

POSTER SUMMARY

BEHIND THE SCENES: GENERATION AND ANALYSIS OF GENETICALLY MODIFIED, INSECT RESISTANT SUGARCANE

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Economic losses in the South African sugarcane industry caused by *Eldana saccharina* can be ameliorated by genetic modification (GM). To protect against this stalk borer, a lepidopteran-specific insecticidal protein (Cry1A), derived from the bacterium *Bacillus thuringiensis* (Bt), can be expressed in sugarcane. Simultaneously producing a second protein (Cry2A) will mitigate the risk of Bt resistance developing in pest insects when GM cane is grown in the field.

For Bt proteins to be functional in sugarcane, the bacterial gene sequence has to be codon-optimised. The modified sequences are subsequently assembled into expression vectors and inserted into embryogenic callus of a recipient cultivar. Two varieties, chosen using both scientific and socio-economic criteria, are being modified for insect resistance. Selecting and analysing GM lines that express multiple genes requires a high throughput system, because many more lines must be generated than can be field-tested. After laboratory analysis, standard insect bioassays are used to screen for the lines most likely to be *eldana* resistant in the field.

Safety and accountability of GM lines during their development and testing is important. The external auditing of SASRI's Biotechnology laboratory practices ensures that they conform to international standards. Each testing facility requires a permit, and field inspections during testing are part of the compliance process. Strict protocols apply for destruction of the assessed material.

An insect resistant GM sugarcane variety will add to SASRI's integrated pest management toolbox. It will improve the economics of sucrose production, resulting in a more competitive industry, while simultaneously reducing its environmental footprint. Reviewing progress made in this project will assist the sugarcane community to timeously identify and address barriers relating to the introduction of GM sugarcane in South Africa.

Keywords: Bt sugarcane; genetic modification; insect-resistance; *Eldana* bioassays; GM stewardship; integrated pest management