



ABSTRACT

“Mechanisms controlling xylem vessels secondary cell wall patterning and synthesis”

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Xylem is essential for transporting water and minerals as well as for mechanical resistance of plants against gravity. These key characteristics of xylem vessels are enabled by three consecutive developmental events which lead to i) the development of specific secondary cell walls which exhibit different type of patterned thickening, ii) the programmed cell death (PCD) to hollow out the cell content and iii) the lignification to reinforce and waterproof its wall for optimal sap conduction. Disturbance of any of these processes greatly impairs xylem vessels function. Using a novel *in vitro* xylogenic system derived from stable *Arabidopsis thaliana* cell lines, the mechanisms controlling xylem vessel secondary cell wall patterning and synthesis are studied using a combination of live-cell imaging, pharmacological treatments and genetic studies. Cortical microtubules, through two microtubules interacting proteins MAP70-1 and MAP70-5, control the patterning of xylem vessel secondary cell wall whose deposition is pursued long after cell death.