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Effect of Natural Plant Enhancers on Soil Bacteria and Control of Plant-Parasitic Nematodes in Lettuce

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Abstract

The root-knot nematode *Meloidogyne incognita* has a world-wide distribution and is a major limiting factor in vegetable cultivation. Today there is an increasing demand for environmental friendly products to substitute or alternate with pesticides in IPM management programs for plant parasitic nematodes control. The impact of plant growth enhancers on the microorganisms that make up the soil antagonistic potential has not been studied in detail. The aim of this study was to investigate the effect of natural plant growth enhancers on soil bacteria population densities and on control of the economically important root-knot nematode, *M. incognita*, in lettuce. The plant enhancers evaluated were Azet®, Oscorna®, MagicWet®, TerraPy®, chicken manure and green compost. All treatments were compared to a biological and a chemical nematicide, DiTera® and Nematicur®, respectively. Oscorna® (450 kg ha⁻¹), Azet® (300 kg ha⁻¹) and DiTera® (112 kg ha⁻¹) significantly increased bacterial population densities over the other treatments 1 and 3 weeks after application. Azet® (300 kg ha⁻¹) reduced *M. incognita* penetration to lettuce roots 50 % from day 0 to 30 days after soil treatment. MagicWet® (200 kg ha⁻¹) reduced *M. incognita* 50 % 7 days after treatment but its efficacy was lost 2 weeks later. DiTera® controlled *M. incognita* similarly to Nematicur® the week after application but its nematicidal activity slightly decreased 4 weeks later. Chicken manure (5,000 kg ha⁻¹) was phytotoxic inhibiting lettuce germination even 30 days after application. The study revealed that Azet® greatly stimulates soil bacteria biomass which seems to be related to a reduction in the root-knot nematode. The results suggest that specific antagonistic bacteria increase when this compound is applied to the soil thereby stimulation the suppressiveness of the soil to nematode damage.

Keywords: Biocontrol, compost, fatty acid derivatives, fenamiphos, *Lactuca sativa*, *Myrothecium verrucaria*, plant lipids, root-knot nematodes, soil amendments, sugar based surfactants, vegetables