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## Oakridge Research and Education Prairie

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# Oakridge Research and Education Prairie

## **Abstract**

Reconstructed tallgrass prairies (prairies that have been replanted) in Iowa and elsewhere in the Great Plains often lose many of the planted species over time, leading to lower diversity compared with prairie remnants. Establishment and maintenance of diversity in these reconstructions may be heavily influenced by herbivores. Herbivores such as white-tailed deer (*Odocoileus virginianus*), rabbits, and voles (*Microtus* spp.) may increase prairie diversity by eating competitively dominant plants, or decrease diversity by eating rare species. In addition to consuming adult plants, herbivores may further affect plant diversity by consuming seeds and seedlings and/or dispersing seeds to new locations.

## **Keywords**

RFR A12120, Ecology Evolution and Organismal Biology

## **Disciplines**

Agricultural Science | Agriculture | Natural Resources and Conservation

## Oakridge Research and Education Prairie

### RFR-A12120

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### Introduction

Reconstructed tallgrass prairies (prairies that have been replanted) in Iowa and elsewhere in the Great Plains often lose many of the planted species over time, leading to lower diversity compared with prairie remnants. Establishment and maintenance of diversity in these reconstructions may be heavily influenced by herbivores. Herbivores such as white-tailed deer (*Odocoileus virginianus*), rabbits, and voles (*Microtus* spp.) may increase prairie diversity by eating competitively dominant plants, or decrease diversity by eating rare species. In addition to consuming adult plants, herbivores may further affect plant diversity by consuming seeds and seedlings and/or dispersing seeds to new locations.

Changes in plant diversity, whether as a result of herbivores or some other means, may also affect the animals in a prairie. For example, the number of plant species in an area can influence the number and activity of herbivores by improving or reducing habitat quality. Interrelationships between plant diversity and herbivores can increase or decrease prairie diversity over time.

### Materials and Methods

The Oakridge Research and Education Prairie was established in March 2012 to experimentally test how mammalian herbivores affect and are affected by plant diversity. Oakridge Prairie also provides

educational opportunities by highlighting the benefits and methods of prairie restoration.

We seeded the 4-acre prairie at a density of approximately 48.2 seeds/ft<sup>2</sup> (~65% forbs and ~35% grass by weight), using 14 prairie species except in high diversity centers, which received a 51 species mixture. Single high-diversity centers cover circular areas with a 63 ft diameter (0.07 acres) within each of eight blocks, with each block covering 105 × 105 ft (0.25 acres). Fences around four of the experimental blocks exclude white-tailed deer, rabbits, and prairie voles (*Microtus ochrogaster*).

Exclosures consist of two strands of electric fencing running approximately 15 and 40 in. above ground level that are both set approximately 39 in. outside a third strand running 30 in. above ground level. This design discourages entry by deer as they cannot jump the horizontal distance of the two fences. The inner fence also consists of 24 in. tall hardware cloth at the base that extends 12 in. belowground to exclude small mammals (e.g., rabbits and voles).

We recorded the presence and abundance of plant species in September, 2012. Aboveground plant biomass was measured at the end of the growing season. Small mammal surveys were conducted in July and October 2012.

### Results and Discussion

*Research.* In general, prairie restorations are dominated by agricultural weeds in the first one to two years before native prairie species fully establish. Accordingly, of the 72 plant species we observed at Oakridge Prairie, 26 were seeded the previous spring with the remaining species largely composed of annual weeds. We expect that native species will

increase in abundance as the incidence of weedy species declines over the next year.

The number of plant species differed between high diversity cores and the surrounding matrix. We observed 58 species in the high diversity centers, including 25 of the 51 species we seeded. By comparison, we observed 51 species in the surrounding matrix, including 10 of the 14 species we seeded. Total aboveground plant biomass did not differ significantly between herbivore or diversity treatments at the end of the first year.

We found six small mammal species during our surveys (Table 1). Small mammal populations were lower inside fenced off areas; however, data from additional years will be necessary to determine the effects of plant diversity on small mammal populations.

*Education and Outreach.* Our education program thus far has included 159 ISU students from the English and Landscape Architecture Departments and the Biology program. We hosted six educational events

where we discussed the impacts of native prairie systems in Iowa and the importance of understanding the ecological processes that underlie these systems. For two of these events, we invited volunteers to help seed the field.

We are also working to promote education about native lands outside of Iowa State University. We have presented to 46 seventh and eighth grade students in the Ames Middle School Science Lunch program about the experiments at Oakridge Prairie that many of them see every day. Furthermore, we held two community meetings for those living near the site to discuss work at the site and answer questions. The 14 residents who attended these meetings were supportive of the work.

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**Table 1. Species and number of small mammals trapped in 2012.**

<b>Species name</b>	<b>Common name</b>	<b>Number</b>
<i>Blarina brevicauda</i>	Northern short-tailed shrew	15
<i>Microtus ochrogaster</i>	Prairie vole	122
<i>Mus mus</i>	House mouse	1
<i>Peromyscus leucopus</i>	White-footed mouse	56
<i>Peromyscus maniculatus</i>	Deer mouse	79
<i>Reithrodontomys megalotis</i>	Western harvest mouse	97
Total		370