recorded and the bees were taken to the lab to be identified. Two separate surveys were completed for each site, once in June 2019 and once in July 2019.

Floral Surveys: Four random 100m transects were generated for each site using ArcGIS. The first 50m of each transect were used for floral surveys. Every 2m along the transect, the abundance of each flower in bloom within a 1 x 1 m² quadrat was observed. The species of the plant was identified and its number of flowers and ramets was recorded. Two separate surveys were completed for each site, once in June 2019 and once in July 2019.

Results

Fig. 4 Floral Abundance Affects Bee Abundance

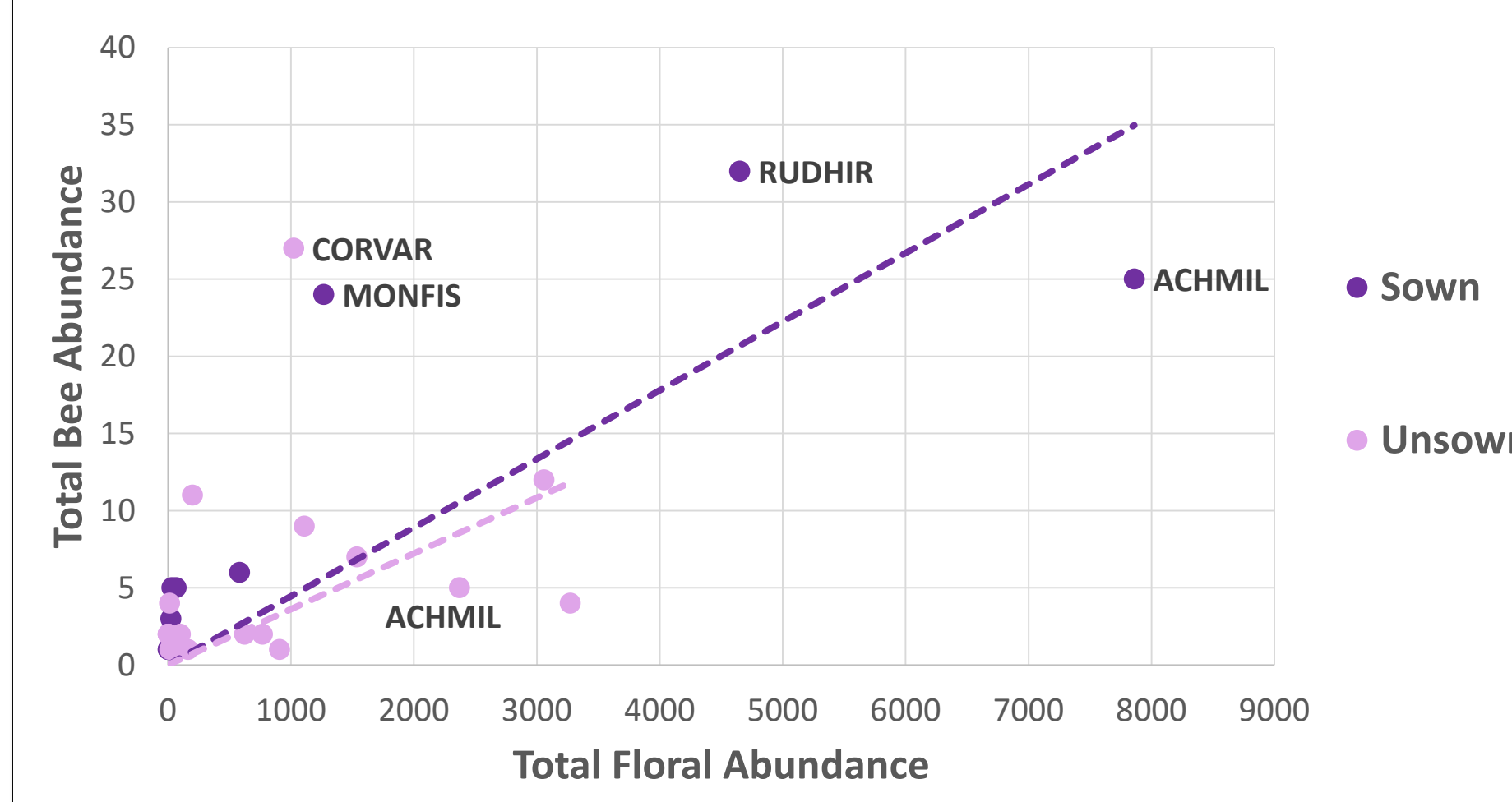


Table 1 Statistics for graph above

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Floral Abundance	1	950.09	950.09	21.1442	0.000115
Sown vs Unsown	1	59.44	59.44	1.3229	0.261405
Interaction	1	43.91	43.91	0.9772	0.332747
Residuals	24	1078.41	44.93		

Fig. 5 Bee Abundance Per Flower

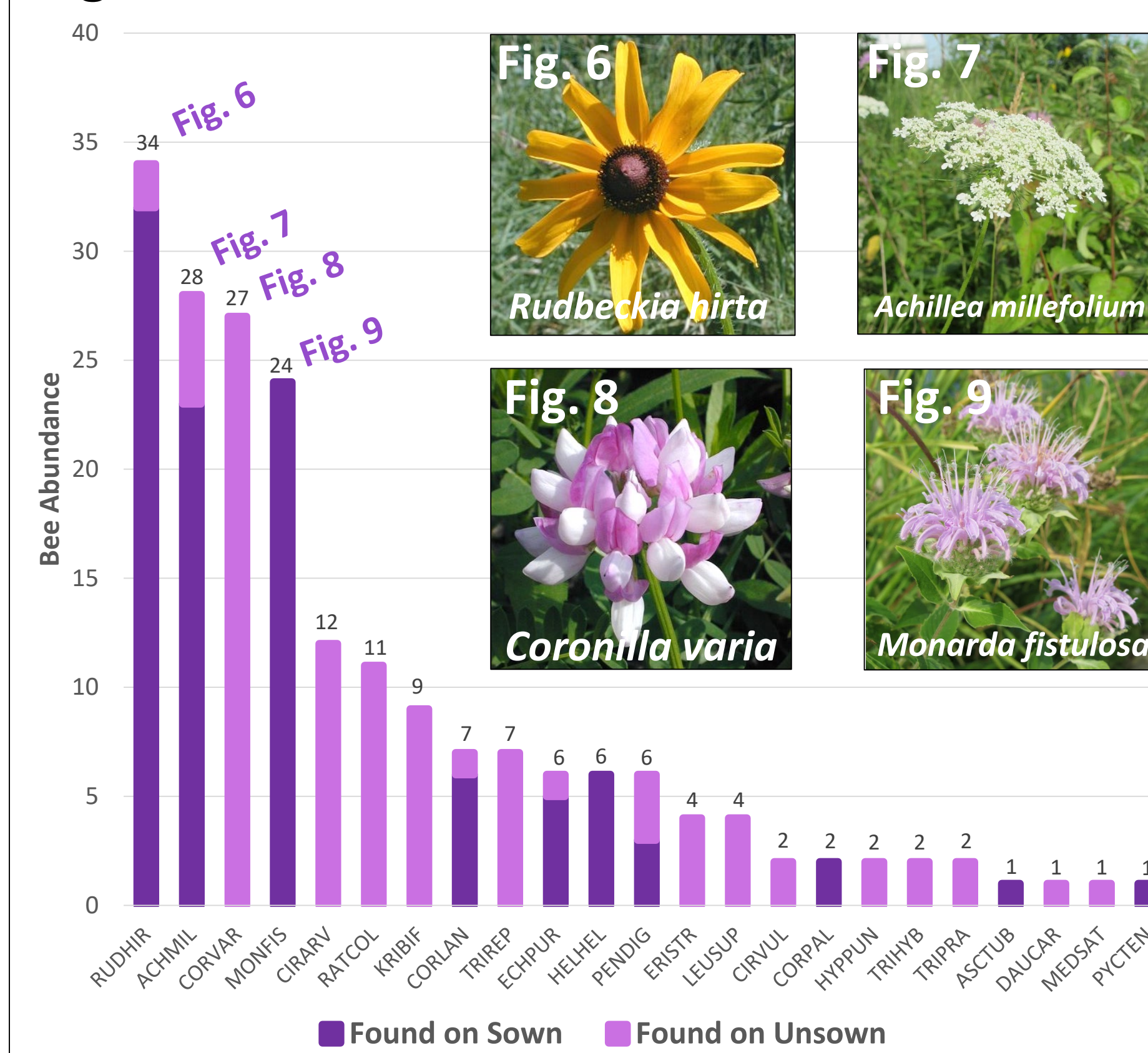
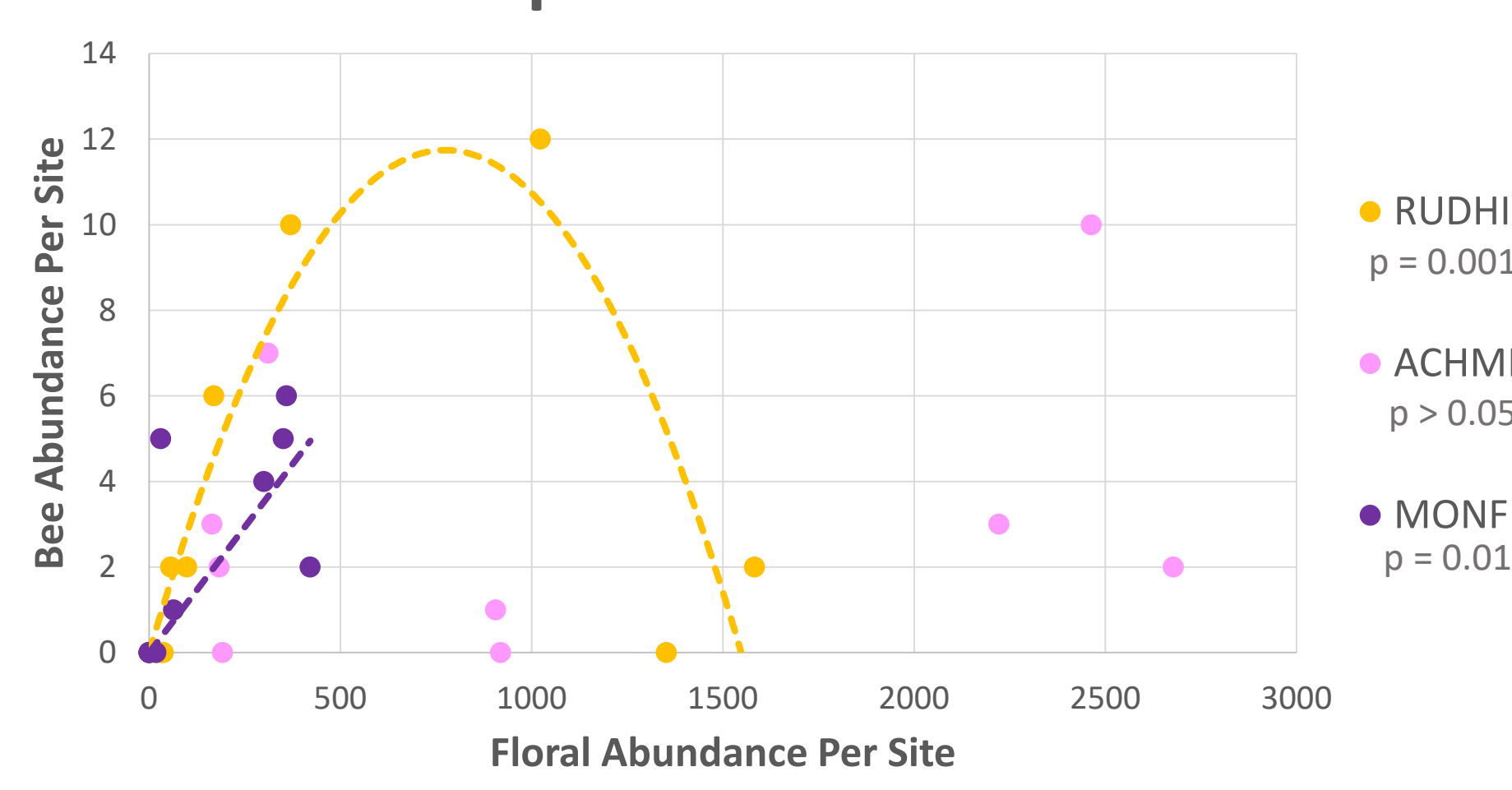


Fig. 10 Top Floral Resources



Discussion

- Positive relationship between floral abundance and bee abundance (Fig. 4, Table 1)
- No significant difference between sown and unsown floral resources (Fig. 4, Table 1)
 - Unsown flowers have equal value for pollinators as sown floral species
- Most effective floral resources: *Rudbeckia hirta*, *Achillea millefolium*, *Monarda fistulosa* (Fig. 5)
- *Coronilla varia* effectively attracted bees, but was only observed at one site
- *R. hirta* follows a unimodal trend (Fig. 10)
 - Optimal bee abundance found at floral abundance large enough to have a significant presence, but not large enough to dominate the field
 - If *R. hirta* overshadowed other flowers, the field's floral resources would be limited outside of its blooming period
- *A. millefolium* follows no trend (Fig. 10)
 - High bee abundance, not dependent on floral abundance
- *M. fistulosa* follows a linear trend (Fig. 10)
 - Positive relationship between floral and bee abundance
 - Data not collected for full blooming period
 - Need further data to know if bee abundance follows unimodal trend
- Further data will be collected in August 2019

Acknowledgements

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4. Figure 6, Figure 9: *Illinois Wildflowers*