SIIB
CRC Sugar Industry Innovation through Biotechnology

project profile

agrobacterium technology for new generation sugarcane

The Australian sugar industry is set to take its place on the world stage thanks to sophisticated biotechnology research by the Cooperative Research Centre for Sugar Industry Innovation through Biotechnology (CRC SIIB). The CRC SIIB is working with industry and its partner organisations to develop biotechnology tools that allow researchers to efficiently breed sugarcane with specific and highly desirable traits.

Background

In a major technological advancement for sugarcane molecular breeding, CRC SIIB researchers have established an efficient and practically useful Agrobacterium-mediated transformation system for sugarcane, whereby bacteria are used to incorporate genes of interest into the DNA of the sugarcane plant.

The Australian scientists have proven that this system is a reliable and very effective method of genetically transforming sugarcane. Additionally, it will allow for single or multiple new traits (ie smut and canegrub resistance) to be introduced simultaneously. Generally, the traits introduced by Agrobacterium-mediated transformation are considered to be more stable than those introduced by the current technology, the biolistic method. Further, Agrobacterium-mediated transformation produces more plants containing just one copy of the introduced gene than other transformation methods, a feature that further enhances the stability of gene function and breeding opportunities. All these attributes make transgenic plants generated by Agrobacterium technology more desirable for commercial release.

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Progress

Researchers working on the project have developed a reproducible method of Agrobacterium-mediated transformation using the well-known cultivar Q117. Hundreds of transgenic lines were produced by the research team in 2006. Growth and development of the plants in the glasshouse were similar to that of non-transgenic Q117 plants. This further strengthens the potential of Agrobacterium-mediated transformation for the commercial development of GM sugarcane.

Plants transformed using this system will be field-tested at the BSES Limited Woodford farm in 2007 to evaluate their performance in a commercial-scale farm setting. It is expected that, as in glasshouse trials, the performance of transgenic plants will be identical to that of non-transgenic plants in the field.

The development of superior transgenic plants that perform well in the field gives the Australian sugar industry a competitive advantage and continues Australia's international leadership in sugarcane transgenics.

Looking ahead

Agrobacterium-mediated transformation underpins the development of genetically modified sugarcane by researchers working for the CRC SIIB. The system may be used to enhance the function of genes involved in sucrose accumulation, shoot architecture, canegrub resistance and nitrogen use efficiency, to name just a few.

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