

Cell wall signaling: mechanisms that regulate plant cell wall synthesis and secretion

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As the most abundant source of biopolymers on Earth, the plant cell wall supplies us with essential renewable resources as food, textiles, building material, and feedstock for next-generation biofuels. Unlike the walls of a building, the plant cell wall must be flexible and constantly remodeled as the plant grows. Developmental, biotic, and abiotic factors can all influence cell wall status. Therefore, plants need to sense the status of the cell wall and respond by regulating cell wall synthesis and modulating cell wall composition. My research asks three key questions regarding how the growing plant communicates with its cell wall to coordinate plant growth with cell wall synthesis and how the plant remodels its cell wall under changing environmental conditions:

- 1) What are the molecular mechanisms of cell wall signaling?
- 2) Are these pathways conserved across plant diversity?
- 3) How does the plant coordinate cell wall changes in response?

I will introduce the techniques and tools that we are leveraging to address these questions, including live cell imaging of cell wall synthesis enzymes, measurements of cell wall composition, whole-genome evolutionary analysis, high-resolution electron microscopy, and reporter based-screens for cell wall signaling mutants. I will demonstrate how we have applied these tools to implicate G-protein mediated signaling and specific G-protein coupled receptors in cell wall sensing, and several other gene products in cell wall synthesis and secretion. Furthermore, I will illustrate how integrating these approaches can uncover new components of cell wall sensing, secretion, and remodeling.