

# Arbuscular mycorrhizae fungi community structures in Conservation Agriculture soils amended with organic and inorganic fertilizers in a sub-humid region of Zimbabwe

Kumbirai Musiyiwa<sup>1</sup>, Brandon Bushe<sup>1</sup>, Nilton Mashavakure<sup>1</sup>, and Justice Nyamangara<sup>2</sup>

<sup>1</sup>Chinhoyi University of Technology

<sup>2</sup>Marondera University of Agricultural Sciences and Technology

November 11, 2020

## Abstract

This study investigated AMF community response to tillage and soil amendment regimes from rhizospheric soil of maize roots at 0-10 cm and 10-20 cm at Hunyani farm, Zimbabwe. Two tillage systems (conservation agriculture: CA) and conventional tillage: CT), and six soil fertility amendments [Control (C), High fertilizer (HF-120), Low fertilizer (LF-60), Manure (M), Manure + low fertilizer (MLF-60), Manure + 60 kg N ha<sup>-1</sup> (M-60)] were laid in a split plot design with three replications. Twelve morpho-species were identified at the study site. Species richness was highest for CA+C (11.7) and CA+ M (11.7) at 10-20 cm depth. Control plots of CT had more diverse AMF species in the surface layers (Shannon-Weaver index = 2.12) compared to the subsurface soil layer (Shannon-Weaver index = 1.86). The tillage x fertility interaction showed that in CA, *A. dilatata* spore populations were higher in MLF-60 amended plots than all other plots, followed by LF-60 plots, while in CT systems MLF-60 promoted higher spore populations than all other treatments. All plots amended with manure plus inorganic fertilizer had lower ( $P < 0.05$ ) *G. clavispurum* spore populations than C, HF-120 and M amended plots under both CA and CT, however LF-20 promoted higher populations than in plots with a combination of manure and inorganic fertilizer in CT only. Tillage x fertility amendment x depth interactions ( $P < 0.05$ ) were observed on *A. denticulate*, *A. schenkii*, and *C. luteum*, *E. infrequens*, *R. clarus*, and *S. calospora* spore populations. Medium term effects of CA+ manure, and CA + no amendments may include increasing species richness and diversity. Application of relatively large amounts of inorganic fertilizers increase populations of *C. luteum* populations in CA and decrease in CT. Manure reduces populations of some species e.g. *C. luteum* in both CA and CT.

## Hosted file

EEJ main text.pdf available at <https://authorea.com/users/374813/articles/492247-arbuscular-mycorrhizae-fungi-community-structures-in-conservation-agriculture-soils-amended-with-organic-and-inorganic-fertilizers-in-a-sub-humid-region-of-zimbabwe>

## Hosted file

EEJ graphs.pdf available at <https://authorea.com/users/374813/articles/492247-arbuscular-mycorrhizae-fungi-community-structures-in-conservation-agriculture-soils-amended-with-organic-and-inorganic-fertilizers-in-a-sub-humid-region-of-zimbabwe>