

## RHAMNOGALACTURONASE LYASE GENE DOWNREGULATION IN STRAWBERRY AND ITS POTENTIAL ON MECHANICAL FRUIT PROPERTIES

P. Ric-Varas<sup>a</sup>, S. Posé<sup>b,a</sup>, M. Barceló<sup>e</sup>, P. Knox<sup>b</sup>, R. Blanco-Portales<sup>c</sup>, J. Muñoz-Blanco<sup>c</sup>, A.J. Matas<sup>a</sup>, M.A. Quesada<sup>d</sup>, J.A. Mercado<sup>a</sup>

<sup>a</sup>Instituto de Hortofruticultura Subtropical y Mediterránea 'La Mayora', IHSM-UMA-CSIC, Departamento de Biología Vegetal, Universidad de Málaga, Málaga, Spain

<sup>b</sup>Centre of Plant Sciences, University of Leeds, LS2 9JT, Leeds, United Kingdom

<sup>c</sup>Departamento de Bioquímica y Biología Molecular, Universidad de Córdoba, 14071, Córdoba, Spain

<sup>d</sup>Departamento de Biología Vegetal. Universidad de Málaga, 29071, Málaga, Spain

<sup>e</sup>IFAPA, Centro de Churriana, Finca Cortijo de la Cruz, 29140 Churriana, Málaga, Spain

Strawberry softening is one of the main factors that reduces fruit quality and leads to economically important losses. Textural changes during fruit ripening are mainly due to the dissolution of middle lamellae, a reduction in cell-to-cell adhesion and the weakening of parenchyma cell walls as a result of the action of cell wall modifying enzymes. Functional studies of genes encoding pectinase enzymes (polygalacturonase, pectate lyase and  $\beta$ -galactosidase) support a key role of pectin disassembly in strawberry softening. Evidence that RG-I may play an important role in strawberry texture has been obtained from the transient silencing of a RG-lyase gene. Pectins are major components of fruit cell walls and highly dynamic polysaccharides, but due to their heterogeneity the precise relation between the structures and functions is incomplete. In this work, stable transgenic strawberry lines with a rhamnogalacturonate lyase gene (*FaRGLyase1*) down-regulated have been analyzed. Several transgenic lines showing more than 95% silencing of *FaRGLyase1* displayed fruit firmness values higher than control. Cell walls from these lines were extracted and analyzed by ELISA and Epitope Detection Chromatography (EDC). This last technique is based on the detection of specific cell wall oligosaccharide epitopes and provides information on sub-populations of pectins containing homogalacturonan and RG-I domains, but also reveals potential links with other cell wall polysaccharides such as xyloglucan. The results obtained indicate that the silencing of *FaRGLyase1* reduces degradation of RG-I backbones, but also homogalacturonan, in cell walls, especially in pectin fractions covalently bound to the cell wall. These changes contribute to the increased firmness of transgenic fruits.

**Acknowledgements:** This research was supported by FEDER EU Funds and the Ministerio de Economía y Competitividad of Spain (grant reference AGL2014-55784-C2), a Marie Curie IEF within the 7th European Community Framework Programme (reference: PIEF-2013-625270) for SP and a FPI fellowship (BES-2015-073616) to support PR-V.