THE EFFECT OF SHORT-CHAIN FATTY ACIDS AND SOIL ATMOSPHERE ON PLANT PARASITIC NEMATODES

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

NATURAL RESOURCES SCIENCE

UNIVERSITY OF RHODE ISLAND

1998

ABSTRACT

Plant parasitic nematodes contribute to substantial crop yield loses and are a significant problem for certain species of turf. It has been suggested that short-chain fatty acids may have a detrimental effect on specific populations of plant parasitic nematodes. We evaluated the effects of butyric and propionic acid on the population of *Tylenchorhynchus* spp. in soil. Soil samples were incubated under aerobic and anaerobic conditions for seven days at 25° C. Percent kill was greatest for butyric acid at 8.8 and 88 μg acid g^{-1} soil. Propionic acid was most effective at 74 μg acid g^{-1} soil. Nematode kill with both butyric and propionic acid occurred regardless of soil atmosphere. In contrast, a combination of butyric and propionic acid (1:1) did not result in a significant decrease in live nematode counts. The effects of altering soil pH were also assessed, with nematode mortality increasing linearly as pH declined from 5 to 3, under both aerobic and anaerobic conditions. Our results indicate that nematode mortality is a function of the type of fatty acids, the concentration of the fatty acid and soil pH.

An experiment was conducted to evaluate the effectiveness of a toxic concentration of butyric acid on *Tylenchorhynchus* spp. over time. We did not observe recovery of the nematode population after the addition of 880 μg acid g^{-1} soil. A decline in carbon mineralization rate and a decrease in the rate of nitrogen mineralization along with 100% death in nematode population was observed over the course of the 21-day recovery period. There was no change in microbial biomass over the 21-day recovery period. The use of fatty acids as a control for plant parasitic nematodes could have a significant role

in turfgrass management. Although experiments were conducted under controlled laboratory settings, additional experiments that include the role and effect of acids on plants could yield information useful to developing this approach to nematode control.

Both carbon and nitrogen cycling was affected by the addition of fatty acids. Future research should concentrate on identifying levels of fatty acids that are effective in controlling nematode populations yet does not interfere with plant and soil processes.