

Tailoring wheat to northern Australia

Wheat is one of the most important plant commodities produced in northern Australia. CSIRO Plant Industry is working in this region to understand the factors that affect wheat production in this region and develop better wheat varieties.

Around 20 per cent of the nation's wheat is grown in the northern region from central NSW north into Queensland. Wheat production differs in this region from the wheat belts in southern and western Australia because, moving northward, rain falls increasingly in summer, rather than winter.

Growers in the northern region aim to produce prime hard wheat, the highest quality wheat that attracts a premium price, but they also produce other grades. Drought and diseases are the two most important constraints of wheat in northern Australia.

Improving wheat yields under drought

Wheat grown in northern Australia, and particularly in Queensland, is often dependent on water stored in the soil from summer rains. To varying degrees every year this results in the wheat suffering from stress due to lack of available water, reducing yield and profit for the farmer.

Wheat research highlights

- Identified the range of fusarium species present in Australian wheat farms and their disease causing potential.
- Identified new fusarium resistant wheats using novel screens for resistance.
- Characterised the yield responses of different wheats to drought.



Growers in northern Australian aim to grow wheat for use in bread, pasta and livestock feed.

Two CSIRO bred wheat varieties, 'Drysdale' and 'Rees', are particularly suited to these warmer dryland conditions. They use water more efficiently than other varieties because of how they exchange water for carbon dioxide to photosynthesise and grow. CSIRO Plant Industry is identifying the genes in wheat responsible for this specific ability to use water more efficiently.

Using a broad range of wheat varieties sourced from all over the world CSIRO Plant Industry is identifying other plant features useful for improving wheat yield under

drought conditions in northern Australia. Plant attributes for both conventional and newer farming systems, like wider rows, are being examined.

From here CSIRO Plant Industry will identify the genes responsible for these features and 'molecular markers' that flag their location. This means that the desirable features can be selected far more easily, making classical breeding quicker and more effective.

Overcoming fusarium diseases of wheat

'Crown Rot' and 'Head Blight' caused by the fungus fusarium are among the most important diseases that plague Australian wheat farmers. Crown Rot is a chronic problem across Australia costing \$50 million in lost yield each year. Head Blight is a particular problem in the north that can seriously affect grain quality for animal and human consumption.

At least 17 different species of fusarium cause Head Blight worldwide and several of these can cause Crown Rot, but only two are prominent in

Australia. By studying the characteristics of these two species and the most virulent individuals within the species, CSIRO Plant Industry will be able to gather 'enemy intelligence' to develop a better picture of the nature of fusarium in Australia. This will assist in developing control strategies.

The other important step in tackling fusarium is to search for resistant wheats and their resistance genes that prevent a fusarium infection or reduce its negative effect on yield and quality. CSIRO Plant Industry has developed a high throughput system that can readily screen hundreds of wheat plants for their ability to resist fusarium. Once resistant wheats have been found the search will begin for their resistance genes. Promising genes can then be used to help breed new fusarium resistant wheat varieties.



Field trials in Queensland provide CSIRO Plant Industry scientists with the best facilities to breed better wheat varieties for northern Australia.

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