

# Acid Tolerant Barley – University of Tasmania

## Background

Soil acidity with high levels of toxic aluminium is the largest (by area) soil constraint limiting sustainable barley production in Australia. Soil acidity impairs the root growth of sensitive crops and reduces nutrient acquisition and access to water reserves. As a result, acid soil tolerance is associated with drought tolerance in low rainfall regions but is also closely associated with waterlogging in the high rainfall regions. Soil acidity is estimated to cost WA grain growers \$300 to \$400 million annually. Liming has been an important approach to combat acid soils in the past 20 years, however, surface liming is costly and is slow to decrease acidity in the subsoils because of the slow movement of lime down soil profiles.

Barley has a reputation for a wider adaptation than wheat. However, this is not the case in Australia due to the lack of appropriate variability and breeding selection for abiotic stress tolerance and adaptation. Soil acidity is one of the key limiting factors, with barley much more sensitive to acid soils than wheat. For these reasons, acid soil/Al tolerance is a priority as a genetic solution, in combination with lime application.

## Project Aims

The trial aims to validate the performance of a newly developed acid tolerant barley varieties (i.e. P33-1) with RGT Planet parentage on acid soils in South-western Australia. The research to date has primarily been conducted in Tasmania with encouraging results (Figure 1). After the 2023 SCF study tour to Tasmania, where SCF members met with University of Tasmania (UTAS) researchers, a positive and collaborative relationship has been established.

*Figure 1. Visual results from the UTAS acid tolerant barley research.*

## Methodology/Treatments

The trial protocol is yet to be finalised; however, the trial will include at least two (2) barley varieties containing the acid soil tolerant genes in comparison with RGT Planet and another commonly grown barley variety.

Three small plot trial locations will be selected, each targeting a soil pH of either 4.5, 4.8 or 5.5. This will enable comparison of productivity and yield in both acidic and non-acidic soil environments. The trial treatments will be triple replicated and completely randomised.

The following measurements will be conducted:

- Baseline soil testing (particularly to establish soil pH).
- Plant establishment counts
- In-season biomass (multispectral drone)
- Harvest yield and Grain quality.

## Summary

This trial will locally validate the effectiveness of the new acid tolerant genetics in barley on local acidic soils. It will also validate the performance of the genetics on neutral soils to determine if there are any yield penalties due to inclusion of the gene.

## Acknowledgements

Grateful acknowledgement goes to Professor Meixue Zhou and his research team at University of Tasmania for inclusion of Stirlings to Coast Farmers in the project. Acknowledgement also goes to RAGT for investment in this important research.

