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THE PROSYSTEMIN PROTEIN NETWORK IN TOMATO PLANT

NATALE R.*, COPPOLA M.*, ALBANO M.*, DELANO-FRIER J.P.**, RAO R.*

*) Department of Agriculture, University of Naples "Federico II", Via Università 100, 80055 Portici (Italy)
**) Unidad de Biotecnología e Ingeniería Genética de Plantas, Cinvestav-Unidad Irapuato, km 9.6, Libramiento Norte Carretera Irapuato-León, CP 36821 Irapuato, Guanajuato (Mexico)

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Tomato plants release a small defense peptide called Systemin (Sys) from a larger precursor of 200 amino acids called Prosystemin (ProSys) upon the perception of a stress condition. This peptide activates a cascade of events that leads to the production of defense compounds (Ryan, 2000 Biochim. Biophys. Acta 1477, 112-121). Tomato transgenic plants overexpressing ProSys show tolerance towards a wide array of biotic and abiotic stressors (Coppola et al., 2015, Plant Mol Biol Rep 33:1270–1285; Orsini et al. 2010, Physiol Plant, 138: 10–21). The molecular mechanisms underpinning such a wide array of defense responses are largely unknown. In order to acquire knowledge in this respect we decided to define protein-protein interactions involved in Sys signaling pathway. Starting from transcriptomic profiles imposed by ProSys constitutive expression and by querying interactome databases ('Predicted Tomato Interactome Resource', PTIR, and 'Search Tool for the Retrieval of Interacting Genes/Proteins', STRING), we obtained the in silico prediction of a protein network including 16000 nodes (proteins) and about 160000 edges (interactions). We focused our attention on proteins directly interacting with ProSys obtaining a sub-network of 99 nodes and 98 edges. ProSys interactions, coming from STRING database, were divided and grouped based on Gene Ontology (GO) categories. The network shows a direct interaction of ProSys with enzymes involved in the biosynthesis of the 3 major hormones associated with defense responses against biotic and abiotic stressors, Jasmonic Acid, Salycilic Acid, and Ethylene supporting the role of the protein in the activation of a number of different plant defense responses. In addition, among the ProSys interactors several transcription factors, key players in pest recognition and regulation of immunity, were found. These results may explain the phenotype observed for transgenic plants. The validation of the predicted interactions is presently in progress.