

MARSHALL HOFFMASTER and JONATHAN GILKERSON, Department of Biology, Shepherd University, Shepherdstown, WV 25443. Validation of Marker Genes for the Rapid Alkalinization Factor Pathway in *Arabidopsis thaliana*

Most studies involving plant hormones has revolved around the study of small molecule hormones. Although signaling mechanisms for these are well understood, signaling mechanisms involving peptide hormones remain understudied. Our studies center on Rapid Alkalinization Factor (RALF), that when applied exogenously to plants causes rapid alkalization of the cell's apoplast which inhibits cell growth and elongation. RALF consensus sequences have been found in all plant lineages examined, suggesting RALF plays a fundamental role in plant biology. The mechanisms by which RALF mediates its effects remain to be elucidated. We hypothesized, that like other plant signaling molecules, RALF influences plant growth in part by effecting transcriptional changes. This study aims to define the AtRALF1 transcriptional response in *Arabidopsis thaliana* and to establish bonafide RALF marker genes for molecular characterization of the pathway. Two microarray time-course experiments were performed, one with exogenously applied AtRALF1 and another with estrogen-inducible AtRALF1 transgenic lines. Over a 24-hour time-course with exogenous peptide and estrogen-induction, 4799 and 1128 genes significantly changed expression ( $p$ -value  $< 0.05$ , with a  $\log_2$  fold difference of  $\pm 1$ ), respectively. We performed cluster and gene ontology analysis on those genes to elucidate what biological processes RALF influences and determined calcium signaling, membrane modifications, and defense responses to be significant. Comparing the time-courses for overlap identified a set of genes we think is the early transcriptional response for this pathway. We are currently validating targets by qPCR.