CHARACTERIZATION OF A SOYBEAN *BAG* GENE AND ITS POTENTIAL ROLE IN NEMATODE RESISTANCE

Gregory J. Yeckel

Dr. Melissa Mitchum, Advisor

Abstract

Plants resistant to the soybean cyst nematode (SCN) mount a hypersensitive cell death-like response upon nematode feeding, but the genes regulating this process are not known. Laser-assisted microdissection of nematode feeding cells coupled with microarray analysis identified a soybean gene upregulated 87-fold in plants resistant to SCN that shared sequence similarity with the *Arabidopsis BAG6* (Bcl-2 associated athanogene 6) gene. *BAG* genes encode an evolutionarily conserved family of proteins in animals, yeast and plants. These proteins contain a conserved BAG domain which mediates interaction with the molecular chaperone HSP70/HSC70. Members of the BAG protein family in animals and yeast function in apoptosis to regulate a range of activities from inhibition to promotion of cell death. However, much less is known about the role of BAG proteins in plants. A family of seven *BAG* genes (*AtBAG1-7*) has been identified in *Arabidopsis*. *AtBAG6* was shown to induce programmed cell death in both yeast and *Arabidopsis*. Expression of a truncated version of the protein, spanning a calmodulin-binding IQ domain and the BAG domain, enhanced the cell death phenotype. Here, we demonstrate that similar to AtBAG6, overexpression of the full length GmBAG6A protein or a truncated version spanning the IQ and BAG domains, induced cell death in yeast and plants, with the truncated form showing an enhanced cell death phenotype. Expression of the truncated form in *Arabidopsis* and soybean under the control of a nematode-inducible promoter significantly reduced nematode development demonstrating its potential use in engineering a novel form of nematode resistance in crop plants.