

RESEARCH FACTS



UNIVERSITY OF SASKATCHEWAN

Livestock and Forage
Centre of Excellence

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IN PROGRESS

Evaluation of alfalfa and grass species in binary and triple mixtures on performance under soil salinity conditions

PROJECT TITLE

Evaluation of alfalfa and grass species in binary and triple mixtures on performance under soil salinity conditions

In progress:

Results expected in March 2022

RESEARCHERS

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Background:

Soil salinity is considered a threat to production in many parts of the Prairies. Some 20 million out of 67 million hectares (ha) or 30 per cent of land across the Canadian Prairies either openly showed salinization (6 million ha) or were at risk of being salinized. Typical forage mixtures for hay and grazing lack the salinity tolerance needed for these affected soils resulting in reduced forage yield. In extreme salinity situations, no forage yield is produced and economic returns from these areas to the producer are severely impacted. There are 240,000 ha in Saskatchewan where the soil salinity has effectively reduced the yield potential to zero. This is a cost to the landowner and to agriculture at large as neither will gain any economic value from these areas. Perennial forage establishment is one of the most effective ways to combat salinity with minimal production risk or capital investment. Well-adapted perennial forage mixtures would provide ground cover, compete with weeds and lower the water table.

Objectives:

Determine the effect of synergies between saline tolerant forages including grass and legume species on soil salinity, biomass, quality, composition, persistence, and weed suppression.

What They Will Do:

A three-year study will be conducted at the University of Saskatchewan's Livestock and Forage Centre of Excellence, south of Clavet, Sask., on the northeast corner of NE 21-34-03-w3, which has a moderate saline sodic soil.

- Spring soil samples will be taken for salt concentrations, soil nutrients, soil carbon and moisture content.
- Four forages will be selected for stand establishment, persistence, quality and biomass:
 - 1) Radisson smooth brome grass (*Bromus inermis* Leyss) - **SBG**,
 - 2) Revenue slender wheatgrass (*Agropyron trachycaulum* Malte) - **SWG**,
 - 3) Garrison creeping meadow foxtail (*Alopecurus arundinaceus*) - **CMF**, and
 - 4) Halo alfalfa (*Medicago sativa* L.) - **HaALF**

In spring 2019, HaALF will be seeded in binary mixtures with SBG, CMF, and SWG, as well as in a quaternary mixture consisting of each one the three grasses (SBG, CMF and SWG).

- Treatments will include: (i) HaALF + SBG; (ii) HaALF + CMF; (iii) HaALF + SWG; and (iv) HaALF + SBG + CMF + SWG).
- Each treatment will be in four plots, 6.2 × 1.2 metre (7.44-m²) for a total of 16 plots.
- Seeding rates will be HaALF at 9.7 kg/ha, SBG at 13.75 kg/ha, CMF at 2.65 kg/ha and SWG at 12.90 kg/ha in binary mixtures; for the HaALF + SBG + CMF + SWG triple mixtures, seeding rates will be HaALF at 9.7 kg/ha, SBG at 13.2 kg/ha, CMF at 0.8 kg/ha and SWG at 4.88 kg/ha.
- Based on the soil test results and fertilization recommendation, the site will be fertilized accordingly.

Over the growing seasons of 2020 and 2021, plant establishment, botanical composition, weed invasion, forage yield and forage quality will be monitored.

Economic analysis including cost-return analysis for each of the treatments will be undertaken. Costs associated with seeding the reclamation forages will be tracked and returns will be the market value of the forage over three years (2019 to 2021).

Implications:

This project extends the research on salinity control in the dark brown soil zone. Information will be gained on the benefits of the synergy between species on persistence and weed suppression while reducing upward movement of salts on saline areas. Increasing forage production, forage quality and ultimately livestock gain per hectare is one benefit of these research results. Other benefits of this trial could include reduced environmental costs and increased wildlife habitat. This project also will evaluate costs associated with establishing perennial forage mixtures under soil salinity conditions. Overall, the results will identify opportunities to enhance sustainability of beef industry.

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