



Rootstock – scion signalling: factors that mediate scion performance and graft compatibility

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Abstract

During this presentation an overview will be given on the progress that has been made in rootstock-scion signalling: factors that mediate scion performance and graft compatibility, the two working fields of COST Action FA1204 Working Group 2. Results of reciprocal grafting studies will be presented that were aimed to elucidate the root-derived signals that facilitate improved rootstock and scion performance, mainly in tomato. Investigations have focused on the roles of the phytohormones abscisic acid (using the ABA-deficient mutants *notabilis* and *flacca*, and the ABA overproducing transgenics *sp5* and *sp12*), jasmonic acid (using the JA-deficient mutant *JL5*), cytokinin (using cytokinin overproducing *IPT* transgenics) and ethylene (using the partially ethylene insensitive mutant never-ripe, NR). The main focus will be on signalling responses to abiotic stresses such as drought, salt and non-optimal temperatures. In addition, rootstock-scion interactions responsible for determining success in rootstock-scion compatibility will be presented to identify anatomical, physiological and molecular markers for graft incompatibility. Different lines of research have focused on defining the cellular and molecular mechanisms involved in the incompatible reaction and the development of a test to predict (early) compatibility success. During the last 10 years, remarkable progress has been made in the field of graft incompatibility. Important innovative and technical information have been developed to assess levels of graft compatibility by scanning electron microscopy (SEM), electrical impedance measurements, by analysis of reactive oxygen levels (ROS) and chlorophyll *a* fluorescence imaging (F_v/F_m ratio). The role of secondary metabolites, plant growth regulators, cell to cell communication and differentially expressed genes between compatible and incompatible combinations will be discussed in terms of the incompatibility reaction between grafting partners. Finally, examples of deliverables will be discussed that might be useful for nurseries, vegetable growers or rootstock breeders.

Keywords: working group 2, abiotic stress, rootstock-scion communication, graft compatibility