

## Determining the Critical Traits Associated with Lodging in Canadian Barley Varieties and Elite Breeding Lines

Alberta produces nearly 50% of Canada's grown barley and 37% of our barley exports. Alberta barley for malt, feed and food is internationally recognized for its superior end-use product qualities. Lodging resistance is a very desirable trait in barley. Lodging occurs when the plant stems bend near ground level due to wind, rain or irrigation action. It makes crops very difficult to harvest and can dramatically reduce yield. This project evaluates and characterizes the influencing traits for lodging resistance in a set of elite barley breeding lines. Higher yielding varieties with good lodging resistance can increase grain and forage quality and make straight cutting much easier, which can significantly save harvesting costs and increase barley margins. This would grow Alberta's malt, feed grain and forage barley production.



#### RECIPIENT:

Alberta Agriculture  
and Forestry



#### PARTNERS:

InnoTech Alberta  
University of  
Alberta



#### TOTAL BUDGET:

\$242,100



#### AI FUNDING:

\$140,500



#### PROJECT DATES:

March 2018 –  
February 2021



#### PROJECT TRL:

Start: 6  
End: 8

## APPLICATION

Lodging has several negative impacts on barley production and revenue. For example, lodged barley usually remains damp for longer, causing grain bleaching that affects market grade and acceptability for malting. Developing barley varieties with higher resistance to lodging will increase grain quality and yield, speed up harvesting and decrease operation costs. Also, lodging resistance is very important to keep barley competitive with other crops, like wheat and canola, and to keep barley crop rotation in Alberta and western Canada.

# Clean Resources

## Smart Agriculture and Food Innovation

### Food Innovation

## PROJECT GOALS

- Assess and characterize a diverse range of elite breeding lines and Canadian barley varieties and identify traits associated with lodging.
- Grow elite lines and barley varieties for three years, at four to five sites. Assess the effect of genotype and field management on lodging, yield, grain and forage quality.
- Measure plant traits associated with barley lodging resistance each year, for three years, using new screening methods to determine chemical, anatomical and structural compositions that determine or contribute to barley lodging resistance.
- Identify and describe at least three traits that are linked to lodging resistance.
- Identify elite breeding lines and Canadian barley varieties with better lodging resistance and determine the best way of incorporating better lodging resistance genes into breeding.

## BENEFITS TO ALBERTA

- Discovery of new approaches and breeding techniques for lodging resistance in barley and other cereals.
- Maintain the revenue of malting barley. Lodged barley usually leads to grain bleaching, which affects market grade and acceptability for malting. When malt barley loses grade due to lodging, it becomes feed, which drastically decreases its market price.
- Severely lodged barley at or near maturity stage may have high grain moisture. It matures and ripens later than non-lodged grain because the soil dries more slowly under the blanket-like covering of lodged crop. Thus, the grain may require drying which can increase production costs.
- Lodging can reduce yield by 22% to 40%. The deployment of barley varieties with good lodging resistance will make production more profitable in Alberta.



2 Publications



4 New  
Products/Services



4 Patents



2 Project Jobs

## CURRENT STATUS

### June 2020

The team has been using a breeding approach coupled with analytical tools that can identify and analyze chemical, structural and molecular genetic factors to understand lodging resistance in barley. The field component of the study was divided into two experiments to capture the effects of barley varieties and location variations on lodging and to mitigate risks related to adverse weather conditions.