

RESEARCH CONNECTION

Impacts of smooth brome on insect diversity and potential for fescue grassland recovery after weed control

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Why this research is important

For protected areas, such as national parks, biological research provides valuable information needed for decision making. For example, it is important to examine the relationship between invasive plant species and other taxa. Part of our research compared plant diversity to smooth brome cover in order to determine the management priorities for this invasive species. Insects and other arthropods provide pollination services and act as a valuable food resource for nesting grassland birds. The outlined research related insect diversity and abundance to smooth brome cover.

In RMNP, smooth brome is managed by mowing and herbicide. These methods are preferred, because soil disturbance promotes smooth brome colonization. Because soil is not removed by these techniques, the seed native bank is an important tool for grassland

What you need to know

Fescue grasslands are increasingly rare yet diverse ecosystems that provide habitat for many bird species including Baird's sparrow, Sprague's pipit, savannah sparrow, clay-colored sparrow, and western meadowlark. Native grasslands undergo outside pressures, such as land-use demands. Invasive plant species threaten grassland integrity from within, by changing ecosystem dynamics and species diversity. Fescue grassland integrity is threatened by smooth brome (*Bromus inermis*), an aggressive exotic grass that effectively out-competes native plant species. Smooth brome forms circular patches that efficiently spread by means of underground stems, or rhizomes. Our research focused on the ecological impacts of smooth brome grass within fescue grasslands.

We conducted studies in Riding Mountain National Park (RMNP), Manitoba, and in the Brandon University greenhouse. We compared smooth brome cover with other components such as soil seed bank, plant diversity, and insect abundance and diversity.

regeneration. Our research also provides data for predicting grassland recovery from the seedbank and identifying gaps in species composition.

How the research was conducted

The chosen study area in RMNP contained a mix of both smooth brome and fescue grassland. All vegetation cover was determined using the pin frame method of counting plants in the field. The seed bank was studied by collecting soil samples from the study area for greenhouse germination. Soil seed bank composition was then compared with smooth brome cover. Two methods were used to collect the insects for the study. Sweep netting was used to collect insects on vegetation whereas pit fall traps were used to collect insects on the ground.

What the researcher found

In the studies relating smooth brome presence to vegetation cover of other species, strong negative correlations were found for six of nine of the most common plant species: As brome cover increased, the native flora thinned.

Examination of the seed bank revealed that fewer seedlings were recovered from soils with greater smooth brome cover. Smooth brome was not found in this seed bank study, but Kentucky blue grass was dominant. However, there were also 14 native herb and grass species present in the seed bank. In addition to seeds, grasslands may also recover from encroaching roots and rhizomes from the surrounding area.

A negative correlation was found between smooth brome cover and arthropod abundance, especially for flies and leafhoppers. The leafhopper and grasshopper groups were further divided into species. A few leafhopper species showed a negative association with smooth brome. Biomass and species richness of these species also had negative relationships with smooth brome. However, no negative relationships were found between smooth brome and the fauna groups that provide nesting bird diet, such as grasshoppers, beetles, moths and butterflies, and spiders. This is great news for the birds

because the smooth brome infestation does not remove their food.

How this research can be used

The current plant and insect diversity studies emphasize the need to control smooth brome to prevent species loss in protected areas. However, food resources for birds do not seem to be negatively affected by smooth brome. This data helps determine the priority of managing smooth brome. In addition, seed bank data can be used for remediation planning such as appropriate seed mixes. Overall, ecological data, such as insect abundances and diversity, strengthen the knowledge base for the larger scientific community.

About the researcher

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Keywords

smooth brome; fescue grassland; insect diversity; seed bank germination

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