



# BCRC

BEEF CATTLE RESEARCH COUNCIL

# RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY

## IN PROGRESS



## Increasing fall productivity in winter-hardy alfalfa

### Project Title:

Increasing fall productivity in winter-hardy alfalfa by selecting for reduced fall dormancy

### Researchers:

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### Project Code:

FRG.11.17

### Completed:

*In Progress.  
Results  
expected in  
March 2023.*

### Background:

Alfalfa with reduced fall dormancy can grow later into the season, so it has higher yields. Alfalfa with higher winter hardiness survives the winter better. Winter hardy alfalfa usually has higher fall dormancy but these traits are genetically independent, so one should be able to select for winter hardy alfalfa with low fall dormancy.

### Objectives:

To improve late-season productivity of winter-hardy alfalfa varieties suitable for grazing in northern regions by recurrent selection for reduced dormancy (RD) and evaluate the impact of selection on freezing tolerance.

### What They Will Do:

Recurrent selection: The team will select Peace and Yellowhead alfalfa varieties for reduced fall dormancy, and test for freezing tolerance, researchers will then look for genes that respond to these selections. They will grow individual plants at long daylengths and warm temperatures, cut them, shorten the daylength and reduce the temperature, grow them again, and find the tallest plants. After three rounds of this, the tallest plants are crossed, and the cycle starts again.

Impact of recurrent selection: The resulting seed will be planted to evaluate grazing or cutting tolerance. These populations will also be tested for freezing tolerance by slowly freezing them at 4°C per hour to -22 through -36°C, thawing in the dark at -20°C,

regrowing them for 3 weeks, and determining which varieties survive.

Genomic validation: Plots established in Normandin, Quebec City, Swift Current and Lacombe will be evaluated for yields, fall dormancy and winter hardiness and their stability in the different locations. Gene markers for freezing tolerance and fall dormancy that have previously been identified in Quebec will be validated in these western populations.

The new, improved varieties and others will be exposed to intense continuous grazing in Lacombe to see how they tolerate grazing, and tolerance to cutting frequency will be evaluated in Swift Current.

### **Implications:**

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This project will identify genes that support late fall growth and winter survival to improve the yields and survival of alfalfa, particularly at more northerly latitudes, and help the forage and beef sector adapt to challenges and opportunities posed by climate change.

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