

Forward Genetic Screen of Trichomes for Discovery of Cytoskeleton-based Mutants

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Understanding plant cell development and what genes influence cell growth can lead to breakthroughs in beneficial areas such as bioremediation, agricultural production, and biofuels. However, information on many of the genes that control plant cell growth is either unknown or severely limited. Further research to fully comprehend the genetic pathways within the cells will enable the genetic engineering of plants to further benefit society. One approach is the combined use of a forward genetic screen, sophisticated growth analysis, and gene identification. Using *Arabidopsis thaliana* trichomes, leaf hairs, as a model system, the mutagenized population of thousands of plants was screened for trichomes that were swollen, had reduced branch numbers, or combination of the two. These mutations took precedence because these phenotypes target known cytoskeletal dependent growth pathways. Mutants that fit the high priority criteria became candidates for genome sequencing which will allow for the hopeful discovery of new genes and alleles. 19 mutants were found. Once collected, the mutant plants were crossed with wild type plants and further analyzed for dominance in successive generations. Along with a forward genetic screen, high-resolution live cell imaging techniques were developed to quantify the growth behavior of wild type and mutant trichomes. The high-resolution live cell imaging techniques were found to be a useful quantitative tool for growth analysis and will lend greater insight in future analysis of these trichome mutations.