

**EFFICACY OF SELECTED BIOLOGICAL AND SYNTHETIC AGENTS IN THE
MANAGEMENT OF PLANT PARASITIC NEMATODES IN TISSUE CULTURE
BANANA**

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DECLARATION

This thesis is my own original work and has not been presented for a degree in any other university.

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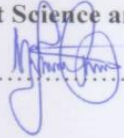


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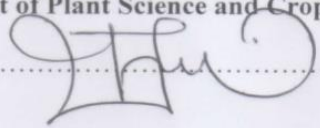
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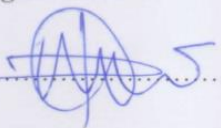
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ABSTRACT

Pratylenchus spp. and *Meloidogyne spp.* are key pests of banana in Kenya. Tissue cultured banana plantlets are considered clean for planting but infestation with these pests has been increasing due to the state of the soil in the farms. This has contributed a lot to huge losses from toppling disease which occurs at production stages of banana just before the banana bunches are ready for harvesting. Biological control agents in nematodes management may be used separately or can be combined with synthetic products to bring down the number of nematodes and to impart resistance to the plant. In this experiment, evaluation of selected biological agents and synthetic agent on *Pratylenchus spp.* and *Meloidogyne spp.* damage was conducted. Seedlings of tissue cultured banana were inoculated with biological agents and a synthetic agent and allowed to grow for one month. The variety of banana used in this experiment was grand nain variety. Plantlets were transplanted in clean forest soil. This soil was analyzed for nematodes and was found free of the nematodes. Nematodes were extracted from roots exhibiting root lesions and root galls. These two nematode species were used for inoculation of the clean forest soil after which damage caused by plant parasitic nematodes and their populations were evaluated after the fifth week of treatment. Plant response to biological agent and synthetic agent treatments was assessed from plant height, leaf width and leaf length for the entire duration of the experiments. There was a significant difference in height for banana plantlets inoculated with nematophagus fungi in rice bran substrate (63.6 cm) compared to control treatment. Those inoculated with nematophagus fungi without substrate followed closely with a mean height of 60.2 cm. There was a significant difference in height for plantlets treated with nematophagus fungi (15.1 cm) without substrate compared to those not treated at all. A significant difference in leaf length was also realized in seedlings that were inoculated with nematophagus fungi without substrate (36.6 cm). Nematophagus fungi in rice bran

substrate produced seedlings with the least number of galls (1.5 galls) compared to control treatment. Combined treatment had the least number of root lesions (4.2 lesions). Seedlings inoculated with calcium (27.1 roots) exhibited a significant difference in the total number of primary roots formed compared to control treatment. Similarly, seedlings inoculated with calcium treatment recorded the least number of *Pratylenchus spp.* (95.5 nematodes) while those inoculated with nematophagus fungi in rice bran carrier recorded the least number of *Meloidogyne spp.* (20.2 nematodes). In this experiment, barley exhibited the highest spore count of 3.38×10^{10} on the 28th day of the experiment. Barley was followed closely by rice bran with a spore count of 2.99×10^{10} . With time there was an increase in the number of spores from week one of inoculation to the fourth week. Growth of this fungus was significant in barley carrier. The findings of this study show that barley can be considered as a suitable carrier for production of *Paecilomyces lilacinus* fungi for effective management of nematodes in banana plants. *Paecilomyces lilacinus* positively played a key role towards growth and establishment of the banana seedlings.