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INNOVATIVE CEREAL BREEDING PAYS OFF

By Geoff Thomas, SAGIT Project Manager

One of the responsibilities of SAGIT is to invest wisely in long-term research to provide benefits to the grain growers of South Australia. The development of Double Haploid techniques is a good example

There are a number of successful examples of this type of investment one clear example was SAGIT's commitment to controlling CCN through incorporation of resistance in all cereals.

Another example is the investment in Doubled Haploids (DH). This is an advancing technology, the results of which might not be seen directly by growers in the paddock, as was the case with CCN control where higher yields and more even crops were obvious.

DH technology speeds up the release of varieties by 3 to four years allowing faster incorporation of beneficial characters such as rust resistance or better quality.

What does it involve? SAGIT in partnership with SARDI developed a simple way of producing DH's. This is to culture barley pollen on specially developed gel. After a time these pollen grains which have a single set of genes (haploid) undergo cell division producing duplicate set of genes (the double haploid), and eventually to normal barley plants pure for every character. This method allows accurate selection of thousands of potential plants in small dishes. This is an efficient, accurate and inexpensive process.

The alternative is many plots in the field, under different soil and climatic conditions, with prolonged and expensive evaluation.

The advantage of the double haploid method is shown by the following example. In a cross between a desirable line without CCN resistance and one with good resistance, the resultant DH plants will either be pure for resistance or susceptible. The breeder does not have to do further crossing to weed out impure types and can skip generations speeding up release by 3 to 4 years.

This technology, developed in SA, is now used by barley breeding programs nationally.

The same skills and set up have now been used to develop a different method of developing double haploids in wheat, with the same benefits. Oat is now the latest crop to use this technology.

The benefits to SA grain growers are large because the 3 to 4 year speed up in release of varieties applies to more than ten cereal breeding programs nationally. This means for SA grain growers get quicker access to higher yielding, better quality varieties with better resistances and tolerances not just from SA breeders but from programs across Australia.

The work continues as SAGIT continues to invest in using this method of pollen culture to more rapidly select for boron tolerance, manganese efficiency and salt tolerance although this research is in its early stages of development.

Currently Dr Phil Davies (Principal Investigator) is screening breeding populations produced by Jason Eglinton (Barley Breeder) to select types with these characters.

This then will herald a new era for cereal breeding making the breeding of cereals even more efficient with many benefits to growers.

Further information Geoff Thomas 0409 781469