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Biotechnology Approaches to Modulate Post-harvest Physiological Deterioration of Cassava Storage Roots

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Abstract

Cassava storage roots play an important role not only as a basic food source for the developing countries but also as starch reserve for the starch industry. Cassava roots undergo post-harvest physiological deterioration (PPD) within 24 hours after harvest, thus reducing the crop's palatability and marketability.PPD is an active physiological process involving changes in gene expression, protein synthesis and accumulation of secondary metabolites. It shares many features with wound responses in other plants, except that wound repair, which seals the wound sites and returns the plant to normal development, is inadequate in the detached cassava root.Information regarding changes in gene and protein profiles during post harvest physiological deterioration is currently scarce.

Using a proteomics approach, the protein expression profiles of cassava during PPD was studied. Proteins were extracted from cassava roots 0 and 12 hours after harvesting and separated by 2D-electrophoresis. Changes in protein profiles were found in cassava roots in the two PPD time points. Gel image analysis identified unique and down-regulated proteins during PPD with annotated functions in protection against oxidative stress and regulation of reactive oxygen species. The characterisation of differentially expressed proteins in cassava storage root during PPD is an initial step towards understanding the mechanisms underlying PPD and will deliver useful tools to modulate the process via genetic engineering.

In parallel, and to further develop the cassava storage root for improved nutrition and storage, we are interested in the isolation of cassava root-specific promoters. Partial isolation and characterisation of root-specific promoter candidates of cassava is ongoing. The obtained information will enable us to generate transgenic cassava with improved nutritional traits and longer storage potential.

Keywords: Keywords: Post-harvest physiological deterioration, protein expression, Two- dimensional electrophoresis

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