

Characterization of 16B09 AND 2D01 Effector Proteins in Cyst Nematodes

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ABSTRACT

The soybean cyst nematode (SCN), *Heterodera glycines*, is an obligate sedentary endoparasite with a narrow host range. It is considered the most economically important pathogen of soybean, causing a loss of \$1.286 billion in yield annually in just the United States alone. Cyst nematodes use stylet-secreted effector proteins to modify a selected host cell into an elaborate feeding cell. The function of the novel effector proteins 16B09 and 2D01 from the SCN and sugar beet cyst nematode (BCN) *H. schachtii* was studied. This class of effectors is expressed in the dorsal gland cell of parasitic life stages and was found to be highly expanded in the SCN genome suggesting that the 16B09 and 2D01 superfamily is essential in plant-nematode interactions. Host-induced gene silencing targeting *16B09* demonstrated that this effector protein is required for cyst nematode parasitism. The susceptibility of Arabidopsis to BCN significantly decreased when the expression of *Hs16B09* was reduced. Plants overexpressing *Hs16B09*, however, did not show any abnormal phenotypes to provide clues to its function. Interestingly, however, unlike the closely related 2D01 effector, 16B09 was found to be toxic to the growth of yeast suggesting that it may be modulating an important eukaryotic cellular process. Because 16B09 toxicity to yeast precluded the use of a yeast two hybrid approach to identify potential host targets, a screen with 2D01 was carried out and HAE, an Arabidopsis leucine-rich repeat receptor kinase that controls floral organ abscission and lateral root emergence, is expressed in the nematode feeding cell, and was identified as a potential host target of this effector.