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Native cover crops and timing of planting: Effects on ^{15}N uptake, weed invasion and prairie establishment

Abstract: Cover crops have been used for several purposes in prairie restorations. This project looked at whether the assumed benefits are supported by research results.

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More details:
www.leopold.iastate.edu/research/grants/2009-1/E2006-11.pdf

The project investigators recommend that when plantings are done in former brome fields, prairie establishment will be highest with spring plantings without a native cover crop, or in spring plantings with Canada wildrye as a cover crop.

ECOLOGY

What was done and why?

Planting cover crops to simultaneously establish native prairie seedlings and prevent weed invasion has become a common management practice for prairie plantings. The underlying assumption is that the cover plant will act as a nurse plant to prairie seedlings and will have a positive effect on seedling recruitment by increasing weed suppression and lowering the harmful effects of high evaporation and light availabilities. Cover crops also could reduce the amount of soil erosion that occurs during planting. This potentially could lead to decreased weed biomass and increased prairie establishment in restoration planting situations.However, evidence supporting these benefits is largely anecdotal and has not been universally accepted. Further scientific evidence is needed on the efficacy of cover crops for this use.

Objectives of the project were to determine if:

- Native cover crop species facilitate the growth and establishment of native Iowa grassland species, and
- Native cover crops positively affect native grassland species establishment and negatively affect weeds by keeping nitrogen (N) in the system and away from the weeds and out of water bodies.

What did we learn?

Cover crops showed some benefits in reducing weed biomass, but this ran counter to their tendency to inhibit establishment of prairie species. Control plots had as high or higher prairie plant establishment as the cover crop plots. This suggests that cover crops were not acting as nurse plants. Cover crop effects on N retention were neutral.

If a cover crop is to be used, Canada wildrye would be recommended. It reduced weed establishment and did not significantly lower prairie species establishment. Side-oats grama was the poorest performing cover crop species. It reduced prairie species establishment significantly below that seen in the control plots, and it showed only marginal resistance to weeds.

Prairie establishment was highest when prairie seeds were added in the spring at the beginning of the project. Very little prairie establishment occurred when cover crops were over-seeded during the following growing season.