

RESEARCH DIRECTIONS

Making barley more tolerant to salt

Dr Zhong-Hua Chen, of the School of Health and Science, has been awarded funding to investigate the genetic factors that would promote the successful farming of barley in saline soils. The project, which is supported by the 2013 Science and Innovation Awards, the Grains Research and Development Corporation and the Minister for Agriculture's Award, has implications for Australia's domestic and export barley crops, as well as for countries that struggle to grow barley in salt-affected soils.

'Soil salinity is one of the most severe environmental problems in many parts of the world, a third of agricultural land will be significantly affected by salinity by 2050,' says Dr Chen. 'Given increasing demand for high-quality malting barley from Asian countries such as China, developing salt-tolerant malting barley will be critical to increase the profit of Australian barley growers.'

Barley is the world's fourth most important cereal crop, after rice, wheat and maize. Annual production of barley in Australia is about 6.6 million tonnes with about 65 per cent of that being sent for export. This account for a third of the world's malting barley trade.

Stomatal guard cells are specialised leaf cells that regulate CO₂ uptake while minimising water loss by transpiration against salinity stress. Understanding the molecular mechanisms and genetic control of stomata under salinity stress is a key to developing barley that grows well in salt-affected soils.

Although barley is relatively tolerant to salt, there are large variations among different genotypes. This project will use innovative molecular and bio-imaging techniques, to examine how barley yield under saline conditions is linked to stomatal control. It will also identify the genetic potential for exploiting stomatal control in breeding malting barley varieties with a high salinity tolerance.



The background photo shows a barley field trial in Launceston, Tasmania. Inserts are images of stomata. Photo credit: Michelle Mark, Xiaohui Liu

Given the burgeoning markets in Asian countries such as China, developing high-quality salt-tolerant malting barley will help to secure a healthy future for this important sector of Australia's grain industry.

Project Title: Improving yield performance in saline soil by identifying quantitative trait loci for stomatal regulation in barley & Functional analysis of "stomatal movement genes" for barley salt tolerance: connecting gene to yield performance in saline field

Funding has been set at: \$47,559

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