"Developing biological control strategies for foxtail barley in saline pastures, hayfields, and other areas"

CONTROLLING FOXTAIL BARLEY

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RESEARCH INSTITUTION: Agriculture and Agri-Food Canada (Semiarid Prairie Agricultural Research Centre, Swift Current, SK)
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Background: Foxtail barley is a major weed across many regions of Canada, causing detrimental effects to both crop and livestock production. Foxtail barley invades bare areas, caused by disturbances or saline soils. Although the shallow root system makes it easily controllable with tillage, areas such as pastures, hayfields and reduced-tillage cropland are more susceptible to foxtail barley infestations. Early spring cropland burn-offs can be ineffective due to cool weather and small foxtail leaf target area. This perennial plant reproduces through vast quantities of air-dispersed seeds, which are easily carried by the wind from nearby areas. Due to this widespread seed dispersion, foxtail barley thrives in any area not occupied by other plants, which is why it can be such a problem in saline areas. The stiff, sharp awns of foxtail barley act like slivers, creating a hazard for grazing animals by lodging in the noses and mouths of livestock, giving rise to infection. This causes animal discomfort as well as reduced feed intake, weight gain, and milk production.

Objectives: To identify forage varieties that can suppress foxtail barley on saline land, provide good nutrition for grazing, and maintain long stand life.

What they did: Two Alberta field sites, one near Oyen and one near Warner, were selected for the foxtail barley suppression trials. Both areas were seeded in 2006 and lay downwind of a significant foxtail barley seed source, with soil salinity averaging 8 dS/m at the Oyen site (severe) and 4 dS/m at the Warner site (moderate). The Warner location also contained another invasive plant, downy brome. Each test site evaluated 10 forage species or mixes as well as unseeded control plots, with six replicates per site. The forage varieties tested were Saltmaster blend, AC Rocket smooth bromegrass, Spredor 4 alfalfa, AC Saltlander green wheatgrass at 12 and 6 inch row spacing, Nuttall's salt-meadow grass, Polar northern wheatgrass, slender and green wheatgrass in alternating rows at 6 inch row spacing, Poole western wheatgrass, and Orbit tall wheatgrass.

Grazing performance, forage quality, and yield was compared between one of the saline tolerant green wheatgrass varieties, AC Saltlander, and smooth brome grass. This portion of the project also included pasturing yearling steers to evaluate any differences in livestock gains, forage utilization, palatability, and pasture longevity between AC Saltlander and smooth brome.

What they learned: In 2007, 2008 and 2010, at the more saline Oyen site, no one treatment averaged more than 79% foxtail barley control. There was a severe drought in this region in 2009, and therefore no results could be reported. However, in 2011, plots seeded with

AC Saltlander green wheatgrass at both 12 and 6 inch row spacing and plots seeded with slender and green wheatgrass in alternating rows resulted in greater than 80% foxtail barley control. The higher degree of soil salinity at this site resulted in fewer forage species able to compete effectively with foxtail barley. The green wheatgrass varieties were the best suited to control foxtail barley at this location.

At the lower saline Warner site, where both foxtail barley and downy brome were present, five of the forage treatments tested provided greater than 80% foxtail barley control. These included the same wheatgrass varieties (AC Saltlander green wheatgrass at both row spacings and slender and green wheatgrass seeded in alternating rows, resulting in 99% foxtail control after three growing seasons) as well as the Saltmaster blend, Orbit tall wheatgrass, and AC Rocket smooth bromegrass. Similarly, the green wheatgrass treatments provided 98% control of downy brome. Due to the lower salinity, this location was also conducive to control by other forage species out-competing foxtail barley and downy brome at lower levels of control.

As the AC Saltlander variety was one of those best suited to controlling foxtail barley infestations at both salinity levels, its suitability as a grazing forage was tested. Forage production was similar between AC Saltlander and smooth brome grass over a four-year period, in both saline and non-saline areas. The average forage quality was similar during the summer grazing period, however; the quality of AC Saltlander during the fall grazing season was not tested, so its suitability for late fall grazing or as a stockpile forage requires further research. Grazing performance between the AC Saltlander and smooth brome, based upon animal average daily gain, was not statistically significant, although there was a consistent numerical advantage in gain for those steers grazing AC Saltlander. Over the four years of the study, the average daily gain per head was 13% higher over the entire grazing season for those animals pastured on AC Saltlander.

What it means: The research team proved that certain forages, with proper preparation to ensure establishment, are able to suppress foxtail barley and downy brome infestations in saline soils. Seedbed preparation is key to the establishment of suppressor forages. Any existing weeds should be destroyed. Tillage of the affected area prior to the seeding of suppressor forages like Saltlander is recommended to bury the existing shallow seedbank and decrease the salt concentration at the surface of the soil. In regions where soil salinity is below 8 dS/m, more forage options are available to suppress foxtail barley growth. The suitability of AC Saltlander for summer grazing provides producers with the means to control foxtail barley in their pastures, along with a forage that produces comparable animal gains and forage quality.

The value of using suppressor forages to control foxtail barley lies not only in reducing the application of costly herbicides to infested areas, but also in reduced treatment costs and improved weight gain for grazing animals who develop infections due to the sharp awns of foxtail barley, decreased quantity of weed seeds available for transfer, and increased forage production. If the land is being used for hay production, a decrease in the amount foxtail barley present from 10% to 5% would return $10-$20 per ton of hay produced by decreasing the price discounts resulting from foxtail barley contamination. Cropland with saline areas unsuitable for crop production could be seeded to AC Saltlander to help contain the saline areas and eliminate the negative cash flows associated with applying expensive crop inputs to these low yielding areas. Whether on pasture, hay, or cropland, the objective is to establish a useful, deep-rooted, high consumptive water-using crop that can lower the groundwater levels in the area and convert unproductive land to a productive asset.

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