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Tallgrass Prairie Center: Factors Affecting Cirsium arvense Density in Eastern Iowa Conservation Reserve Program Fields

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Factors Affecting *Cirsium arvense* Density in Eastern Iowa Conservation Reserve Program Fields

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**Background**

- An estimated 230,000 acres of Conservation Reserve Program (CRP) fields were planted since 2011 across Iowa to restore habitats suitable for monarchs and pollinators.
- The CRP Pollinator initiative requires the planting of three species of native flowering forbs per blooming season.
- *Cirsium arvense* (Canada thistle) is a major competitor because it is perennial, spreads clonally, and its seeds are wind-dispersed.

**Research Questions**

- How does thistle density vary with the density of other species in the plant community?  
- Is thistle density in a CRP field affected by proximity to other thistle populations?

**Methods**

- We surveyed vegetation in 12 sites in eastern Iowa during summer 2017.
- For each site, we selected random points using QGIS to establish five to ten, 100m transects.
- 75-0.5 m x 2.0 m quadrats were placed at 7 m intervals along the transects.
- We identified sown forbs and then counted how many stems per plant.
- Using a series of nested sub-quadrats, we recorded the area of the smallest sub-quadrat in which a perennial grass first appeared (frequency).
- We recorded the presence or absence of *C. arvense* in neighboring ditches and land.
- Perennial grass frequency was converted to density using: $d = \ln(1-f) / \alpha$.
- We calculated mean grass, forb and thistle density for each site.
- We plotted the relationship between thistle density and competing vegetation at the level of individual quadrats (n=975) and sites (n=13).

**Results**

- Preliminary observation suggests that at the quadrat level, *Cirsium* density is lower at extremely high sown forb densities (Fig.1).
- Sites varied from a mean of zero to 5 stems/m² but neither forb nor grass stem density appeared to influence *Cirsium* density at the site level (Figs. 2 & 3).
- The difference between quadrat and site results may be related to *Cirsium*’s dense clonal growth form.
- *Cirsium* in CRP fields had higher density when close to neighboring populations (Fig.4).

**Conclusions**

- In the summer of 2018, more sites will be surveyed and we will begin statistical tests.
- The role of neighboring populations needs to be further studied.

**Future Goals**

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