Abstract

Arabidopsis thaliana trichomes are large unicellular epidermal outgrowths with a specific development and intriguing shape, which makes them an excellent cell type for our research of cell polarization mechanisms. Cell polarity is essential for plant development and the exocyst complex is one of its key regulators. It is an octameric protein complex that mediates polarized exocytosis and growth by targeted tethering of secretory vesicles to the plasma membrane. Its EXO70 subunit functions as a landmark for exocytosis site and physically binds the target membrane through interaction with phospholipids. A remarkable multiplication of EXO70 subunit paralogs in land plant genomes is well documented, but the functional diversity of these paralogs remains to be described.

In trichomes we revealed the specific role of the EXO70H4 paralog in secondary cell wall deposition, especially in callose synthase delivery. We documented formation of a thick secondary cell wall during the maturation phase of wild type trichome development and a lack of it in the *exo70H4* mutant. Moreover, we showed evidence for silica deposition dependency on callose synthesis. Further, we unveiled the formation of apical and basal plasma membrane domains, which differ in their phospholipid composition and ability to bind different EXO70 paralogs. Our results have a potential of broader implications thanks to the putative role of EXO70H4 in the response to pathogens and thanks to its evolutionary conservation among other angiosperm species.