Ecology of Nematode suppressive Soils in Midwest Soybean-cropping Systems

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Abstract

Soils naturally suppressive to the pathogenic nematode *Heterodera glycine* exist but mechanisms that suppress disease are unknown. A 4-year field experiment was initiated in 2009 to identify sources of disease suppression in Minnesota. The experiment was designed as a split-plot to test the hypothesis that antagonistic fungi and/or antagonistic bacteria suppress the nematode by secretion of antibiotics and/or enzyme products. The main plots were with or without tillage and the subplots were assigned randomly to six treatment combinations of crop sequence and biocides. Biocides specific to fungi, bacteria or both were included. Crops were grown in soybean monoculture or a rotation between corn and soybean. Activity of 14 extracellular enzymes was quantified using fluorometric and colorimetric substrates. The amino peptidase assays indicate ample supplies of nitrogen microbes in the field. Only three enzymes differentiated among treatments. Phosphatase, β-1, 4-N-acetylglucosaminidase and β-D-glucosidase activity were greater in continuous cultivation than crop rotation but similar among biocide treatments. This suggests that the mechanism of natural disease suppression involves a combination of fungi and bacteria that utilize the pathogenic nematodes to satisfy limiting nutrients.