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Correlation Between Wild Bee Populations and Vegetative Resources in the Conservation Reserve Program’s Pollinator Enhancement Plantings

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Background

- Wild bee populations are in decline; and one of the main factors that caused this is habitat loss, which diminishes floral resources that bees utilize for nectar and pollen (Watanabe 2013)
- The Conservation Reserve Program (CRP) aims to combat habitat loss by implementing ecological restorations that provide resources for a variety of different wildlife
- In 2011, the CRP established a Pollinator Habitat Initiative called CP-42, which encompasses forbs and grasses to create adequate habitat for pollinators
- A primary goal of this program is to enhance pollinator abundance and diversity

Research Questions

- Does wild bee density and diversity show a positive correlation with total floral resources in CP-42 fields?
- Does wild bee density and diversity correlate to sown floral resources in CP-42 plantings?
- Does wild bee density and diversity correlate to total plant stem densities in CP-42 plantings?

Methods

- All of the sites surveyed were within a 60 mile radius surrounding Cedar Falls, Iowa
- 28 CP-42 sites were surveyed for their vegetation density and floral resources; in June, 2018 we randomly selected 8 sites to conduct wild bee surveys (figure 1)
- The pollinator survey was conducted on days when the average wind speed did not exceed 32 km/hr and the ambient air temperature was about 15.5°C
- We used the computer program ArgGIS to randomly create four 2500m² plots spanning the area of a single CP-42 field
- The survey took place by an individual patrolling each plot and examining flowers for the presence of bees for a total of 15 minutes; when bees were observed, we captured them using a sweep-net (figure 6)
- Once a bee was captured the timer was stopped thus the processing time was eliminated
- The bees collected were transported to the lab where they were washed and pinned prior to identification
- At each site, four 50m transects were laid out, and alongside each, 25 1m² quadrats were randomly placed to either the left or right side every two meters
- Floral density and abundance was measured by counting the number of ramets and flowers of each blooming plant within the quadrat

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References


Conclusions

- Out of 8 sites surveyed across a 60 mile radius surrounding Cedar Falls, Iowa a total of 22 different wild bee species were identified and one genus (figure 2)
- Our results indicate that CP-42 plantings with a higher floral diversity in bloom will support a more diverse wild bee population (figure 3)
- We concluded that CP-42 plantings that have a greater density of floral in bloom will support a higher abundance of wild bees (figure 4)
- Wild bee density and diversity showed an insignificant association to total stem density/diversity and sown species density/diversity of plants at each site

Future Direction

- Bee surveys will continue throughout July and August to capture the seasonality of the wild bee community
- Utilize the data collected to further analyze how CP-42 seed mixes could be improved in order to attract a more diverse array of wild bees, especially the specialists and declining species

Figure 1: Site Map

Figure 2: Total wild bee species identified from all eight sights and their abundance. Floral association is depicted as either generalist or specialist species

Figure 3: Significant positive correlation between bee diversity and floral diversity in six CP-42 sites

Figure 4: Significant positive correlation between bee density and floral density in six CP-42 sites

Figure 5: 2018 pollinator habitat research team

Figure 6: Sweep-netting