



## aiming for targeted traits and promising new varieties

CRC SIIB-funded research is proving that Diversity Arrays Technology (DArT), DNA profiling technology used in several other crops, could be used in future sugarcane breeding. This finding could pave the way for some very exciting new varieties.

### Background

Sugarcane has a complex genetic structure. As such, the crop has lagged behind the development and application of genetic marker technologies compared to other major agricultural crops with a less complex structure, such as wheat and barley.

In an effort to help overcome this limitation in cane, the Cooperative Research Centre for Sugar Industry Innovation through Biotechnology (CRC SIIB) and Canberra-based Diversity Arrays Technology Pty Ltd, have been undertaking research into the use of DArT in the Australian sugarcane industry. Their work is closely linked with the BSES-CSIRO breeding program which is focused on discovering how to enhance and significantly 'speed up' the development of genetically improved varieties.

During the first phase of the CRC SIIB (2003 to 2006), their research highlighted that DArT is a viable tool for Australian sugarcane breeding. Due to its capabilities, they believe it could open many windows of opportunity for the targeted development of varieties with highly desirable traits, such as smut resistance, high sugar content and many others.

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## Progress

In 2006, scientists concluded that DArT technology worked well in sugarcane despite the plant's special complexities. They also highlighted that DArT has the potential to generate comprehensive marker profiles of sugarcane varieties, estimated at over 3000 markers, quickly and at very low cost compared with other DNA marker technologies. This feature is especially important in sugarcane because of the very large genome size.

Researchers and the industry are now using the technology to find markers linked to important traits, especially smut resistance, CCS and cane yield. Once this is done, it is expected DArT technology will be used routinely for screening clones and parents on a large scale in the core industry breeding programs, to improve genetic gains and quality of varieties released. Scaling-up applications of the technology will involve significant investment by the CRC SIIB and its partners.

## Looking ahead

The current sugarcane genetic map covers approximately 60% of the sugarcane genome. With the addition of over 2000 DArT markers, it is hoped that a genetic map of over 90% of the sugarcane genome will be generated by the CRC and its partners.

Future applications of DArT technology will revolve around finding associations between DArT markers and the important traits breeders need to select for, especially smut resistance, CCS and cane yield. A Phase Two CRC project is in the process of generating this type of information. It is hoped that as soon as early 2008, DArT technology will be used by breeders to help select parental clones in breeding programs targeting all sugarcane growing regions.

The DArT work is a tremendous step forward towards helping Australian sugarcane growers enhance the future of their businesses through a technologically strong sugarcane breeding program able to add value to sugar and sugarcane.

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