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# Nematode metabolic footprints, ecological and functional indices in tropical maize-beans agro-ecosystems under different farming practices

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## Abstract

Maize and beans contribute significantly to food security in Kenya. Farming practices used in production of these crops may affect nematode community assemblages and influence agricultural productivity. Information on response of nematofauna, particularly free-living nematodes, under various agronomic practices in Kenyan maize-beans intercrop is scarce. This study reports on the effects of farming practices on nematode community dynamics, ecological and functional indices, nematode metabolic footprints, and predator-prey relationship in maize-beans cropping systems in Mwea, Kenya. The field trials were set up in two seasons in a randomized complete block design with each treatment consisting of four replicates. The treatments included cow manure plus chemical fertilizer (CmDCF), cow manure plus wood ash (CmWa), cow manure combined with wood ash plus fertilizers (CmWaF), chemical fertilizers only (DNF) and unamended controls. Soil samples were collected at 0–20 cm depth at bimonthly intervals during 2018–2019. During the two seasons, 54 nematode genera were identified. *Cephalobus*, and *Heterocephalobus* (bacterivores), *Labronema* (omnivore) and *Nygolaimus* (predator) were abundant in CmDCF, CmWa, CmWaF, and DNF while *Aphelenchus* and *Aphelenchoides* (fungivores) were dominant in all treatments. Principal response curve analysis showed that CmWaF significantly reduced the population of *Helicotylenchus*, *Scutellonema* and *Rotylenchulus* during the 2$^{nd}$ and 4$^{th}$ month in the second season. Renyi diversity analysis indicated that CmWaF had higher diversity of omnivores while functional metabolic footprints categorized it as

structured in both seasons. Predator-prey analysis suggested that CmWa and CmWaF have the potential to provide suitable conditions for predators, target prey and amplifiable prey biomass. This study provides an insight on the implication of farming practices, on nematode abundance and soil food web in two economically important crops in Kenya. It also provides a basis for exploring the potential role of organic amendments containing cow manure in control of plant parasitic nematodes in maize-beans cropping systems.

## Keywords

Amplifiable prey
Food web
Metabolic footprint
Target prey