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

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Background

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.

Research Questions

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?

Methods

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.

Unknown species were pressed for later identification.

Plants with branching stems were considered individuals. Stem number was counted for rhizomatous species.

Establishment rate was calculated as: plant density (plants/m²) divided by sown seed number. Establishment rates were calculated at the site-level and species-level.

We depicted establishment rates for: Asclepias tuberosa, Astragalus canadensis, Echinacea pallida, Helianthus helianthoides, and Monarda fistulosa because these were species with variable establishment rates and of particular interest to 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<.05-0.1

Conclusions

Of 101 sown species, 45 did not establish, 45 had low establishment (<5%) and 11 had high establishment (>5%).

We found no effect of field age, season of planting, or grass forb ratio for establishment of all sown species combined.

Astragalus canadensis was found at higher rates in older fields.

Monarda fistulosa and Echinacea pallida were more abundant in fields planted in fall.

Monarda fistulosa and Astragalus canadensis were more abundant in plantings with a low grass forb ratio.

Future Direction

In summer 2018, we will survey additional CRP sites in eastern Iowa.

We can use these data to improve seed mix design.

References


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