



SAGIT Research Snapshot

S0311: Cost-effective doubled haploids for accelerating wheat and oat breeding

FAST FACTS

The details

Start: September 1, 2011 **Finish:** August 30, 2014

Project participants: SARDI - Dr Phil Davies, Dr Parminder Sidhu.

The problem

Doubled haploids (DH) plants can decrease the time to produce new varieties by three to five years, producing significant economic gains for the industry. Current methods are labour intensive and costly which has seen a decline in adoption of the technology.

The research

The aim was to develop more efficient and cheaper methods for doubled haploid production in wheat and oats using the isolated microspore culture (IMC) technique. For wheat, the aim was to develop a method as efficient as that used for barley. For oats, the aim was to develop a method efficient enough to develop doubled haploids for the National Oat Breeding Program.

BACKGROUND

Doubled haploid technology creates efficiencies in plant breeding by bypassing the natural sexual reproductive process. Wheat doubled haploids have been used since the mid-1990s, primarily using a technique crossing wheat and maize. Doubled haploid technology allows cereal varieties to be released three to five years earlier than using conventional methods.

Since 1997, seven barley varieties and 11 wheat varieties have been released by Australian doubled haploid laboratories and breeding programs to deliver significant gains to the grain industry by the early adoption of significant yield-bearing traits.

In a nutshell

The project successfully regenerated wheat doubled haploids using technology similar to that used for commercial barley breeding. This is the first time such high levels of regeneration have been achieved using this method in Australia. The project also successfully regenerated oat doubled haploids at levels far greater than previously achieved.

However, these methods have been labour intensive and costly, resulting in a reduction in the number of doubled haploids used in wheat breeding. For oat breeding, doubled haploid technology is not yet efficient enough for commercial use.

RESEARCH AIMS

This project aimed to develop techniques to deliver more efficient and commercially viable production of wheat and oat doubled haploids.

IN THE FIELD

During the course of the project, more than 4000 wheat spikes were cultured in experiments designed to achieve maximum growth and plant regeneration.

In addition, 4000 oat panicles were cultured in experiments designed to achieve maximum growth and plant regeneration.

RESULTS

A method for doubled haploid production in wheat that produces plants at a similar frequency to the barley method has now been successfully developed and two breeding populations have been provided to breeding companies. For oats, the level of plant

