ABSTRACT

Many studies in different eukaryotes have shown the importance of the vesicle-tethering exocyst complex for cellular processes dependent on intensive polarized secretion. The plant exocyst complex is crucial for regulation of cell polarity, morphogenesis, and defence. In land plants, gene encoding the EXO70 exocyst subunit multiplied into many paralogs, but only a few of them have been functionally described. In this thesis, the EXO70A2 isoform, a member of the EXO70.1 subfamily, was found to be the main EXO70 exocyst subunit involved in the canonical function of the exocyst complex in Arabidopsis pollen. EXO70A2 is important for several stages of pollen development—pollen grain maturation, germination, and pollen tube growth. Pollen-expressed EXO70A2 was the only EXO70 isoform able to substitute for the function of EXO70A1 in the sporophyte, but not *vice-versa*. This indicates partial functional redundancy of these two closely related isoforms and a high specificity for pollen-related processes. The finding that the exocyst is targeted to the plasma membrane via EXO70A1 subunit is further elaborated in the thesis. EXO70A1 binds plasma membrane via interactions with specific phospholipids that form a unique plasma membrane-lipid signature in plants. Other isoform, EXO70B1 from the EXO70.2 subfamily, is engaged in autophagy-related transport to the vacuole. The function of EXO70B1 could not be functionally substituted by its closest paralog EXO70B2 or any other EXO70 isoform tested, indicating a high degree of EXO70B1 specialization. Taken together, novel findings presented in this thesis significantly expand the current understanding of the plant exocyst complex function and uncover the functional specialization of multiplied EXO70 paralogs acquired during the evolution of land plants.