Increasing Cost-Effectiveness of Nutrient Reduction Practices Using Perennial Native Vegetation

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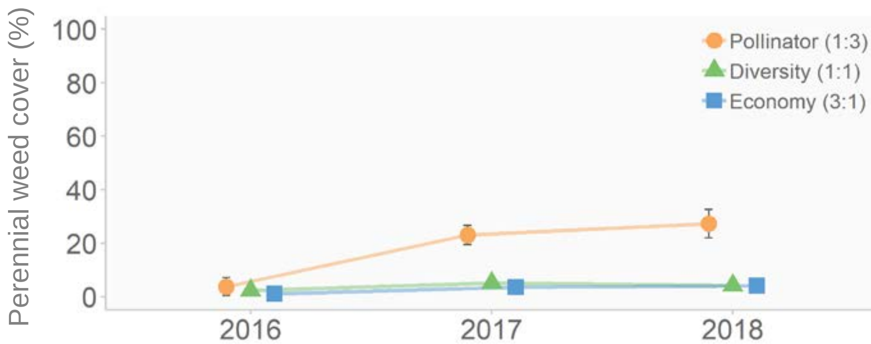
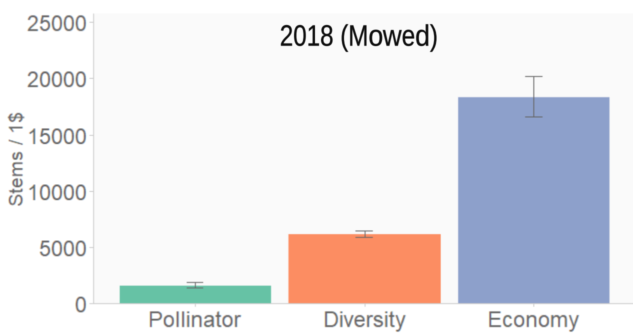
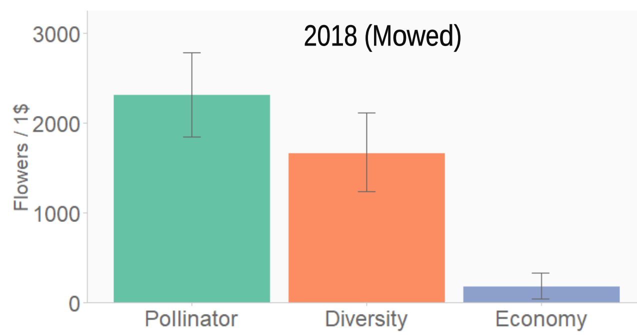
Key Findings

- Diverse native seed mixes are resistant to perennial weed invasion, reducing maintenance costs for producers
    - o Perennial weed cover 5% or less in diverse native seed mix, over 25% in pollinator focused mix

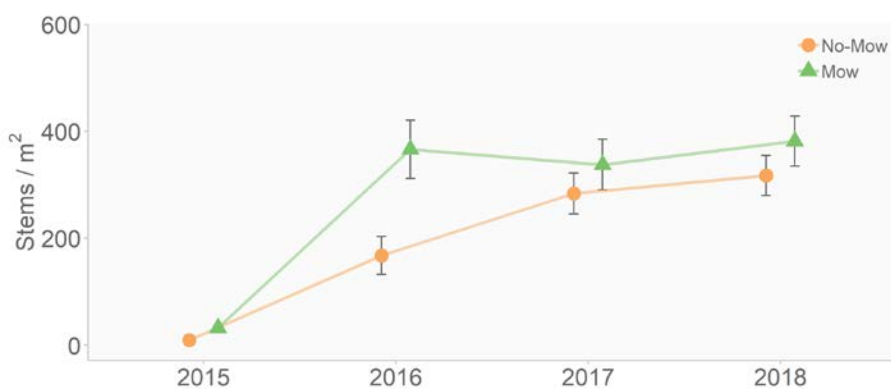


- Diverse native seed mixes (1:1 grasses to wildflowers) are cost-effective at providing multiple ecosystem services as well as nutrient reduction
    - o Pollinator mixes are cost-effective only when considering flower production, while Economy mixes are cost-effective only when considering stand density





- First year mowing accelerates establishment, helping create nutrient reducing stands faster
    - o Stem density and number of species match or nearly match mature stands by year two with establishment mowing



Background

Why Is Seed Mix Design and Early Stand Management Important For Cost-Effective Vegetation Establishment?

- Majority of conservation implementation costs for perennial nutrient reduction practices are for seed[1]
- Seed mix[2] and management determines long-term stand make-up (and resulting ecosystem services)

How Can We Design Nutrient Reducing Seed Mixes That Maximize Ecological Quality While Minimizing Cost?

- Balance seeding rates of grasses and forbs to ensure multiple ecosystem services are provided
- Select diverse plant species adapted to site conditions (e.g. climate, soils, plant functional groups)
- Ensure first year management optimizes plant establishment

Research Objective: Compare Establishment and Cost Effectiveness for Three Different Seed Mixes That Differ in Grass to Forb Seeding Ratio and Soil Type Customization

- Randomized complete block design (*n*=36) planted May 2015 near Nashua, IA
- Three seed mixes: 1) economy ($130/ac, 21 species, 3:1 grasses to forbs), 2) diversity ($291/ac, 71 species, 1:1 grasses to forbs), and 3) pollinator ($368/ac, 38 species, 1:3 grasses to forbs)
- Half of plots mowed, half unmowed- data presented in this document are averaged over the mowing treatment

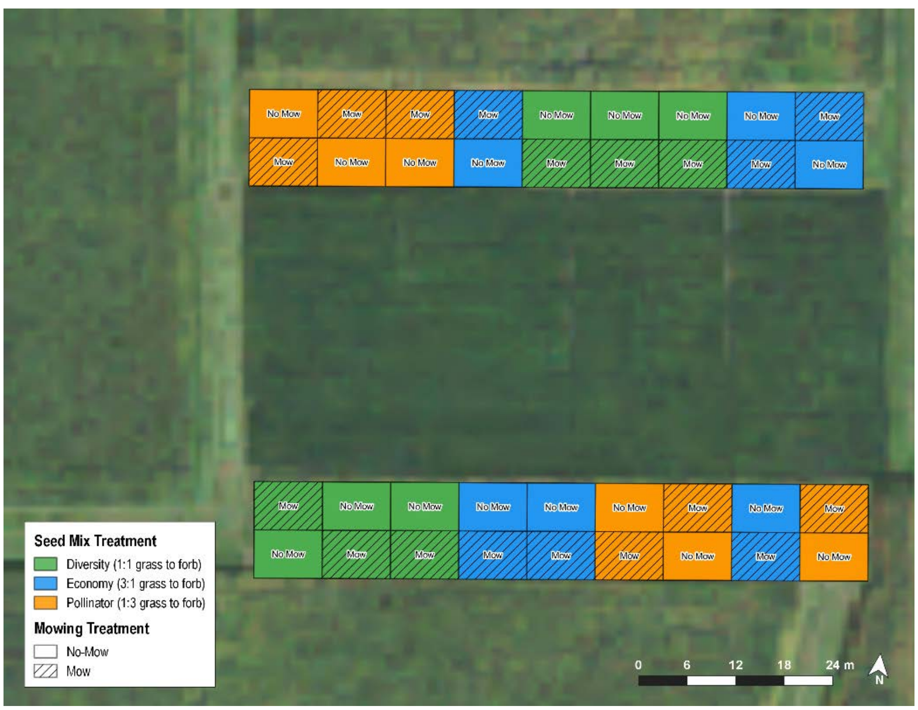


Figure 1. Experimental layout at the Iowa State University Northeast Research and Demonstration Farm near Nashua, Iowa

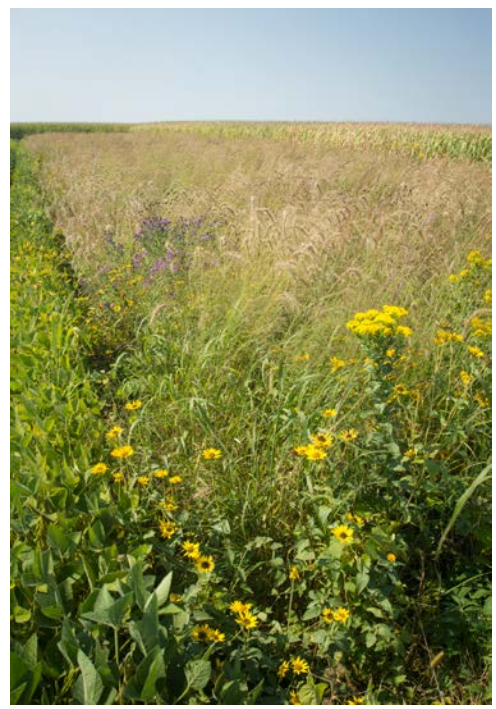


Figure 2. View of study site in September 2017.

References

1. Grman, E., T. Bassett, and L. A. Brudvig. 2013. Confronting contingency in restoration: management and site history determine outcomes of assembling prairies, but site characteristics and landscape context have little effect. Journal of Applied Ecology 50:1234–1243.
2. Phillips-Mao, L., J. M. Refsland, and S. M. Galatowitsch. 2015. Cost-Estimation for landscape-scale restoration planning in the Upper Midwest, U.S. Ecological Restoration 33:135–146.