2 Abstract

ARP2/3 protein complex is formed from seven proteins (ARP2, ARP3 and ARC1-ARPC5) with a relatively conserved structure. ARP2/3 complex branches and nucleates new actin filaments. This thesis focuses on the study of the role and importance of the individual subunits of the complex ARP2/3 in plants.

One of the principal aims of this work is to determine whether complex ARP2/3 may at least partially maintain its role when one or more of the subunits are not available. Furthermore if the individual subunits play another, plant-specific role and if the subunits are functionally equivalent in the complex. The main way how to achieve this objective is the analysis of multiple mutants of *Arabidopsis thaliana* in subunits of ARP2/3 complex.

After comparing several phenotypes of mutant lines it is obvious that all the subunits are functionally equivalent. A loss of ARPC5 subunit usually manifests the strongest phenotypic expression. On the contrary, loss ARPC3 and ARPC2b subunits have weak phenotypic manifestations. Because some phenotypes, such as phenotype distorted trichomes was detected only in some mutant lines, whereas the phenotype of faster roots gravitropic response or vacuolar system fragmentation that was detected in all analyzed mutants suggests, that different subunits play varying roles during specific morphogenetic processes in the plant. These findings indicate plant-specific function of complex and even subunits themselves.

ARPC3 subunit in complex probably plays a previously unknown regulatory role, as indicated phenotypic manifestations of multiple mutant plants. This shows that the complex may be present in cells also in a state where the function is partially preserved, and when the "partial failure" has more pronounced symptoms than the total loss of function. This is also indicated by repetitive results where double mutants showed weaker phenotypic manifestations than single mutants. At the same time, the results of this thesis are supported by analysis of data from the database Genevestigator, which confirms different subunits expression in tissues. These unique results clearly indicate that the plants carrying mutations in the genes for the subunits of ARP2/3 complex are unique plant material for the research of nucleation and actin cytoskeleton function in eukaryotic cells.

Keywords: ARP2/3 complex, actin, nucleation of actin cytoskeleton