Tallgrass Prairie Center: Effects of Planting Time and Grass-Forb Seeding Ration on Establishment in CRP Pollinator Habitat

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Butterfly and bee populations have declined in recent years due to a lack of flowers and forbs that provide nectar and pollen for these insects.

One of the Conservation Reserve Program’s goals is to create land that is environmentally healthier and to create habitats more suitable for wildlife.

There is substantial interest in knowing how well this program is working for creating ideal habitats for bees and butterflies. The process of evaluating the effectiveness of the seed mixes had yet to be done successfully.

What species of forbs have the highest establishment rates in CRP fields?
Does field age, season of planting, or grass-forb ratio of the original seed mix affect overall plant establishment or individual species plant establishment?

We surveyed 13 CRP sites in eastern Iowa in summer 2017.

QGIS was used to choose random starting points for five – 100 m transects which ran along the longest plot dimension.

We surveyed 75 – 0.5 m × 2.0 m quadrats, at seven meter intervals along the length of the five transects.

All forbs >20 cm were identified to species.

All 101 sown species, 45 did not establish, 45 had low percent establishment for five Penstemon meadia, Iris Shrevei p, Lilium michiganense. We can use these data to improve seed mix design.

We compared establishment rates were calculated at the site-level and species-level.

We depicted establishment rates for: Asclepias tuberosa, Astragalus canadensis, Echinacea pallida, Heliopsis helianthoides, and Monarda fistulosa because these were species with variable establishment rates and of particular interest for pollinators.

We compared establishment rates between (1) two, three, and four year old CRP fields, (2) spring-sown vs. fall-sown CRP fields, (3) CRP fields with high, medium, and low grass-forb seeding ratio using one way ANOVAs with site age, seeding time, and grass-forb ratio as fixed factors respectively.

Results
Figure 1. Map of CRP fields evaluated.
Figure 2. Mean percent establishment for every species sown in any of the 13 sites evaluated. An additional 45 species were seeded but not observed.
Figure 3. Mean (± 1SE) percent establishment for five selected species and all species combined ("all sown species"), by (a) field age in 2 (n=8), 3 (n=2), or 4 (n=2) years; (b) planting time in spring (n=8) or fall (n=4), and (c) grass-forb seeding ratio: high (1:1, n=4); medium (1:3, n=7); low (1:10, n=2). * p<.05 , ** p<0.05-0.1

Acknowledgements

I would like to thank my fellow SURP students in all their assistance in the field and in the lab, as well as my committee members, Dr. Laura Jackson, Dr. Mark Sherrard, Dr. Mark Myers, and Dr. Ai Wen. Thanks to all the farmers that participated and allowed us to survey their fields. A special thank you to Daryl Smith and Bruce Stiles for letting us tour your prairies. This project was supported by the UNI Conservation Corps (an initiative funded by The Roy J. Carver Charitable Trust) and the UNI Biology SURP.

References
