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Functional analysis of nematode secreted CLE peptides

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Cyst nematodes (Heterodera spp.) are small roundworms that parasitize plant roots and cause more than $1 billion in U.S. yield losses each year. These nematodes secrete proteins through a stylet into root tissues to form feeding sites near the vasculature. Among the secreted proteins are small peptides similar to CLAVATA3/ESR-like (CLE) peptide ligands. Plant CLE genes encode for peptide ligands that are thought to play an integral role in plant growth and development. Nematode CLEs have been shown to cause shoot and floral meristem termination when overexpressed in Arabidopsis. To further examine nematode CLE peptide function in roots, Heterodera glycines CLE genes were constitutively expressed in soybean hairy roots to monitor root growth phenotypes. In addition, synthetic CLE peptides corresponding to the conserved CLE domains of nematode CLEs were synthesized and used in exogenous root application assays of Arabidopsis and soybean to test for functional sufficiency. Current data suggests that nematode CLE peptides may be more similar to predominately root expressed CLEs like CLE5. This would be consistent with the fact that nematode CLE domains are more closely related to Arabidopsis CLE1-7 which stimulate rather than terminate root growth when overexpressed in Arabidopsis. More detailed characterization of root phenotypes in overexpression lines is underway. Ultimately, identifying the function of secreted CLEs in nematode parasitism will be useful for devising novel strategies for nematode resistance.