



Contribution of hemicellulose network to plant cell wall properties

Pauline Videcoq, Carole Assor, Olivier Arnould, Adelin Barbacci, Marc Lahaye

► To cite this version:

Pauline Videcoq, Carole Assor, Olivier Arnould, Adelin Barbacci, Marc Lahaye. Contribution of hemicellulose network to plant cell wall properties. 13. Cell Wall Meeting, Jun 2013, Nantes, France. pp.218, 2013. hal-02748177

HAL Id: hal-02748177

<https://hal.inrae.fr/hal-02748177>

Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

on plant cell wall mechanical properties

P. Videcoq ¹, C. Assor ^{1,2}, O. Arnould ², A. Barbacci ¹, M. Lahaye ¹

¹ INRA, UR 1268, Biopolymères Interactions Assemblages, Cell Wall team, INRA, rue de la Géraudière, BP 71627, 44316 Nantes, France

² Laboratoire de Mécanique et Génie Civil, Université Montpellier 2, CNRS UMR5508

CC048 place Eugène Bataillon, 34095 Montpellier, France

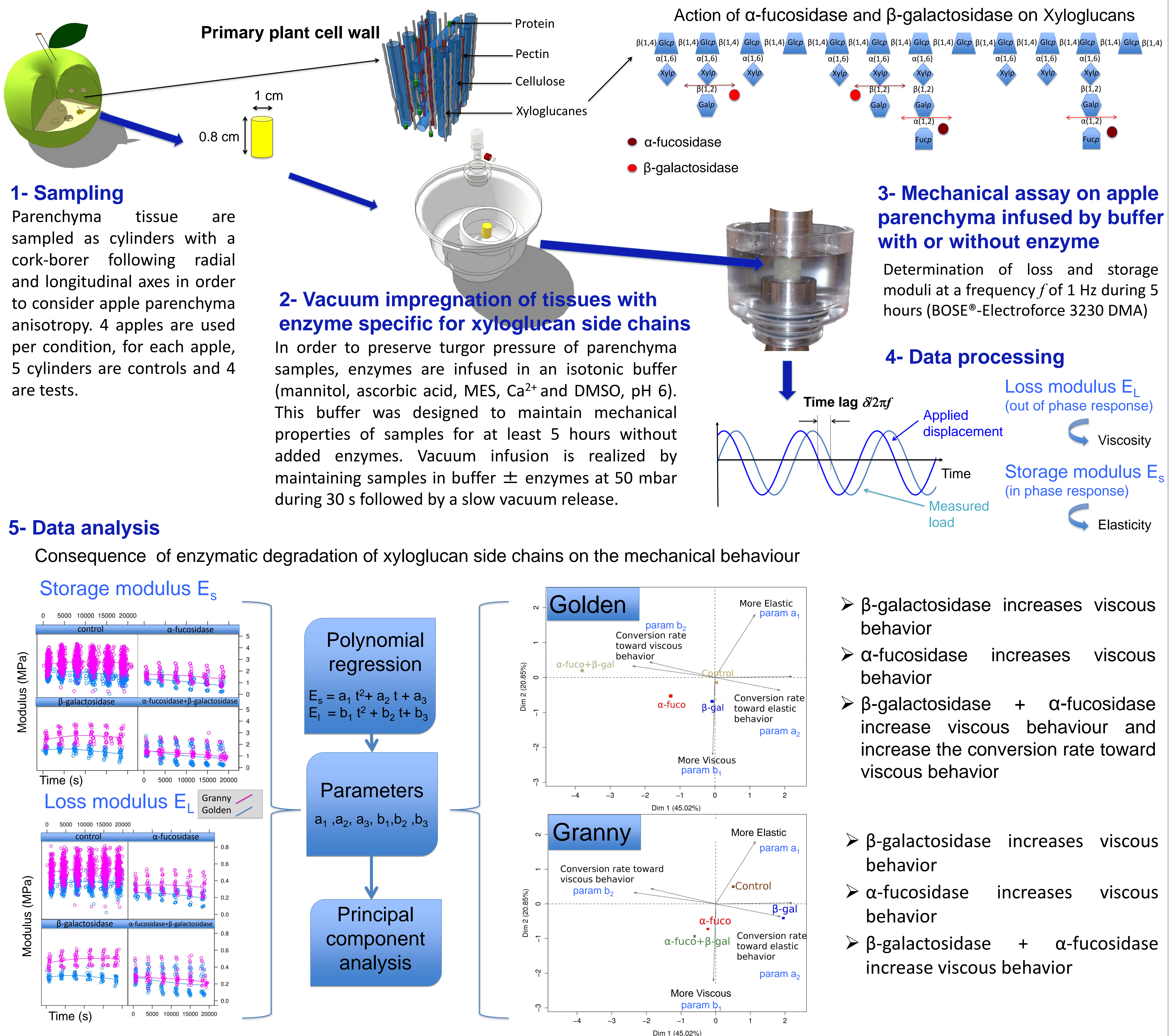


Plant development with erected stature and exploration of the environment relies on tissue mechanical properties. These are determined by the turgor pressure, spatial organisation of cells in tissue and cell wall chemistry and organisation. The growing dicot plant cell wall is mostly composed by polysaccharides (cellulose, pectin, hemicellulose) and small amounts of proteins and lignin. During development, the polysaccharide network is build, reassembled and disassembled by numerous enzymes leading to significant changes of mechanical properties.

The aim of this work is to establish relationships between cell wall polysaccharides structure and parenchymatous tissue mechanical properties.

The approach used consists in a targeted alteration of the fine structure of cell wall polysaccharide by specific enzymes combined with the monitoring of the induced changes in mechanical properties at the tissue scale. The targeted polysaccharide structural domains, are xyloglucan side chains. In spite of the major role of this hemicellulose on the cell wall load-bearing network, the function of its side chains on mechanical properties has not been reported.

This study is performed on parenchymatous tissues from two contrasted apple varieties Golden delicious and Granny Smith. These varieties differ in their polysaccharide composition and texture but share close histological structure.



Alteration of xyloglucan side chains causes important modifications of mechanical properties at the macroscopic scale. These results emphasize the key roles of side chains in the load-bearing implication of xyloglucan in cell wall mechanical characteristics either directly in changing polysaccharides interactions or indirectly in regulating endogenous enzymes activity. These contrasted effects in Golden and Granny apple illustrate the diversity and complexity of cell wall with regards to their role on fruit development and maturation.