

Ten years of biotechnology: A breeder's perspective

This season marks the 10th anniversary of the first commercialisation of biotechnology in the Australian cotton industry. This biotechnology has brought with it huge benefits as well as many challenges as growers, consultants and industry personnel have worked to first understand this new technology and then more importantly, learnt how to maximise the benefits it can provide.

Deltapine Australia's involvement with biotechnology is even longer. Deltapine's plant breeder, Richard Leske, has actually been working with biotechnology for the past 15 years.

The crossing, selection and variety testing program required for the integration of the Ingard, Roundup Ready and Bollgard II technology into commercial varieties is a long complex process. It involves the evaluation of an enormous numbers of individual plant lines.

Richard has assessed thousands of individual lines and walked through hundreds of nursery plots during this breeding process, but it has all been worth it. Since 1996 Deltapine has released many outstanding transgenic varieties including NuPEARL RR, DP 510 RR, DP 546 BGII/RR and one of the most recent releases — DP 408 BGII.

The first biotechnology material introduced into Australia by Deltapine was the Monsanto Cry 1A(c) gene which was brought through quarantine during the 1992–93 season. The lines introduced at this time formed the foundation for the development of the first commercial (Ingard) varieties released by Deltapine. Some of these early selections also contributed to the overall development program for Ingard as Deltapine seed was provided to Monsanto for utilisation in some of the first field efficacy studies conducted in Australia.

The initial introduction of Ingard was quickly followed by the introduction of the Roundup Ready trait. The first Roundup Ready varieties were released in 2000.

More recently these traits have been followed by the introduction and release of Bollgard II technology. The most recent trait being integrated into new varieties by the Deltapine team is the Roundup Ready Flex gene.



Deltapine plant breeder Richard Leske inspects new biotech lines.

The Deltapine cotton breeding team has worked to produce biotech varieties for commercialisation as quickly as possible. Integration of the biotechnology traits is an ongoing process which begins with a crossing program conducted in a greenhouse facility specifically established for this purpose.

Once the breeding cycle is completed, each line undergoes a rigorous selection and trial evaluation program which has operated through every summer growing season since the first lines were introduced through quarantine. In addition, Deltapine has conducted breeding and seed increase nurseries in the Ord River, WA through most winter seasons in order to move breeding material forward as quickly as possible.

The introduction of biotechnology has added another dimension to the breeding program. Not only is it now important to ensure new varieties include key agronomic parameters such as disease tolerance, yield and fibre quality but there is increased demand to ensure biotechnology purity for each individual trait being incorporated into a particular line. The high standard of quality control from both a compliance and a grower perspective necessitates more rigorous testing.

Initially this testing program used an ELISA based protein testing system. More recently, Deltapine has established new laboratory facilities which use DNA-based PCR testing procedures to assist with the purity testing program.

Despite the ever-increasing importance of biotechnology to the industry, conventional breeding remains a priority for Richard and his team. This program ensures they can continue to make advances in breeding for the key agronomic parameters which have always been and will continue to be important, such as disease, yield and fibre quality.

The best new conventional varieties are then used in the transgenic integration program. This program ensures new varieties will always contain the key agronomic traits in combination with the best transgenic traits the cotton industry requires.

With the possibility of an increasing number of GMO traits being utilised by the industry, the biotechnology breeding program will potentially continue to become even more complex from a breeding, purity, regulatory and compliance perspective.

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