

ABSTRACT

McBRIDE, ROBERT GRABER. The contribution of low-molecular weight organic acids from decomposing rye to the suppression of root-knot nematode populations on cotton. (Under the direction of Robert L. Mikkelsen).

Incorporation of rye (*Secale cereale* L.) cover crops prior to planting cotton has been demonstrated to be an effective means of minimizing damage caused by root-knot nematodes (*Meloidogyne incognita* (Kofoid and White) Chitwood). Low-molecular weight organic acids have a lethal effect on these nematodes. Organic acids released during the decomposition of rye have been implicated for these nematicidal properties. This study was conducted to quantify the amount and duration of formic, acetic, propionic, butyric, and valeric acids in soil solution following the incorporation of fresh rye shoots. Formic and acetic acids were detected by means of ion exclusion chromatography primarily in the first 24 hours and at concentrations less than 20 µg/L. Despite the low concentrations of organic acids detected, the rye treatment resulted in a significant suppression in root-knot nematode activity. Cotton planted up to 3 weeks after rye incorporation still benefited from the nematicidal effects. When added directly to soil, these five acids were found to exist only for short periods, with 30% being recovered from the soil solution after 10 hours. Although low-molecular weight organic acids may be one of many factors that contribute to restrictions in root-knot nematode damage when rye is incorporated into the soil, these acids singularly do not appear to be responsible.

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