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Molecular characterization of the unintended and unexpected effects of genetic engineering on the endogenous *Solanum tuberosum* genome

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Genetically modified (GM) crops with diverse traits are currently developed and produced to generate social, economic and environmental benefits focused on amongst others, resource-poor farmers. However, current safety assessments of these GM crops are thought to be biased as they focus on potential hazards posed by the inserted transgene and its products. As a result, a project was initiated to study the unintended effects of the integration of the transgene within the host genome. The model plant for the study was a *Malus domestica* polygalacturonase inhibiting protein 1 (Mdpqip1) transgenic potato produced for enhanced resistance against *Verticillium* wilt. Genome walking revealed that the T-DNA containing the transgene was successfully inserted into the potato genome with no non-T-DNA sequences from the binary vector having been inserted into the potato genome. Furthermore, studies indicated the insertion site of the Mdpqip1 transgene as being adjacent to the photosystem QB gene on chromosome 1 of the potato genome. DNA fingerprinting analysis revealed unintended effects that resulted in alterations in the expression genes encoding the PsaC, AFG3, 25S rRNA, tryptophan/tyrosine permease, Ef-Tu domain, SKP1-like 1A, StPGIP1 and XTH proteins in the transgenic. It can thus be concluded that the insertion and expression of the Mdpqip1 transgene in the transgenic potato does not appear to have a major effect on the gene expression levels of the endogenous potato genes and that the transgenic potato is significantly equivalent to its traditional counterpart with a few quantifiable differences as determined by tools used for gene expression analysis.

Biography

Lerato Bame Tsalaemang Matsaunyane is an alumni of the University of Free State, and she has done her BSc in Biological Sciences and completed her Master's degree from University of Pretoria. After completion of her postgraduate studies, she then joined the University of Johannesburg as a Doctorate student. She has presented her research findings from her postgraduate degrees in both national and international conferences and has used her skill to mentor and train students for internships as well as postgraduate qualifications. She is currently a Molecular Biologist at the Agricultural Research Council (ARC) at the Vegetable and Ornamental Plant Institute (South Africa) in the Crop Protection Division..

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