Abstract

EXO70H4 subunit of the exocyst complex plays a crucial role in vesicle tethering during secondary trichome cell wall biogenesis. This thesis investigates the intricate relationship between MLO protein, which function as plasma membrane calcium channels, and the exocyst complex in driving secondary cell wall synthesis in Arabidopsis thaliana trichomes. Analysis of three *mlo* mutants trichomes revealed disrupted callose deposition and thinner cell walls, with MLO6 isoform playing the most significant role. The mislocalization of PMR4, a callose synthase, in *exo70h4-1* and *mlo* triple mutants highlights the complex interaction between MLO proteins and EXO70H4 in callose deposition. Furthermore, ROS and heavy metals localisation are compromised in all mutants studied, indicating the role of MLO proteins as positive regulators of these trichome features. Interestingly, Raman spectroscopy revealed a lack of calcium carbonate in the cell wall of all mutants, providing insights into the role of MLO proteins along with the EXO70H4 in biomineralisation and cell wall hardening. These findings shed light on the cellular function of MLO proteins and their integral role in the fundamental cellular process of cell wall formation in Arabidopsis thaliana trichomes.

And lastly, the introduction of the proximity-labelling methods in our laboratory and the study of the Arabidopsis proteome under biotic stress.