

Sample abstract:

ENGINEERING SOYBEAN (*Glycine max*) RESISTANCE TO ITS MAJOR PATHOGEN, THE SOYBEAN CYST NEMATODE (*Heterodera glycines*)

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The major pathogen of *Glycine max* (soybean) is the parasitic nematode *Heterodera glycines* (soybean cyst nematode; SCN), responsible for ~\$1 billion in lost revenue annually in the United States. *H. glycines* infects soybean roots, establishes a feeding site (syncytium), and derives all of its nourishment from soybean during the course of its lifecycle. We compared genes of the genomic model nematode species *Caenorhabditis elegans* with those of SCN and identified a series of *H. glycines* genes that are essential for its survival. We engineered these genes into a panel of double-stranded RNA plant transformation vectors to silence SCN target genes by RNA interference (RNAi). The vectors also were designed to express enhance green fluorescent protein (eGFP) so that transformed roots could be recognized easily. The constructs were transformed into soybean using an *Agrobacterium rhizogenes*-based transformation system. After several weeks, non-transformed roots were trimmed from the composite plants while roots expressing eGFP were retained. Transformed roots were challenged with SCN and the number of mature female cysts was determined and compared with the number of cysts found on roots transformed with empty vector control. Preliminary results indicate that an average of 149 adult female cysts were found on roots transformed with empty vector, while some RNAi constructs reduced the number of mature females by 80 to 93%. Some of the genes identified in this study may prove useful for engineering resistance in soybean to *H. glycines*.