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Effect of solitary and combined use of cover crops on soilborne disease suppressiveness in woody ornamental nursery production systems

Abstract

Cover crops are known to be effective in reducing soilborne diseases in woody ornamentals. However, it remains unknown how solitary and combined uses of cover crops influence soilborne disease, and whether these effects differ with seed rate. The objective of this study was to explore the impacts of cover crops, in solitary and combined use, on soilborne disease suppressiveness in woody ornamental nursery production systems. Soils were sampled from the established red maple (*Acer rubrum L.*) plantation grown with and without cover crops [crimson clover (*Trifolium incarnatum L.*)] or triticale (× Triticosecale W.) or (their mixture)] following the cover crop senescence. Greenhouse bioassays were carried out using red maple cuttings on inoculated (with *Rhizoctonia solani*, *Phytopythium vexans*, or *Phytophthora nicotianae*) and non-inoculated field soils. Plant height, total plant weight, and fresh root weight were measured, and plant roots were assessed for root rot disease severity using a scale of 0 to 100% roots affected. Population of beneficial Pseudomonas in soil was counted. Results showed that there were no significant differences in plant height among the treatments. Total plant and fresh root weights were significantly or numerically greater for red maple plants grown in soil collected from cover cropped than non-cover cropped field. Although all the cover crop treatments demonstrated effective control of root rot diseases, a high rate of crimson clover and a high rate of the mixture were the most effective. Cover crops also improved fluorescent Pseudomonas activities in the soil. These findings may be helpful to nursery growers in making soilborne disease management decisions.

Keywords: soilborne diseases, woody ornamentals, cover crop, disease suppressiveness

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