Canadian Agronomist
DIGGING INTO RESEARCH

Using forage mixtures to reclaim saline land

CATEGORY soils and fertility | *July 27, 2026*

Salt tolerant hybrid wheatgrass, salt tolerant alfalfa, a legume forage mix, and a forage pollinator mix yielded similar over two years on saline sites in Saskatchewan ranging from 4228 lbs/ac (4750 kg/ha) to almost 5340 lbs/ac (6000 kg/ha). Establishing salt tolerant forages on saline soils improves forage yields and soil health, and can improve pollinator activity.

Approximately 2.47 million acres (1 million ha) are rated with moderate to severe soil salinity on the Prairies. Establishing forages on these saline lands can help return them to productivity and improve soil health. At the same time, forages can also help to reduce the spread of weeds such as kochia that thrive in saline soils.

A field research study was conducted in 2022 and 2023 at the Livestock and Forage Centre of Excellence (LFCE) near Clavet, the Western Applied Research Corporation (WARC) at Scott, and the Southeast Research Farm (SERF) near Redvers, Sask.

The objective of this study was “to assess four unique perennial forage mixtures for their establishment rate, forage yield, botanical composition, and their contributions to pollinator abundance and soil microbe biomass under both saline and non-saline field conditions.”

Measured in the two six inches (15 cm), the Dark Brown soil Clavet site had a high salinity rating of 6.4 dS/m, the Black soil Redvers site was moderately saline at 4.2 dS/m, and the Dark Brown soil at Scott was rated as non-saline with a level of 0.9 ds/m.

The forage treatments included salt tolerant hybrid wheatgrass CDC Salt King, salt-tolerant alfalfa Halo II, a salt-tolerant grass dominant mixture, and a legume dominant pollinator mixture. The salt tolerant grass dominant mixture included smooth bromegrass, slender wheatgrass, birdsfoot trefoil, Halo II alfalfa, and yellow sweet clover. The pollinator mixture included hybrid wheatgrass CDC Salt King, plantain, and milkweed. These forage treatments were seeded with and without a barley companion crop in the year of establishment.

In addition, an annual grain crop treatment was included with CDC Copeland barley in year one and LL345PC canola in year two.

At Clavet, the trial was planted on terminated perennial grass in 2022, and on wheat stubble at Scott and Redvers. Fertility programs varied by site. Herbicides were applied prior to seeding for weed control in 2022. In-crop weed control in 2022 was done by hand-weeding. In 2023, herbicides were only applied to the canola plots.

Forage establishment was assessed on June 4, 2023. Pollinator surveys were conducted twice during the flowering stage of alfalfa at two week intervals in 2023.

Stand establishment varied

At Clavet, alfalfa stand establishment was significantly lower at around 60 per cent compared to the salt-tolerant and pollinator mixtures, and hybrid wheatgrass exceeded 80 per cent establishment. At the other two sites, forage treatments were not significantly different in stand establishment. Average establishment rates was highest on the non-saline soil at Scott at 97 per cent, followed by 90 per cent at Redvers and 83 per cent at Clavet.

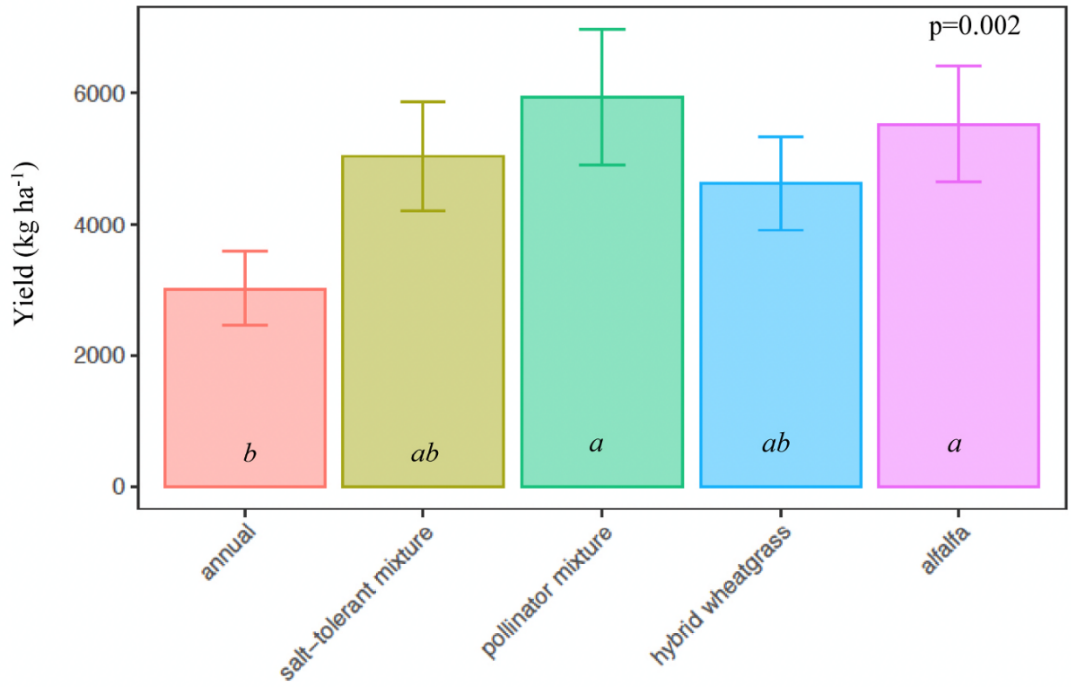
The companion barley crop did not significantly affect forage establishment at any location.

Total forage biomass yields

In the year of establishment, including a companion crop significantly increased total biomass (companion + perennial forage) by 72 per cent in Redvers, 75 per cent in Clavet, and 90 per cent in Scott. In the year of establishment, the non-saline Scott site yielded significantly higher at 9494 lbs/ac (10,665 kg/ha) compared to moderately saline Redvers at 2160 lbs/ac (2427 kg/ha) and the high saline site at Clavet at 1243 lbs/ac (1397) kg/ha.

Over both years, the total two-year biomass yield was statistically similar between the four perennial forage treatments ranging from around 4228 lbs/ac (4750 kg/ha) to almost 5340 lbs/ac (6000 kg/ha). The annual grain crop had the lowest two-year biomass yield indicating it is less desirable as a forage crop on saline areas as they did not produce seed heads.

Mean biomass yield of forage mixtures and annual crop (barley 2022; canola 2023) at three sites in Clavet, Redvers and Scott, SK over a two year period (2022, 2023)



Source: Waldner et al. 2026

Nutritional analysis found higher crude protein in the legume mixtures at 15.4 per cent crude protein. Mixtures dominated by grasses had higher acid detergent fiber (30.2%) and neutral detergent fiber (56.3%).

Analysis of the pollinator mixture found 10 to 66 per cent greater honey bee abundance compared to other treatments.

Soil microbial biomass carbon measured at pre-seed and post-establishment had a substantial increase in the perennial forage mixtures.

This work was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canadian Agricultural Partnership Bi-lateral agreement between the federal government and the Saskatchewan Ministry of Agriculture

Alex Waldner, Jeff Schoenau, Chris Willenborg, Jessica Enns, Kayla Slind, Lana Shaw, Bill Biligetu. Using perennial forage mixtures to reclaim saline land: Establishment success, forage yield, and environmental benefits. Field Crops Research, Volume 342, 2026, 110450, ISSN 0378-4290, OPEN ACCESS: https://doi.org/10.1016/j.fcr.2026.110450

 © Haywire Creative Inc.