

Models of Plant Cell Wall Architecture

Description

The plant cell walls can be viewed as a supramolecular complex of polymers intertwined in an organized manner. How the various and complex polysaccharides, proteins, phenolic compounds and inorganic ions are organized and interact to form the structural entity of the plant cell wall remains in great part unknown. Several models have proposed tentative structures of primary and secondary walls. All of them have a basis of cellulose-hemicellulose interconnection dominated by hydrogen bonding. This is the cellulose-xyloglucan which features the basic framework of primary walls, whereas cellulose-other hemicelluloses relationships predominate in the secondary walls, in addition to the lignin-hemicellulose matrix.

Building an integrated model of the primary wall structure(s) is difficult because it is a dynamic structure that changes during plant growth and undergoes remodeling and rearrangements. Because the lignified secondary walls provide mechanical strength to the plant, modeling the structural organization of the constituting polymers must take into account the orientation of their respective deposition. The anisotropic properties of hemicelluloses, and to some extent, that of lignin, are important features when modeling secondary walls. Åkerholm & Salomon 2003 Salomon et al., 2012)>

The architectural complexity and diversity of plant cell walls is such that imaging the archetype of the plant cell wall is a difficult enterprise. That requires a systemic approach. The progress of analytical, spectroscopic, genomic, and live imaging techniques, will help elaborating models relating structure and specific function.

Category

1. News