

# Enhanced tolerance to ion toxicities improves wheat yield in WA

October 8 2014, by Tony Malkovic

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Researchers from The University of Western Australia have identified ways for farmers in medium-to-high rainfall areas of the WA grain belt to increase wheat yield. Their breakthrough may have implications for other important grain crops in WA, such as barley and canola.

Cropped land in these regions is prone to transient waterlogging early in the growing season, followed by terminal drought during grain filling. Soil saturation with water, combined with the acidity of WA soils, alters soil chemistry to increase concentrations of toxic metal ions, resulting in major yield losses that, when combined with terminal drought, can reach up to \$800 million in the WA grain belt annually.

Assistant Research Professor Hossein Saberi from UWA's School of Earth and Environment and Institute of Agriculture has pioneered the idea that tolerance to toxicity of aluminium, iron or manganese plays an important role in enhancing grain yield in [wheat](#) grown in acidic soils prone to waterlogging followed by drought.

"These ion-tolerant wheat genotypes have enhanced root and shoot growth during the transient waterlogging when compared to varieties that are not tolerant," Professor Saberi said.

The resulting well-developed deep root system means the plants can access water from deep in the soil profile. When terminal drought sets in, these tolerant wheat plants are less affected because they tap into deeper water supplies for grain filling."

The future Australian climate scenario predicts warmer and drier conditions with infrequent heavy rainfall events in winter (i.e. early in the growing season). Hence, there are increased chances of waterlogging occurring early, followed by increased drought in spring during grain filling.

Project Supervisor Winthrop Professor Zed Rengel explained that the capacity of a root system to take up water efficiently from deep water supplies could be fully expressed in acidic soils only if coupled with tolerance to ion toxicities occurring in transiently waterlogged soils.

"The outcomes of this research enable growers to make informed decisions on the selection of wheat varieties best suited to their region. Breeders can use the information in developing future [wheat varieties](#) with improved tolerance to ion toxicities to enhance grain yield in [acidic soils](#) prone to extreme environmental constraints," Professor Rengel said.

**More information:** Khabaz-Saberi Hossein, Barker Susan J., Rengel

Zed (2014) "Tolerance to ion toxicities enhances wheat grain yield in acid soils prone to drought and transient waterlogging." *Crop and Pasture Science* 65, 862–867. [dx.doi.org/10.1071/CP14011](https://doi.org/10.1071/CP14011)

Provided by University of Western Australia

Citation: Enhanced tolerance to ion toxicities improves wheat yield in WA (2014, October 8)  
retrieved 27 April 2024 from  
<https://phys.org/news/2014-10-tolerance-ion-toxicities-wheat-yield.html>

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