FROST RESEARCH

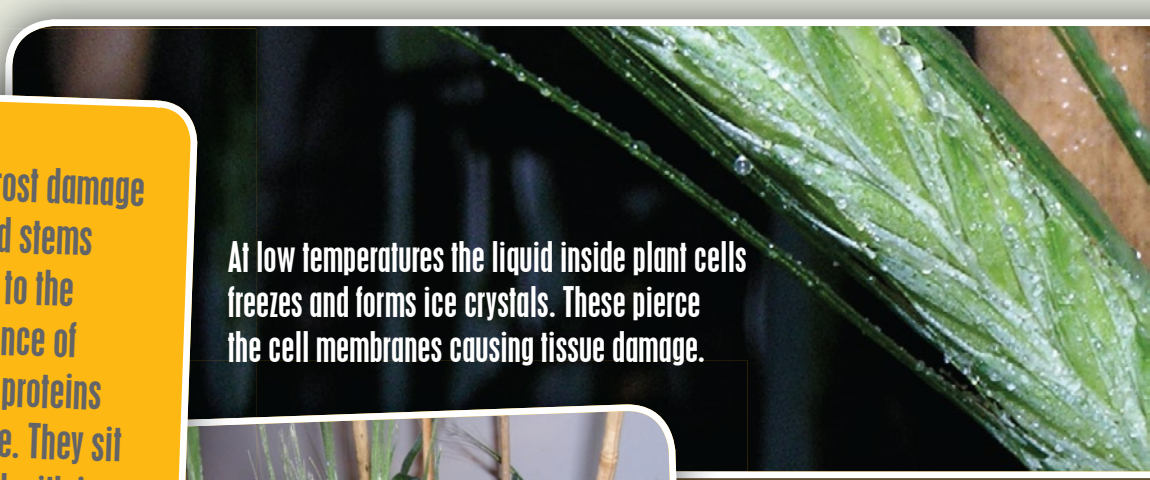
ACPFG
AUSTRALIAN CENTRE FOR PLANT FUNCTIONAL GENOMICS PTY LTD

ACPFG SCIENTISTS ARE IDENTIFYING GENES that help plants combat frostbite!

Researchers have found that frost damage is less severe in the leaves and stems of cereal crops in comparison to the flower. This is due to the presence of ice recrystallisation inhibition proteins (IRIPs). IRIPs act like antifreeze. They sit outside the plant cells and bind with ice crystals as they form, inhibiting the growth of large ice crystals. Since only small crystals form, less tissue damage occurs.

So far, five IRIP proteins have been identified, one of which has a greater affinity with water.

Researchers are working to transfer the gene coding for IRIP production into the barley flower. This will develop crops that can withstand temperatures two degrees lower than current varieties.



At low temperatures the liquid inside plant cells freezes and forms ice crystals. These pierce the cell membranes causing tissue damage.

DID YOU KNOW?

One frost can destroy an entire crop!

The annual economic impact of frost on wheat and barley production in Victoria and South Australia combined is estimated at $95.8 million and $33.6 respectively. So even modest improvements in frost tolerance can deliver tens of millions of dollars of benefit to the industry.

IRIPS are found in all cold tolerant cereals including wheat, barley and rye. They are not present in more temperant cereals such as maize and rice.

ACPFG researchers are also investigating the genes in frost tolerant barley germplasm from Japan. Map based cloning is being used to isolate these frost tolerance genes, which are located on chromosome 2H. Work is also focussed on investigating whether the frost tolerance genes are missing from Australian varieties or whether they're simply just not working.

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ACPFG Research

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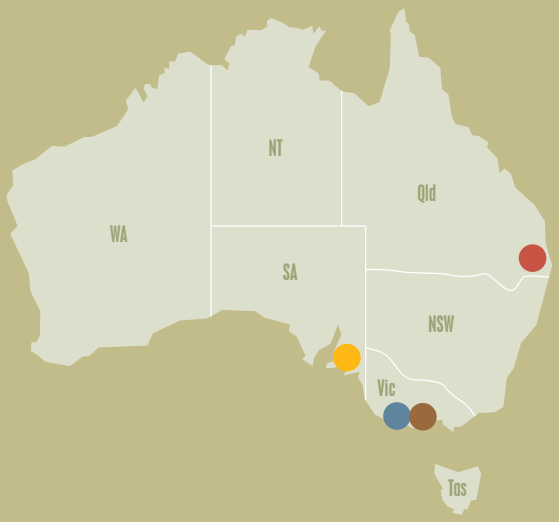
The Australian Centre for Plant Functional Genomics (ACPFG) uses functional genomics to improve the resistance of wheat and barley to hostile environmental conditions such as drought, salinity, frost and mineral deficiencies or toxicities. These stresses, known as abiotic stresses, are a major cause of cereal crop yield and quality loss throughout the world.

To meet our mandate of delivering research outcomes nationally, ACPFG has four nodes throughout Australia. The headquarters is at the University of Adelaide's Waite Campus, with other major research nodes at the University of Melbourne, the University of Queensland and the Department of Primary Industries (DPI) at La Trobe University.



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