Minimal Herbicide-Based Conservation Tillage Enhances Soil Macro fauna Abundance and Distribution in Uganda

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Introduction

- Use of pesticides and other agrochemicals has extensively increased worldwide to control weeds and pest incidences
- Glyphosate is a widely used agrochemical in Uganda due t limited use of mechanizations –as a cheap option
- There is an assumption that its less toxic in nature to humans and tat is have less likelihood of persisting in the environment as compared to other herbicides
- However, it can have direct effects on soil biodiversity

Problem statement

- Glyphosate, widely used herbicide by farmers could be having long-term effects on soil macro fauna and soil health

- The impact of using herbicides in Uganda to control weeds has had limited studies, that link the chemicals to soil health development efforts.

- Limited Studies have explored he extent of the impact of herbicide based tillage agriculture conservation practice on soil biodiversity (Mutema et al., 2013; Holland, 2004)

Objective

- To assess the impact of herbicide-based conservation tillage (HBCT) on soil macro fauna variations in soils of Uganda.

Materials and Methods

- Location: Nyarubungo and Nyakikara in Rwampara district in south Western Uganda

- Treatments: – 1. Fields that had been sprayed in the last 10 days (T1) with glyphosate herbicides; Treatment 2 - fields sprayed 60 days back (T2) in Treatment 3 – the control with field that had not been sprayed by glyphosate herbicide before

- Sampling: Termites, earthworms, millipedes and centipedes - Monolith sampling used (Anderson and Ingram, 1993).

- The quadrats measuring 65 cm by 65 cm and the inner quadrat measuring 25 cm by 25 cm x 30 cm was used.

- **Soil monoliths were also excavated to 30 cm depth (n=3) per plot.**

- Soil layers within the quadrants were evaluated at 0-10 cm, 10-20 and 20-30 cm depths

- Termites, earthworm, centipedes and millipedes were sorted and count manually on plastic trays.

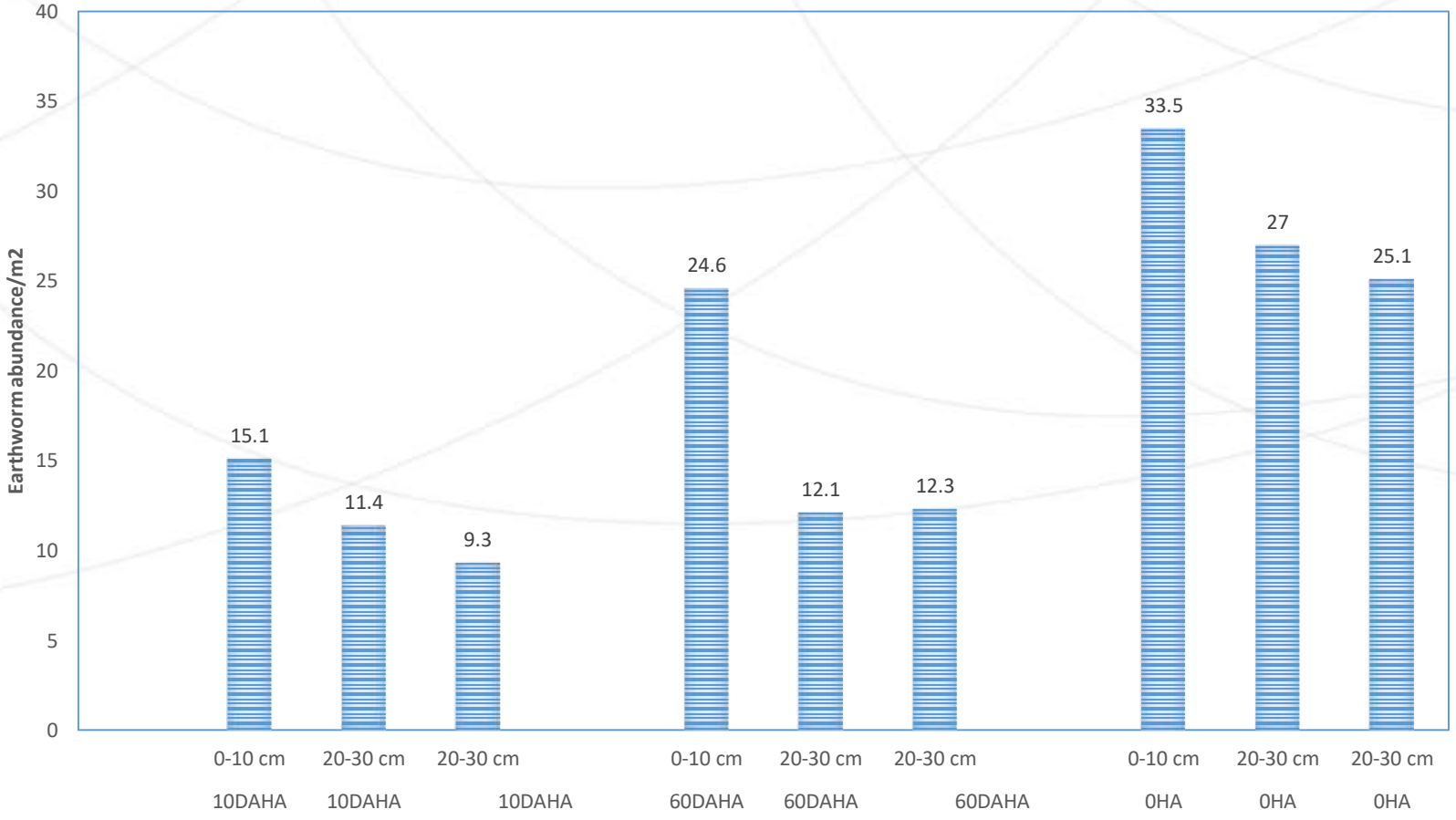
- Abundance (that represents the number of organism per m^2 and biomass was calculated as g m^{-2})

- Data was subjected to analysis of variance (ANOVA) using GENSTAT. Treatment differences were evaluated using Fisher's least significant difference at $P<0.05$).

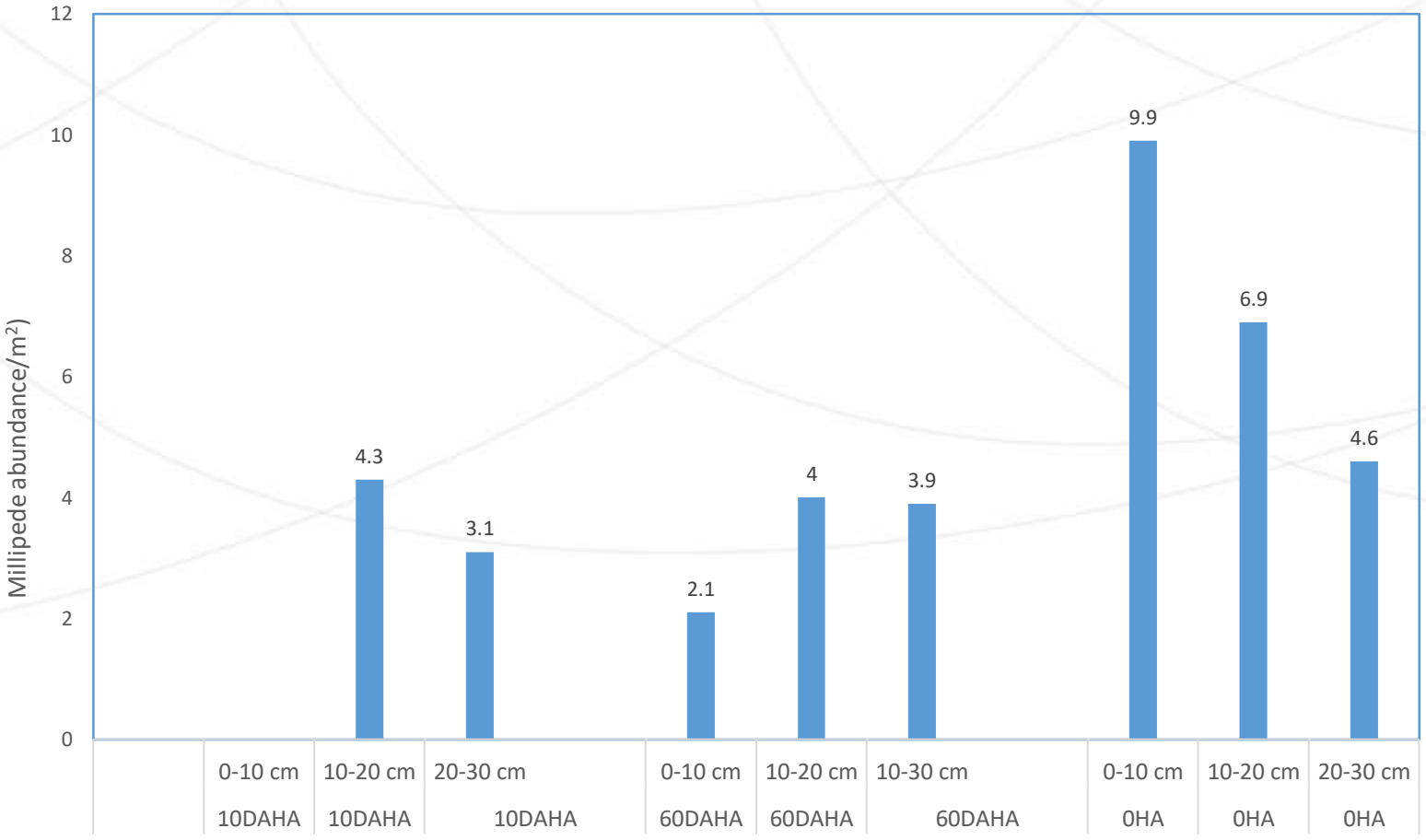
Results

Treatment with herbicides	Earthworm abundance/ m^2	Earthworm biomass (g/m^2)	Millipede abundance/m^2	Millipede biomass (g/m^2)	Termites Abundance (m^2)	Termite Biomass ($g//m^2$)
T1 (10 DAHA)	14.9a	0.43a	0	0	0	0
T2 (60 DAHA)	24.6a	0.46a	2.1a	0.34b	1.61a	26.2a
T3 (control)	33.5b	1.97b	9.9b	1.7c	5.17b	64.2a
LSD 5%	13.92	1.276	4.83	0.24	2.712	47.37

Earth worms abundance



Millipede abundance



Conclusion/Recommendations

- Herbicides use in tropical soils for weeding and conservation tillage is a practice that is significantly disrupting the patterns of soil biodiversity.
- There was clear effect of herbicides use on soil biota abundance which is a key indicator of agrochemical impacts on soil.
- Further studies are needed to study the soil biological components in the soil over time as a result of continuous use of glyphosate herbicides.
- This will enable analysis of long-term effects of agricultural management practices on the soil macro-fauna, and help understand soil biodiversity

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Thank you for your attention