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by

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Elucidation of Programmed Cell Death Using A Time Course Microarray Analysis of Barley-Powdery Mildew Interactions

ABSTRACT

Analysis of Barley1 GeneChip data from powdery-mildew resistant genotype and its fast neutron-derived mutant allows for pattern expression analysis and predictions of gene functions in relation to cell death pathway. Interactions of wild-type and mutant barley plants with two isolates (Bgh 5874 and Bgh K1) of powdery mildew provided 3 analysis strategies that helps eliminate confounding effect of resistance and susceptibility. Differential gene expression between wild-type and mutant plants gives evidence on specific effect of mutations allowing for identification of candidate genes possibly involved in cell death. Setting a threshold of pvalue < 0.0001 for differential gene expression and a false discovery rate of 2.0% identified 100 significant genes in contrast 1 comparing interactions involving Bgh 5874, 550+ significant genes in contrast 2 comparing interactions involving Bgh K1, and 700-800 significant genes in contrast 3 comparing the averages involving interactions with Bgh 5874 and Bgh K1. We focused our analysis on top 100 genes from each contrast, and found a putative thioredoxin (with known anti-apoptotic function) that showed an interesting pattern of expression in wild-type and mutant barley plants.