Novel technique to find salt-tolerant plants

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University of Adelaide researchers are developing a novel technique to easily measure root growth on growing cereal plants, to identify varieties that are more tolerant to salt stress.

The researchers hope that the technique will enable rapid screening of plants to assess their root growth under saline conditions, without needing to dig up and destroy them.

"Soil salinity is a major problem for agriculture around the world," says project leader Dr Megan Shelden, from the ARC Centre of Excellence in Plant Energy Biology within the School of Agriculture, Food and Wine.

"Within Australia it's estimated that salinity affects 5.7 million hectares and this is expected to increase to 17 million ha by 2050. About 67% of the land affected by salinity is in the cereal growing regions, particularly impacting south-western and south-eastern Australia, with an estimated cost to the local farming industry of around $1.5 billion a year through loss of yield.

"If we can develop cereal crops with enhanced tolerance to salt stress and improved root growth in salt and drought conditions, plants will be able to access deeper soil layers for nutrients and water, leading to improved crop yields."

Dr Shelden was awarded a Premier's Research and Industry Fund's Catalyst Research Grant for this project and is working in collaboration

with the University of South Australia and Australian Grain Technologies.

She is using a technique called 'electrical impedance spectroscopy' to measure the changing electrical properties of the plant under salt stress.

"Basically, we are putting an electric current at different frequencies through plants," says Dr Shelden. "The pattern of electrical impedance in response to different frequencies will change with the size of the root system and membrane properties that are affected by salinity. We will be correlating the amount of root growth to the patterns of impedance.

"The great benefit of this new technique is that we can use it to measure what's happening to plant growth within the soil without having to destroy the plants. This means that we can measure root growth over time on the same plants.

"We hope the technology will lead to an inexpensive and rapid screening method for measuring root growth in cereal crops that could be potentially adapted to other agriculture crops."

Dr Shelden is starting her measurements with commonly grown Australian wheat varieties including Mace, Scout and Gladius. When she has satisfactorily developed the technique, she will then progress to screening wheat lines from around the world to identify those that are more salt-tolerant.

Provided by University of Adelaide