Effect of farming systems on termite abundance and damage on maize crop

Anyango J.J.[1,2,3], Lagat Z.O.[2], Fiaboe K.K.M.[3], Muvea A. M.[3], Muriuki A.W.[1], Stöckli S.[4], Musyoka M.W.[3], Karanja E.N.[3] and Adamtey N.[4]

[1]Kenya Agricultural and Livestock Research Organization (KALRO), [2]Jomo Kenyatta University of Agriculture and Technology (JKUAT), [3]International Centre of Insect Physiology and Ecology (*icipe*), [4]Research Institute of Organic Agriculture (FiBL)

Email: anyangojohn@yahoo.com

INTRODUCTION

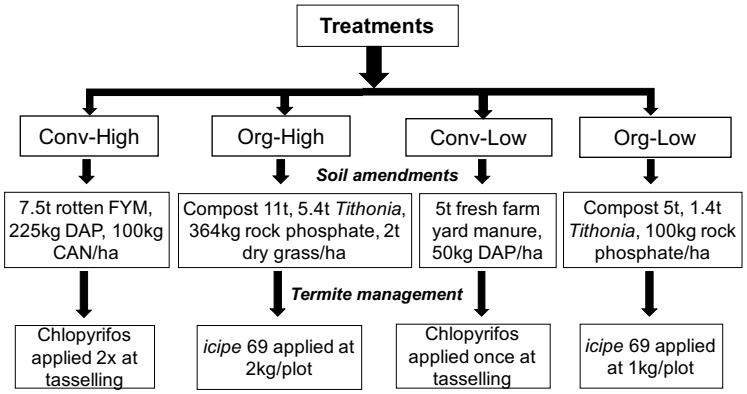
Termites comprise a large and diverse group of ecologically and economically important insects. Although termites can be destructive to crops and wood-based products, they make positive contributions to the world's ecosystems because they degrade plant debris and their tunnelling efforts help to ensure that soils are porous (Gholami and Riaz, 2012). In soils with organic waste, termites are involved in decomposition process by feeding on plant litter, which often influences soil physical and chemical characteristics (Colloff *et al.,* 2010). Since 2007, comparison of conventional and organic farming systems on soil fertility has been ongoing to assess their suitability in Kenya. Organic soil amendments may include maize stalks biomass and leaves left after grains and other economic components have been harvested. This study aimed to understand how the farming systems affect termite abundance and unravel how that correlates to crop damage.

OBJECTIVE

- To determine the effect of farming systems on termite abundance and damage on maize crop.

MATERIALS AND METHODS

- Studies were carried out at KALRO-Thika and Chuka over 3 seasons (2014 I, 2014 II and 2015 I).
- Four treatments arranged in a RCBD were replicated 4 and 5 times in Chuka and Thika, respectively.



- Termite abundance was determined weekly from soil surface and at different depths (0–10, 10–20, 20–30 and 30–40 cm).
- Damage was expressed as the number of maize plants lodged per plot.
- Cumulative data were obtained from different phenological stages of maize.
- All means were separated using Tukey, and data were analysed using R open source statistical software.

RESULTS

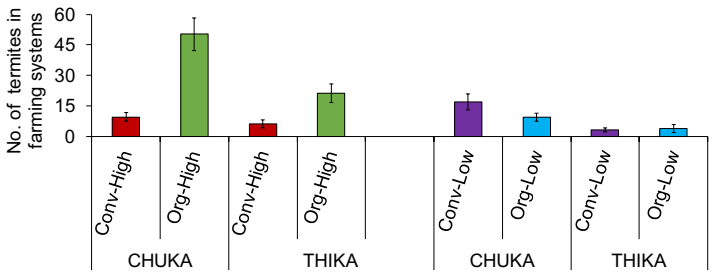


Fig. 1 Mean number of termites recorded under different farming systems and locations

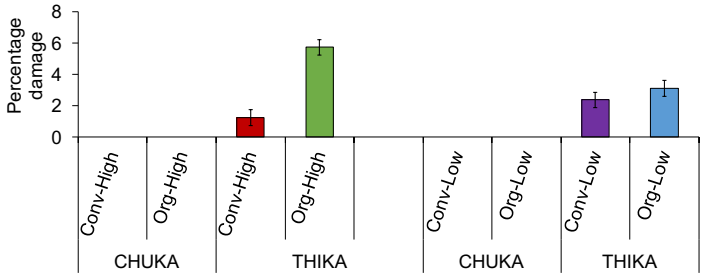


Fig. 2 Mean percentage damage of plants by termites under different farming systems

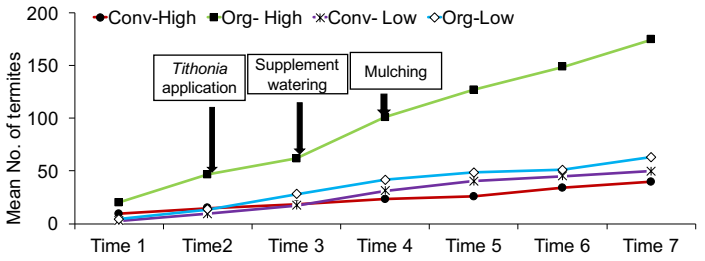


Fig. 3 Mean number of termites at different phenological stages

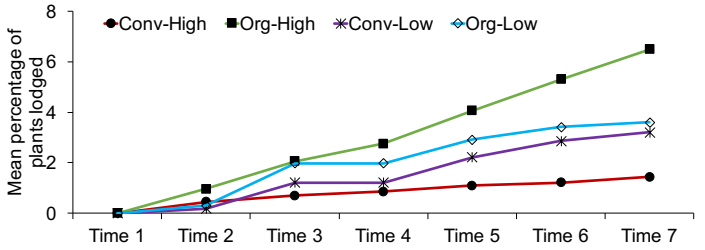


Fig. 4 Mean number of maize plants lodged at different phenological stages

KEY: Time 1= 1 WAE (Weeks After Emergence), Time 2 = 4 WAE (4 leaf vegetative), Time 3 =7 WAE (knee height), Time 4 = 10 WAE silking, Time 5 = 13 WAE, Time 6 = 16 WAE (browning), Time 7 = 18 WAE (dry maize stage)

CONCLUSIONS

- At high input level, the number of termites was higher in organic than in the conventional system while at low input there was no difference. This could be due to incorporation of crop residues, mulches, and compost in Org-High, which are preferred by termites.
- Chuka site recorded more termites in Org-High and Conv-Low; however, both sites were not different in termite numbers at Conv-High and Org-Low systems, a difference that is probably due to woody materials, crop residues and soil compost (Org-High), and raw manure (Conv-Low).
- Unlike in Thika with fewer termites and moderate damage, Chuka site with more termites recorded no damage. The lack of damage could be attributed to the site soil characteristics and the termite species in an area, which requires further studies.
- Termite damage peaked at knee height growth stage for organic treatments and Con-low. Since high termite numbers caused no damage in Chuka, further studies are warranted to assess potential effect of soil moisture, rate of organic matter decomposition, and weather parameters.
- Despite the noted damage on babycorn, the crop did not suffer significant loss because much of the recorded damage occurred after most harvesting had taken place.

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This project is supported by the Coop Sustainability Fund.
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