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BACKGROUND

We examine the density of Common Milkweed (*Asclepias syriaca*) in relation to the seed mix and surrounding land cover in Conservation Reserve Program (CRP) Pollinator Habitat Initiative (CP-42) plantings. Long thought of as an agricultural "weed", *A. syriaca* readily establishes itself in roadsides and disturbed landscapes. However, specifications for establishing *A. syriaca* in restorations are not well known.

We want to know if seeding *A. syriaca* is necessary for its establishment, or if milkweed populations in the surrounding landscape could spread into the plantings. By understanding the density of *A. syriaca* in CP-42 plantings, we can adapt policy and management to efficiently provide crucial breeding habitat for monarchs.

Figure 1. Surveying a transect in a CP-42 field

Figure 2. *A. syriaca* in bloom

Figure 3. Locating GPS points

Figure 4. Transect running through a quadrat with no milkweed present

Conservation Reserve Program

- Provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner (NRCS – USDA n.d.).

CP-42

- Program within CRP that replaces existing row crop vegetation with seed mixes of plants that support pollinators in an effort in increase pollinator abundance and diversity (Farm Service Agency n.d.).

METHODS

Plant Density Sampling:

- 45 CP-42 sites were surveyed during the months of June and July in 2018 and 2019. All sites were in their third year of establishment and within a 60-mile radius of Cedar Falls, Iowa.
- We used ArcGIS to randomly establish nine 100m transects at each CP-42 site (Figure 3).
  - At five of these transects, a 1m^2 quadrat was observed every 7m for presence of all plant species within the quadrat (Figure 1).
  - At the remaining four transects, a 1m^2 (2018) or 2m^2 (2019) quadrat was observed every 7m for density of *Asclepias* spp. (Figure 4).
  - Between these nine transects, total of 150m^2 (2018) and 225m^2 (2019) were surveyed at each site for milkweed stem and plant number.

Land Coverage Categorization:

- In ArcGIS, polygons of the CP-42 plantings were buffered to 1km then clipped so the planting itself was not included in the analysis.
- We used the "Extract by Mask" tool on the *High Resolution Land Cover of Iowa in 2009* (Iowa DNR 2017) raster layer to extract cells of the raster that correspond to the mask of the 1km buffer (Figure 5).

Data Analysis:

- Density (stems / m^2) was calculated for each site.
- Percentages of land cover were calculated from the data extracted within the 1km buffer.
- We performed linear regressions in SigmaPlot comparing density at each site with different site factors.
- Each point in Figures 7-10 represents an individual CP-42 site.

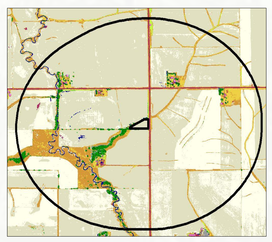

Figure 5. Example of ArcGIS land coverage categorization. The black border surrounds the area being analyzed. The black triangle in the center is the CP-42 field, excluded from analysis. The remaining colors represent different categories of land cover.

Figure 6. Site information

Seed mix presence	Number of sites	Average number of stems/site	Average stems/m^2
SOWN	35	30.8	.14
UNSOWN	10	10.2	.04

RESULTS

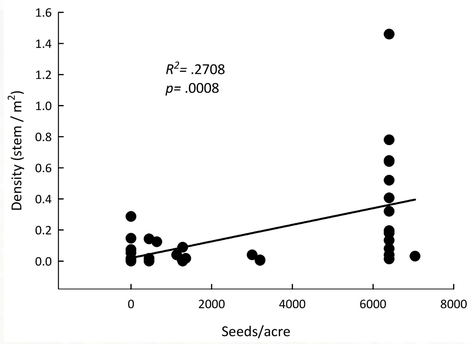

Figure 7. *A. syriaca* density vs. seeds planted per acre.

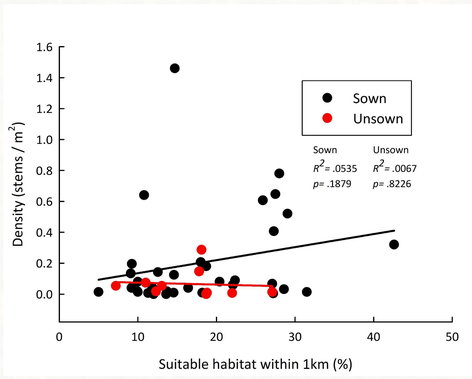

Figure 8. Density of *A. syriaca* vs. suitable habitat within 1km. Suitable habitat is defined as any category in the *High Resolution Land Cover in Iowa in 2009* (Iowa DNR 2017) layer with a description matching the habitat of *A. syriaca as* defined by Illinois Wildflowers (n.d.).

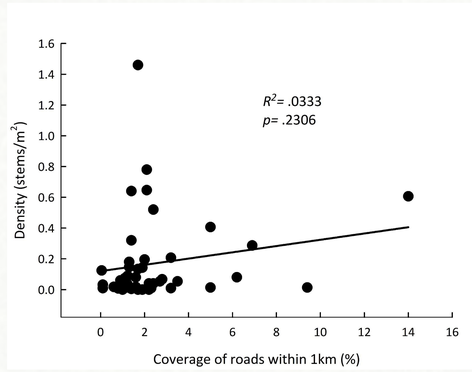

Figure 9. *A. syriaca* density vs. percentage of surrounding area covered by road.

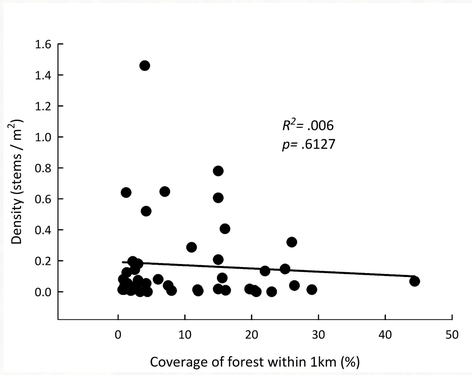

Figure 10. *A. syriaca* density vs. percentage of surrounding area covered in forest.

CONCLUSIONS

- *A. syriaca* density is significantly higher in CP-42 fields where it has been seeded with higher seeding rates (Figure 7).
- There is no significant correlation between density and percentage of the surrounding area within 1km covered by road, forest, or habitat suitable for *A. syriaca* (Figures 8-10).
- Based on these results, we determine that seed mix is important for establishing higher densities of *A. syriaca* in CP-42 plantings.
- At this time, we cannot draw conclusions on the importance of surrounding land cover on *A. syriaca* density. More factors need to be tested.

FUTURE DIRECTION

- More sites in which *A. syriaca* has not been sown need to be surveyed in order to gain a clearer understanding of the factors that influence its establishment.
- Impact of land cover should be analyzed using a smaller buffer (100m).
- Further analysis is needed to examine factors that may influence density. Our next step is to look at soil drainage classes.
- Impact of surrounding land cover should be analyzed in sites at different points in time (e.g. 1st year sites, 10th year sites).

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