

## **Abstract**

Plants have an artillery to defend themselves. The plant surface is protected by water-resistant cuticle and mechanically strong cell wall. Then each plant cell has tools to recognize and to answer to a pathogen threat. In an extreme case, the answer is programmed cell death. Plant immunity is a complex process integrating these passive and active mechanisms in an effort to overstay a pathogen attack. When the plant cell is attacked by a pathogen, the metabolic resources are redirected towards immunity reaction which results in growth restriction. Both the immunity reaction and the growth are dependent on the efficient polarized secretion of various cargoes.

Exocyst complex mediates tethering of a secretory vesicle with a target membrane and SNARE complex orchestrates the subsequent steps of vesicle docking and fusion. Exocyst and SNAREs are regulated by various proteins. In my work, I focused on identifying the exocyst interaction partners in plant immunity. In cooperation with my colleagues, we found the direct association between Qa-SNARE SYP121 involved in plant penetration resistance and EXO70B2 exocyst subunit. Moreover, we confirmed the relevance of their interaction for the formation of epidermal defensive structures, papillae and haustorial encasements in plant defence against non-adapted powdery mildew fungi. We wanted to further inspect if the exocyst-SNARE interaction could have an impact on the exocyst complex general function in secretion. We performed the membrane-bound mbSUS interaction assay between several exocyst subunits and SNAREs. We have demonstrated that more subunits of the exocyst complex have the ability to interact with several SNAREs, both in yeast and plant models. We have described an amplified growth phenotype in the double mutant for the EXO70A1 exocyst subunit and the VAMP721 R-SNARE protein. This additive defect, in our view, reflects the importance of the interaction between the two complexes in plant growth. We conducted a broad proteomic analysis where we identified proteins bound to all eight subunits of the exocyst complex, including EXO70A1, and also to the EXO70B1 and EXO70B2 isoforms. The additional set of co-immunoprecipitation along with the LC/MS/MS analysis shows the SYP121/VAMP721 is the most prominent interactor shared between the entire exocyst, while other SNAREs were less common. However, we also detected other SNARE proteins involved, for example, in the secretory pathway leading from the Golgi apparatus to the vacuole. We described the importance of secretion for growth response on the phenomenon of fast root hair growth reaction after contact with plant-specific bacteria. We identified the secretory pathway

and ethylene signalling as the major players in the rapid root growth inhibition and root hairs growth stimulation upon the bacteria treatment.

Taken together, we brought the evidence about exocyst and SNAREs interaction in plant defence and regular growth.