DNA discovery key to drought resistant crops

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(Phys.org) -- Scientists have pinpointed the ‘stay green' DNA in barley in new research that may help farmers to grow better crops in areas of drought, heat and salinity.

In an international collaboration, researchers studied a set of 292 barley accessions from the International Center for Agricultural Research in the Dry Areas (ICARDA) in Aleppo, Syria. The accessions were collected from 35 countries in six geographic regions including Africa, Middle East Asia, North East Asia, Arabian Peninsula, Australia and Europe.

The collaboration was between The University of Western Australia's Institute of Agriculture and researchers in China, the United States and Syria.

Using a molecular biology technique known as EcoTILLING that allows direct identification of natural mutations in specific genes, the researchers were able to identify 23 DNA sequence variations, 17 of which occurred in the gene coding region. Two of the 17 DNA sequence variations in the coding region are predicted to cause malfunctioned proteins, which will cause change in barley phenotypic traits.

By gaining a better understanding of the genetic variation in genes that encode the light harvesting chlorophyll a/b-binding proteins (LHCP), plant breeders will be able to use these DNA sequence variations as DNA markers to improve the 'stay green' efficiency of plants.

The study found that samples from Middle East Asia had the highest genetic diversity in genes that encode the LHCP. The barley species Hordeum spontaneum showed greater genetic diversity than Hordeum vulgare, leading researchers to conclude that crossing and transfer of genes from Middle East Asian accession into cultivated barley will enhance genetic diversity.

Barley is an important cereal crop grown during winter/spring in dryland areas of the world for both food and feed.

In Western Australia, barley is the second most important cereal crop after wheat. Some 85 per cent of WA barley production is exported playing an important part in the international barley trade where it provides around one sixth of the worlds' traded malting barley.

Future research will use the latest study Allelic Variations of a Light Harvesting Chlorophyll A/B-Binding Protein Gene (Lhcb 1) Associated with Agronomic Traits in Barley published by *PLoS One* online to focus more closely on the drought resistance of barley lines.

UWA has Memoranda of Understanding with Guangzhou University

(GZU) and ICARDA and actively collaborates with both institutions.

The ICARDA gene bank holds the largest collection of barley genetic resources in the world, including wild types and land races with tremendous potential for genetic variation in resistance to drought and heat stress.

Provided by University of Western Australia