How Does Size of Roadside Wildflower Islands Affect Wildflower Establishment?

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Introduction

Roadsides Can be Refuges

- There are over 4 million miles of roads in the U.S. road system.[1]
- Nebraska budgeted for $150 million on road maintenance costs in 2016. [2]
- Sustainable roadsides can improve quality of life, provide cost savings, and transform marginal lands into high biodiversity systems.

Fig. 1. An example of roadside vegetation.

Wildflowers As Habitat

- 10 years after seeding, wildflowers compose less than 10% of highway roadsides.[3]
- Strips or "islands" that separate the seeding of wildflowers from competitive grasses may improve the establishment and persistence of wildflowers.

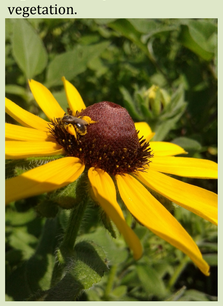


Fig. 2. Blackeyed Susan & a native bee.

Hypothesis

1. Segregating wildflowers seeds from grass seeds when seeding (islands) increases wildflower establishment.
2. Wildflower frequency (establishment) increases as island size increases.

Experimental Design

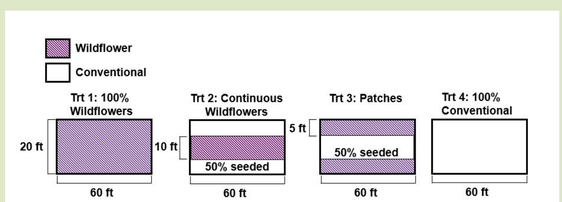


Fig. 3. A diagram of the wildflower island size treatments and spatial arrangement of experimental plots.

Field Site: 8 mile stretch in Union Nebraska: 40°45'18.3"N, 95°54'40.0"W

Treatment 1: wildflower-seeded-only plot

Treatment 2: a single continuous wildflower island is in the middle of the plot.

Treatment 3: wildflower islands are split into the top and bottom portion of the plot.

Treatment 4: the entire plot is seeded with a grass and wildflower seed mix.

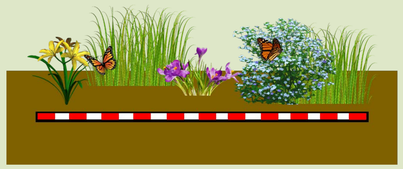
Methods

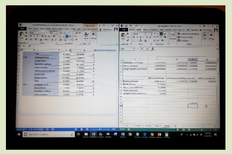
Planting and Treatment

- Planting in April of 2017
- 4 Replications of 4 treatments

Vegetation Sampling

- 15 frequency rods per plot





Data Analysis

- Identified the top 5 5 wildflowers with the greatest sum frequency
- Two-way ANOVA

Results

Seeded Wildflower Response

No evidence of statistical significance was found of wildflower island size impacting the frequency of occurrence for the selected wildflowers analyzed.

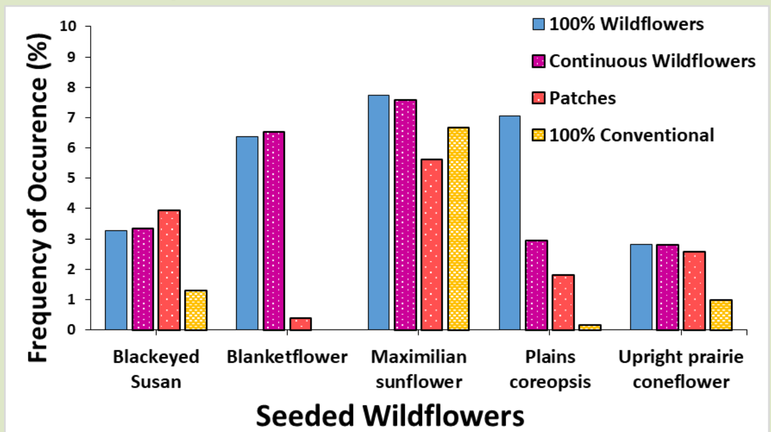


Figure 4. The frequency of occurrence percentage for the top five most frequently occurring seeded wildflower species.

- Segregating wildflowers in islands did not increase establishment for Blackeyed Susan, Maximillian sunflower, plains coreopsis, and upright prairie coneflower compared to seeding wildflowers with conventional approach because of high variance in frequency among replications (ANOVA: df=3, F=0.197, p>0.05).
- Blanketflower establishment in islands trended towards significance in comparison to its establishment in the conventional plots (ANOVA: df=3, F=2.182, p=0.143).

Results continued

Non-Seeded Response

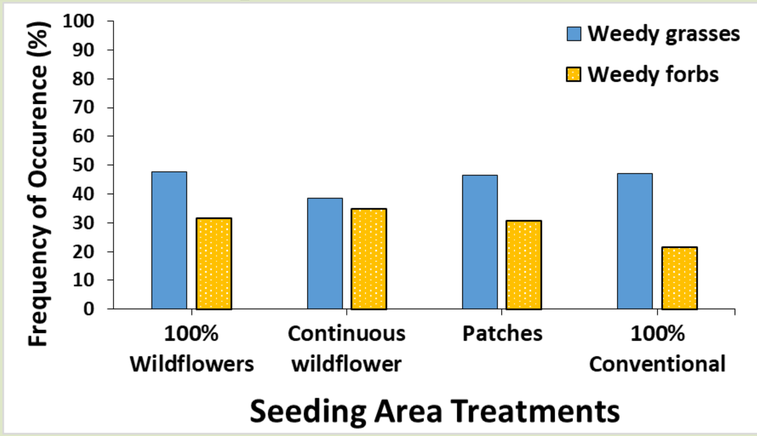


Figure 5. The frequency of occurrence (%) for non-seeded weedy grasses and forbs.

- No statistical differences in frequency of occurrence (%) were found in weedy grasses (ANOVA: df=3, F=0.080, p=0.97) or weedy forbs (ANOVA: df=3, F=0.470, p=0.709).

Conclusion

- Expectations for improved wildflower establishment are not apparent in this year of seeding, but studies suggest expectations may be met in subsequent years.
- Early road top removal (e.g. mowing) may be used to address concerns for controlling weedy plants.

Future Work

- Continue biannual monitoring of wildflower establishment for at least 5 years post-planting.
- Implement wildflower island size treatments at a variety of roadside field sites throughout Nebraska.

Literature Cited

1. US Department of Transportation (2012). Table 1-40: U.S. Passenger-Miles (Millions). *Bureau of Transportation Statistics* (2012).
2. Nebraska Department of Roads (2016). *Some facts and figures from the Nebraska Department of Roads.*
3. Soper (2018). Plant community composition, floristic quality, and establishment of roadside revegetation in Nebraska, USA. *University of Nebraska Department of Agronomy Thesis.*

Acknowledgements

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