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Plant Adenylate Cyclases - Elucidation of their potential roles in stress response and disease resistance mechanisms

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Adenylate cyclases (ACs) are enzymes capable of converting the cellular molecule adenosine 5'-triphosphate (ATP) to the second messenger cyclic 3',5'-adenosine monophosphate (cAMP) (Robison *et al.*, 1968). Apparently, while in animals and other lower eukaryotes, ACs and their cAMP have firmly been established as important signaling molecules with critical roles in cellular processes like signal transduction and stress response (Gerisch *et al.*, 1975), in higher plants however, only 4 ACs have so far been practically and experimentally confirmed. These are the *Zea mays* pollen protein responsible for the polarized pollen growth (Moutinho *et al.*, 2001), the *Arabidopsis thaliana* pentatricopeptide repeat protein responsible for pathogen responses and gene expressions (Ruzvidzo *et al.*, 2013), the *Nicotiana benthamiana* adenylyl cyclase protein responsible for the tabtoxinine- β -lactam-induced cell deaths during wildfire diseases (Ito *et al.*, 2014), and the *Hippeastrum hybridum* adenylyl cyclase protein involved in stress signalling (Swiezawska *et al.*, 2014). With continued work in this specific field domain, a recent study has further proposed an array of at least 14 other AC-encoding gene candidates in the *Arabidopsis* genome, and based on the functionally assigned amino acids in the catalytic center of annotated and/or experimentally tested nucleotide cyclases in lower and higher eukaryotes (Gehring, 2010). Our work therefore, is presently involved in the recombinant expression and functional characterization of these proposed AC genes to try and elucidate their possible physiological roles in stress response and disease resistance mechanisms. Till date, 4 of these candidate genes have already been fully characterized, with some intriguing outcomes, while more work is still underway with the rest of the other genes.

Biography

Oziniel Ruzvidzo is currently working at North-West University, Mafikeng Campus, Faculty of Agriculture, Science and Technology. He has completed his PhD in the field of plant Biotechnology from University of the Western Cape, South Africa. His field of specialization includes Proteomics, Tissue culture technology, Gene cloning, Genetic transformations, Molecular markers, Bioinformatics, Microarray technology, Mushroom cultivation etc.

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