

Title Oxidative stress responses during cassava post-harvest physiological deterioration

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Abstract

A major constraint to the development of cassava (*Manihot esculenta* Crantz) as a crop to both farmers and processors is its starchy storage roots' rapid post-harvest deterioration, which can render it unpalatable and unmarketable within 24–72 h. An oxidative burst occurs within 15 min of the root being injured, that is followed by the altered regulation of genes, notably for catalase and peroxidase, related to the modulation of reactive oxygen species, and the accumulation of secondary metabolites, some of which show antioxidant properties. The interactions between these enzymes and compounds, in particular peroxidase and the coumarin, scopoletin, are largely confined to the vascular tissues where the visible symptoms of deterioration are observed. These, together with other data, are used to develop a tentative model of some of the principal events involved in the deterioration process. *Abbreviations:* ACMV, African cassava mosaic virus; AFLP, amplified fragment length polymorphism; CAT, catalase; cDNA, complementary deoxyribonucleic acid; CIAT, International Centre for Tropical Agriculture; Cu/ZnSOD, copper/zinc superoxide dismutase; DAB, 3,3-diaminobenzidine tetrahydrochloride; DPPH, 1,1-diphenyl-2-picrylhydrazyl; FeSOD, iron superoxide dismutase; FW, fresh weight; GUS, b-glucuronidase; HPTLC, high-performance thin-layer chromatography; HR, hypersensitive response; IEF-PAGE, isoelectric focusing polyacrylamide gel electrophoresis; MAS, marker-assisted selection; MeJa, methyl jasmonate; MnSOD, manganese superoxide dismutase; NADPH, nicotinamide adenine dinucleotide phosphate (reduced form); NBT, nitroblue tetrazolium; PAL, phenylalanine ammonia-lyase; PCD, programmed cell death; PCR, polymerase chain reaction; POX, peroxidase; PPD, post-harvest physiological deterioration; QTL, quantitative trait loci; ROS, reactive oxygen species; RT, room temperature; SAR, systemic acquired resistance; SDS, sodium dodecyl sulfate; SOD, superoxide dismutase