



mapping fingerprints for a prosperous future

DNA fingerprinting may help to identify crime suspects; but what is more surprising is that DNA mapping of the plant kind may be one of the keys to ensuring a prosperous future for the Australian sugar industry.

Background

Trials by scientists working for the Cooperative Research Centre for Sugar Industry Innovation through Biotechnology (CRC SIIB) have shown that particular traits in sugarcane varieties can be identified by recognising and testing for certain DNA sequences, identified by DNA markers. Most recently, the scientists have shown they are able to identify markers associated with smut resistance.

Pests and diseases cost the Australian sugar industry millions of dollars each year in prevention strategies and when these don't work, more significantly through lost production. The recent outbreak of smut is an example of the severe impact such events can have. Since smut was identified on a Bundaberg farm last year, the sugarcane industry has put in a big effort to contain and manage the disease.

DNA mapping means the industry's efforts to contain smut and other devastating diseases could be enhanced by sophisticated breeding techniques and fast tracking promising, new varieties.

Progress

DNA mapping has been used in the CRC SIIB smut marker project to assess a large number of varieties from the industry's peak research group's (BSES Limited's) breeding-program data base.

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Researchers took samples from these varieties for DNA analysis and compared the data to information from BSES trials in Indonesia where the same varieties were monitored in a high-risk smut environment. This study identified several smut-resistance markers. Potentially, the BSES Limited/CSIRO plant breeding program could benefit in terms of more high-yielding and smut-resistant varieties.

Other recent CRC experiments identified markers associated with high CCS and cane yield. Further large-scale experiments are being undertaken to validate these findings.

Looking ahead

DNA mapping gives the industry the ability to find out if a cane plant is likely to contain some of the genes that affect important characteristics. This technology has taken many years to evolve from basic scientific research, and now is headed towards useful and practical research applications in the Australian sugar industry's plant breeding program.

In the case of smut, DNA mapping is likely to lead to the development of markers that could be routinely used to screen thousands of seedling clones for smut resistance in industry breeding programs.

Screening in this instance only requires a very small sample of leaf, compared with having to do expensive field trials that may take several years. Potentially, a detailed DNA map could greatly accelerate the rate of progress in the Australian sugar industry's breeding programs.

The Australian sugar industry, through the CRC SIIB and the BSES-CSIRO Joint Venture, is leading the world in the practical application of DNA markers for sugarcane breeding and as such is fast tracking its efforts to breed world-class varieties.

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