Developing improved native and tame forage varieties for Western Canada

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Project Title:

Development of plant material (grasses, legumes) and mixtures for forage production in the Prairie region

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Optimising endophyte diversity in native North American grasses through genomics and bioinformatics.

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Background

Tame forages are generally more productive than native forages under optimal growing conditions. But when grown in the more environmentally challenging conditions they evolved, native forages tend to outperform tame ones. Researchers in Swift Current have been working on breeding native forages as well as looking into ideal-grading conditions for native forages. This project builds on perennial forage breeding research initiated under the first Beef Science Cluster.

Objectives

To provide industry with improved forage varieties and a better understanding of native forages.

What they did

This project had several components:

Native forage breeding: Both traditional selection techniques and advanced genomics tools were used to develop improved tame and native forages using plant mixtures and plots established in Lethbridge, Swift Current, Saskatoon and Brandon.

Evaluation of mixtures vs. monocultures: Small (4 x 8 m) plots of five native grasses (bluebunch wheatgrass, nodding bluebonnet, western wheatgrass, little bluestem and side oats gramma) and two legumes (purple prairie clover and white prairie clover) were seeded at AAFC Swift Current in 2010. Each grass or clover was seeded on its own (seven monocultures), as well as with each of the other grasses and legumes (35 binary mixtures). No fertilizers or herbicides were used. From 2013 through 2016, the plots were clipped at ground level in early July and late August and assessed for yield, crude protein, acid detergent fiber and neutral detergent fiber levels. This evaluation was repeated in 2016 in all sites and additional trials in Lethbridge in 2017.

Weed suppression by native species: Three greenhouse studies were conducted to look at seven different native forages and if they had the ability to suppress dandelion, scentless chamomile, and foxtail barley.

Optimisation of endophytes: Seven different endophyte strains were studied on paspalum and bermudagrass mixtures with three different grass species (tall fescue, meadow bromegrass, and hybrid bromegrass).

Evaluation of mixtures vs. monocultures: Forage mixtures frequently produced greater dry matter than monocultures. Increasing the amount of purple prairie clover within mixtures had the potential to increase the potential for late-season productivity. These patterns were robust over a wide variety of climate conditions, as this study included both one of the driest and wettest years in the history of the region.

Evaluation of mixtures vs. monocultures: Forage mixtures were also included with other grasses and legumes (21 binary mixtures). No fertilizers or herbicides were used. From 2011 through 2016, the plots were clipped at ground level in early July and late August and assessed for yield, crude protein, acid detergent fiber and neutral detergent fiber levels.

What They Learned:

Native forage breeding: This project has developed new breeding lines of purple prairie clover, white prairie clover, northern wheatsgrass, side oats grama, bluebunch wheatgrass, western wheatgrass, little bluestem, and hybrid bromegrass. These breeding lines are currently being evaluated in replicated plot trials for forage yield, seed yield and quality.

Evaluation of mixtures vs. monocultures: Forage mixtures increased ruminal methane production despite their high concentrations of condensed tannins. Researchers in Swift Current are working on breeding native forages as well as looking into ideal-grading conditions for native forages.

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What It Means:

The results from this study are valuable for producers when considering establishing or reseeding pastures. They also provide researchers with a path forward to continue breeding and improving native forages.

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