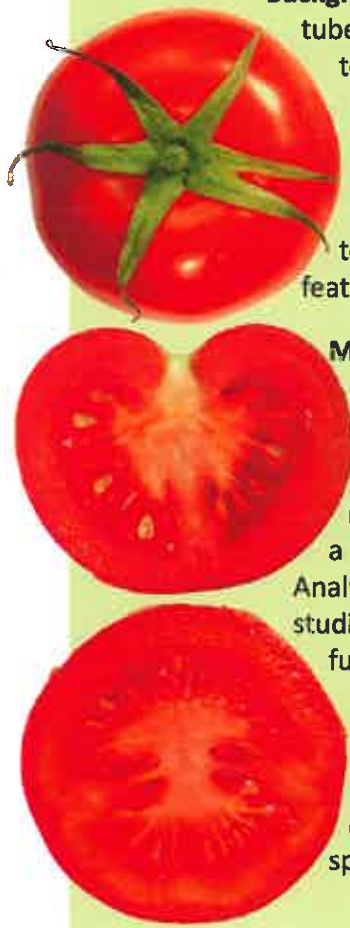
What's new in Plant-Soil-Microbe Interactions

GRR VASI Végétal - Agronomie - Sols - Innovation

Do you know ...

... that cell wall xyloglucan is important for pollen tube growth and plant reproduction?



Background and Aims. In flowering plants, fertilization relies on the delivery of the sperm cells carried by the pollen tube to the ovule. During the tip growth of the pollen tube, proper assembly of the cell wall polymers is required to maintain the mechanical properties of the cell wall. Xyloglucan (XyG) is a cell wall polymer known for maintaining the wall integrity and thus allowing cell expansion. In most angiosperms, the XyG of somatic cells is fucosylated, except in the Asterid clade (including the Solanaceae), where the fucosyl residues are replaced by arabinose, presumably due to an adaptive and/or selective diversification. However, it has been shown recently that XyG of Nicotiana alata pollen tubes is mostly fucosylated. The objective of the present work was to determine whether such structural differences between somatic and gametophytic cells are a common feature of Nicotiana and Solanum (more precisely tomato) genera.

Methods. XyGs of pollen tubes of domesticated (Solanum lycopersicum var. cerasiforme and var. Saint-Pierre) and wild (S. pimpinellifolium and S. peruvianum) tomatoes and tobacco (Nicotiana tabacum) were analysed by immunolabelling, oligosaccharide mass profiling and GC-MS analyses.

Key Results. Pollen tubes from all the species were labelled with the mAb CCRC-M1, a monoclonal antibody that recognizes epitopes associated with fucosylated XyG motifs. Analyses of the cell wall did not highlight major structural differences between previously studied N. alata and N. tabacum XyG. In contrast, XyG of tomato pollen tubes contained fucosylated and arabinosylated motifs. The highest levels of fucosylated XyG were found in pollen tubes from the wild species.

Conclusions. The results clearly indicate that the male gametophyte (pollen tube) and the sporophyte have structurally different XyG. This suggests that fucosylated XyG may have an important role in the tip growth of pollen tubes, and that they must have a specific set of functional XyG fucosyltransferases, which are yet to be characterized.

See the paper by Dardelle et al., Annals of Botany 115: 55–66, 2015

Responsables scientifiques :

Pr A. Driouich
Glyco-MEV, EA 4358
Université de Rouen
76821 Mont-Saint-Aignan cedex
azeddine.driouich@univ-rouen.fr

Dr K. Laval
Directeur de la recherche
ESITPA
3, rue du Tronquet
76134 Mont-Saint-Aignan cedex
klaval@esitpa.org

Février 2015