

1 **Effects of long-term tillage and crop rotation on the relationships between soybean cyst nematode-**  
2 ***Heterodera glycines* and soil nematode community**

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17 **Abstract**

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19 Although there is substantial knowledge on the biology of the soybean cyst nematode (SCN, *Heterodera*  
20 *glycines* Ichinohe), little is known about how agronomic practices alter soil biology and SCN's adaptation  
21 therein. These include the relationships among the effects of agronomic practices on nematode community  
22 structure (NCS, an indicator of soil ecosystem health and nutrient cycling potential) and seasonal SCN  
23 population dynamics. In order to develop potentially sustainable SCN and ecosystem management strategies,  
24 there is a need to quantify the biological mechanisms by which SCN thrives relative to other biological  
25 communities. In this study, we explored the relationship between SCN and NCS in an SCN- and soybean-virgin  
26 Sisson sandy loam field in East Lansing, MI, USA 6-7 years (2008 – 2009) after SCN was introduced under till  
27 an no-till, and either maize (*Zea mays* L., C), SCN- resistant soybean (R), or SCN-susceptible soybean (S)  
28 monocrop, or RCRC and SCSC rotation cycles.. We hypothesized that the population density of SCN will  
29 decrease under conditions that favor opportunistic bacterivorous and fungivorous, and other plant-parasitic  
30 nematodes. The results indicate that SCN population had positive correlations with total nematode abundance,  
31 total non-SCN nematode abundance, free-living nematode abundance, and bacteria-feeding nematode  
32 abundance in both years. This suggests that conditions that favor free-living nematodes also favor SCN. In  
33 general, free-living and bacteria-feeding nematode abundance was higher under tilled than no-tilled treatment,  
34 as well as higher under SCN-treated than non-treated treatment. In 2009, non-rotation management R and S had  
35 higher total and free-living nematode populations compared with the other 2 rotations and the control. These  
36 results suggest that in addition to direct impacts, tillage may have indirect impacts on increasing SCN  
37 population by creating a more conducive environment for all opportunistic nematodes and thereby potentially  
38 higher nutrient mineralization, while crop rotation is likely to have an indirect impact in decreasing SCN  
39 population through decreasing free-living nematodes. These findings are generally consistent with the direct  
40 impacts reported in the accompanying manuscript where no-till suppressed SCN population density.  
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