

Field evaluation of soil nematode communities under organic and conventional farming systems in Chuka, Tharaka Nithi County, Kenya

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INTRODUCTION

Plant parasitic nematodes (PPN) cause major yield loss to many crops including beans and maize. Free living nematodes (FLN) are beneficial and can be used as bioindicators of soil health. Organic systems have been used in reducing populations of PPN to below economic threshold levels (Farahat *et al.*, 2012) while conventional systems have been used in suppressing PPN (Neher, 1999), but this often impacts FLN negatively. In this study we compare the effects of organic and conventional systems on PPN and FLN nematodes.

METHODS

- Study Area: Chuka (Tharaka Nithi County) AEZ 2 (UM3) with average rainfall 2000mm annually and Humic Nitisol soils
- Crops: Maize–bean intercrop
- 5 x 5 m plots arranged in RCBD and replicated 4 times
- 4 Treatments: Farmers' Practice (FP), Organic (Org), Conventional (Conv), Non Amended Control (NA)
- Soil sampling at planting, flowering, and harvest; roots at harvest.



- Nematodes counted and identified up to genera level.
- Categorised into trophic groups, i.e. bacterivores, fungivores, omnivores, predators, and plant parasitic nematodes (Yeates *et al.*, 1993).
- ANOVA to determine effect of treatments on nematode abundance and diversity (for sites).
- All data subjected to R version 3.2.3 and R commander version 2.2.4.

CONCLUSION

- Soils in Chuka have high diversity of soil nematodes.
- PPN in soil were not significantly different between systems, but in roots, they were significantly fewer in the organic system, which may be attributed to suppression by organic amendments.
- Bacterivores were significantly higher in organic system compared to other systems.
- This is possibly due to presence of manure and *Tithonia*, which promote soil microbes and compost, which in turn increases nematodes such as *Rhabditis*.
- Absence of predators from conventional system may suggest that conventional amendments negatively impact predatory nematodes.
- Organic systems will reduce reliability on use of expensive and toxic chemicals for PPN control compared to conventional system.
- Organic system appears to be effective in management of both PPN and FLN.

REFERENCES

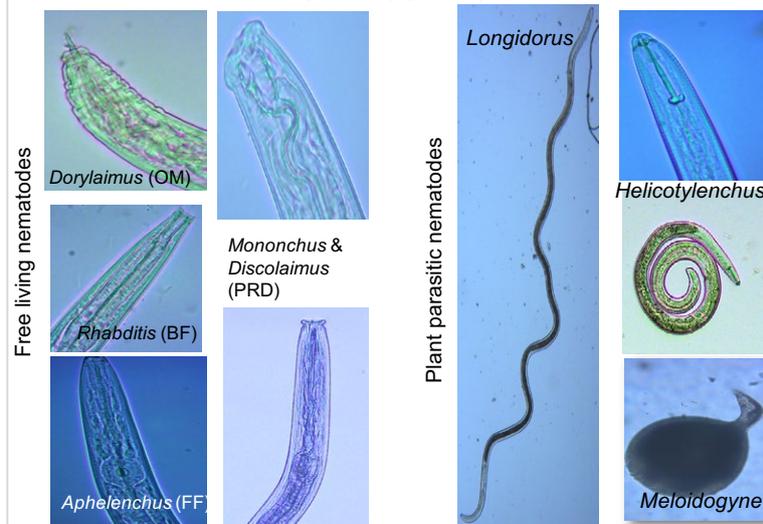
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 Neher, D. (1999). Nematode communities in organically and conventionally managed agricultural soils. *Journal of Nematology* 31, 142–154.
 Yeates *et al.*, (1993). Feeding habits in soil nematode families and genera—an outline for soil ecologists. *Journal of Nematology* 25, 315–331.

OBJECTIVES

- Characterise nematodes in study area
- Determine effect of organic and conventional farming systems on nematode abundance and diversity on intercrops (maize–bean).

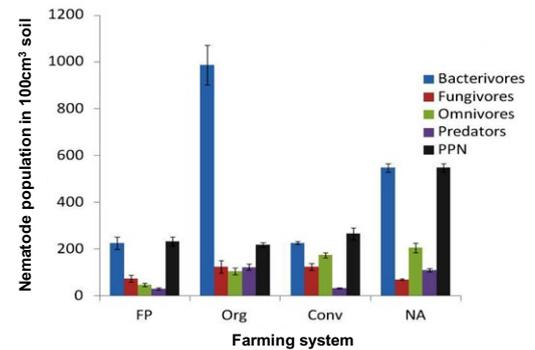
RESULTS

A total of 29 nematode genera were recovered with varying general richness between treatments but not significantly ($p > 0.05$).

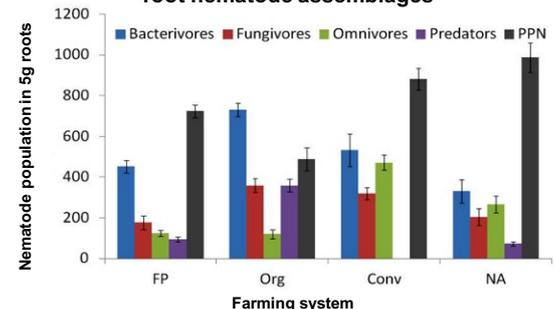


Effect of farming systems on nematode assemblages in soil and roots

Effect of organic and conventional farming systems on soil nematode assemblages at farmer fields



Effect of organic and conventional farming systems on root nematode assemblages



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