



Comparative effects of the combination of Biofertilizer, NPK and mycorrhizal application on maize production system

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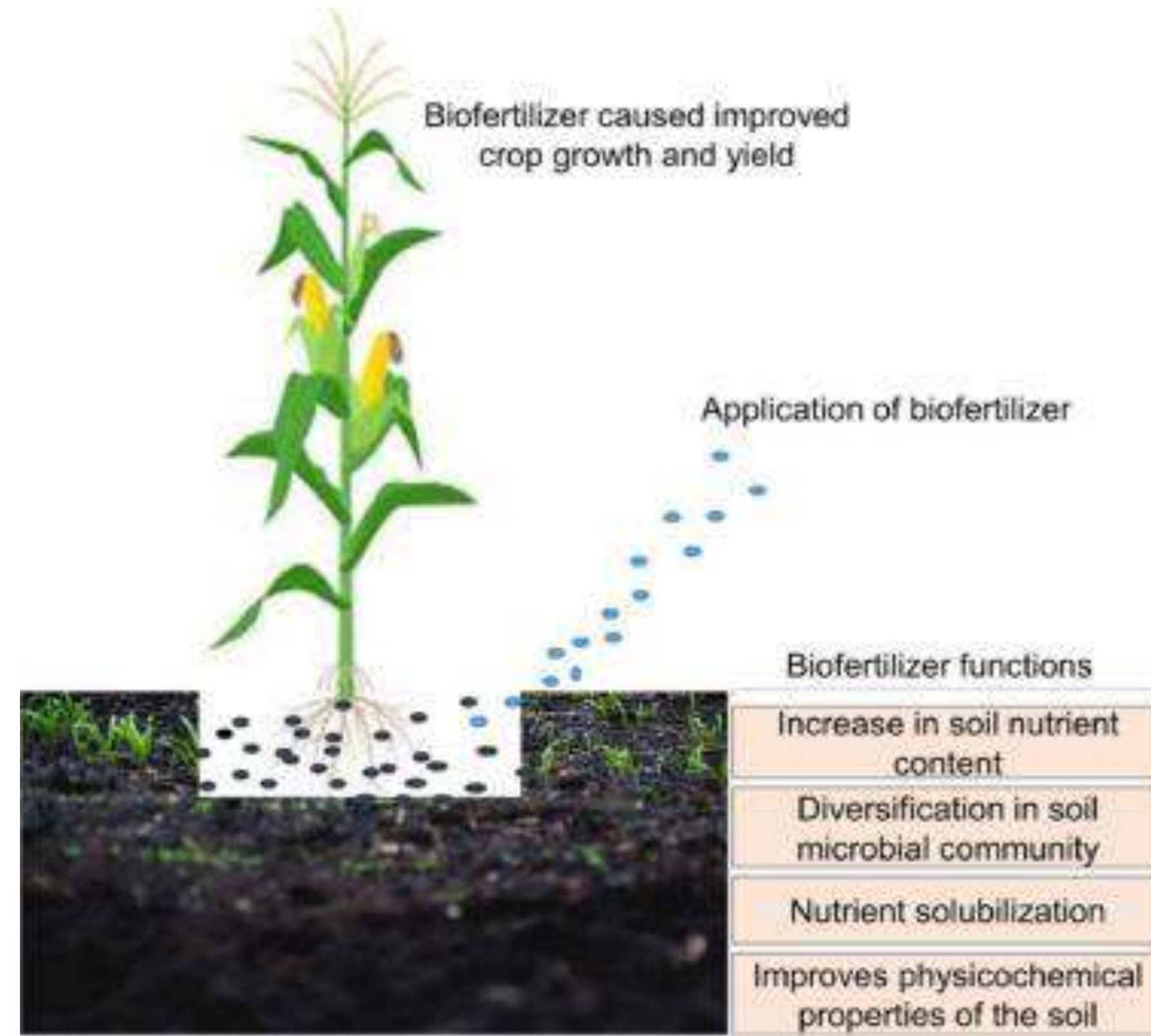
Introduction

The use of uncontrolled an-organic fertilizer continuously will degrade soil fertility and nutrients balance. To minimizing those impact, the use of biofertilizer along with an-organic fertilizer (NPK) under mycorrhizae application is needed to maintain sustainable maize production system. This could have a benefit are improving soil nutrient and microbial communities to increase maize (Figure 1).

Result

The effect of treatments were significantly ($P < 0.05$) impact the plant height, number of leaves over the period of observation along with cob fresh and dry weight, leaf area indices, leaf chlorophyll content and number of mycorrhizae. There was a strong relationship between leaf chlorophyll content with cob dry weight without husk. The MSD multivariate approaches could distinct and clustered the treatment based on selected variable. The major mycorrhizae spore were dominated from *Glomus sp* (Figure 2), whilst visual maize yields across different treatment were presented in Figure 3.

Figure 1. The impact of using biofertilizer to soil environment (adopted from Raimi et al 2021)



Methods

This research was carried out from June 2020 to August 2021 at the Jatimulyo experimental field station, Faculty of Agriculture, Universitas Brawijaya-Malang-East Java, which is located geographically at the coordinates of 7°56'23"S 112°37'01"E, positioned at 500 m above sea level, with an average of temperature of 22 to 25° C and an average of rainfall at about 2000 mm per year. The experimental design was conducted using a randomized block design (RCBD), consisting of nine treatments with four repetitions. In one replication, the plots used were 4 meter x 3 meter wide, with a spacing of 20 cm x 75 cm. There are 36 experimental units in this study (Table 1). The variable of crop performance to be measured were listed as follow : plant height, number of leaves, leaf area indices, cob fresh and dry weight, cob length, and number of mycorrhizae spore. Statistical analysis were using Anova and MDS.

Table 1. The treatment of the combination between organic and an organic fertilizer

Code	Treatment
P0	Control
P1	100% NPK
P2	100% Biofertilizer
P3	NPK 25% + Biofertilizer 100%
P4	50% NPK + 100% Biofertilizer
P5	NPK 75% + Biofertilizer 100%
P6	100% NPK + 100% Biofertilizer + 100% Micro Fertilizer
P7	50% NPK + 50% Biofertilizer + 50% Micro Fertilizer
P8	Mycorrhizae fertilizer 100%

Figure 3. The differences impact of using biofertilizer under combination of anorganic fertilizer (NPK), micro elements and mycorrhizal application to maize yields

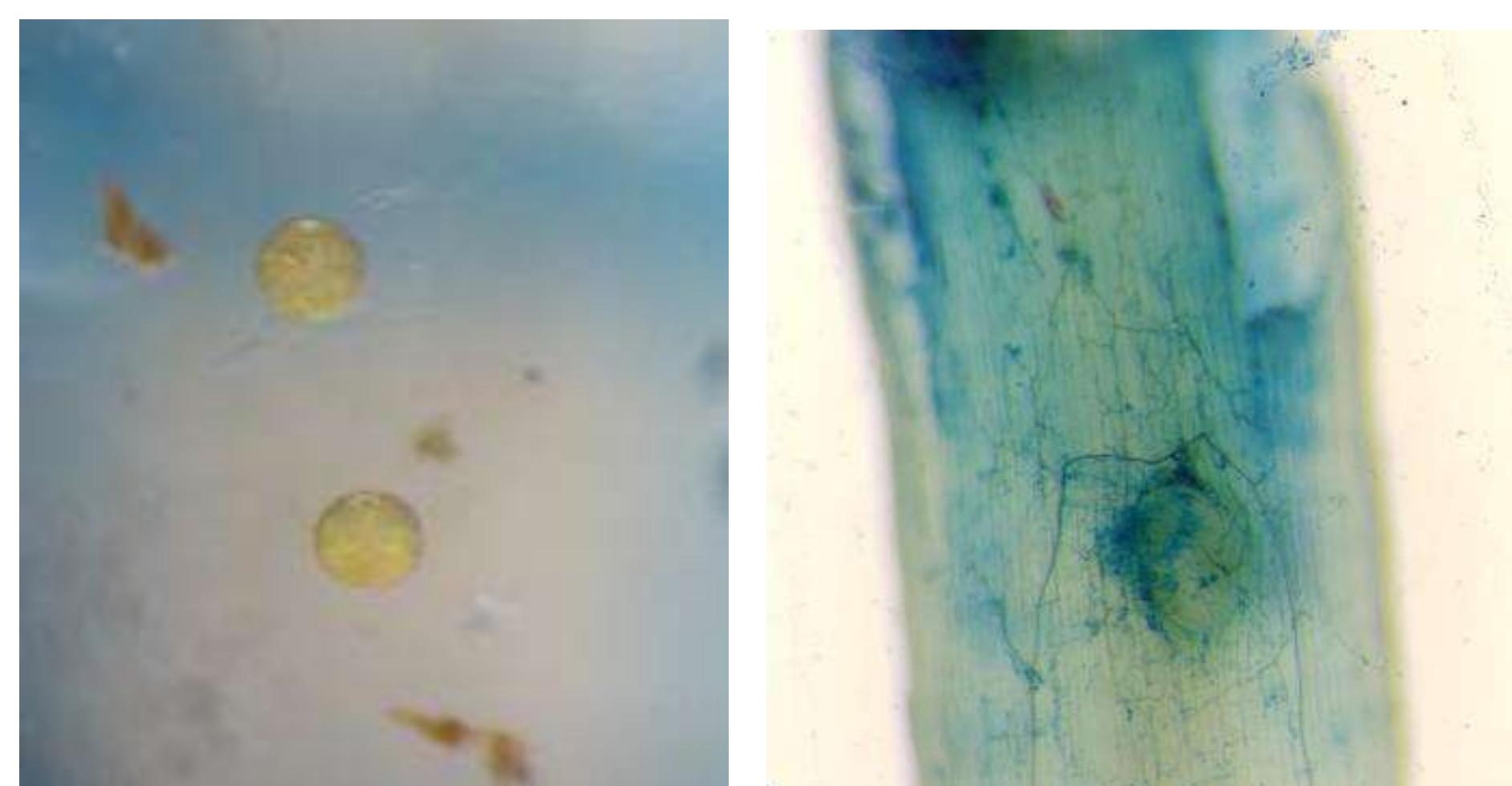
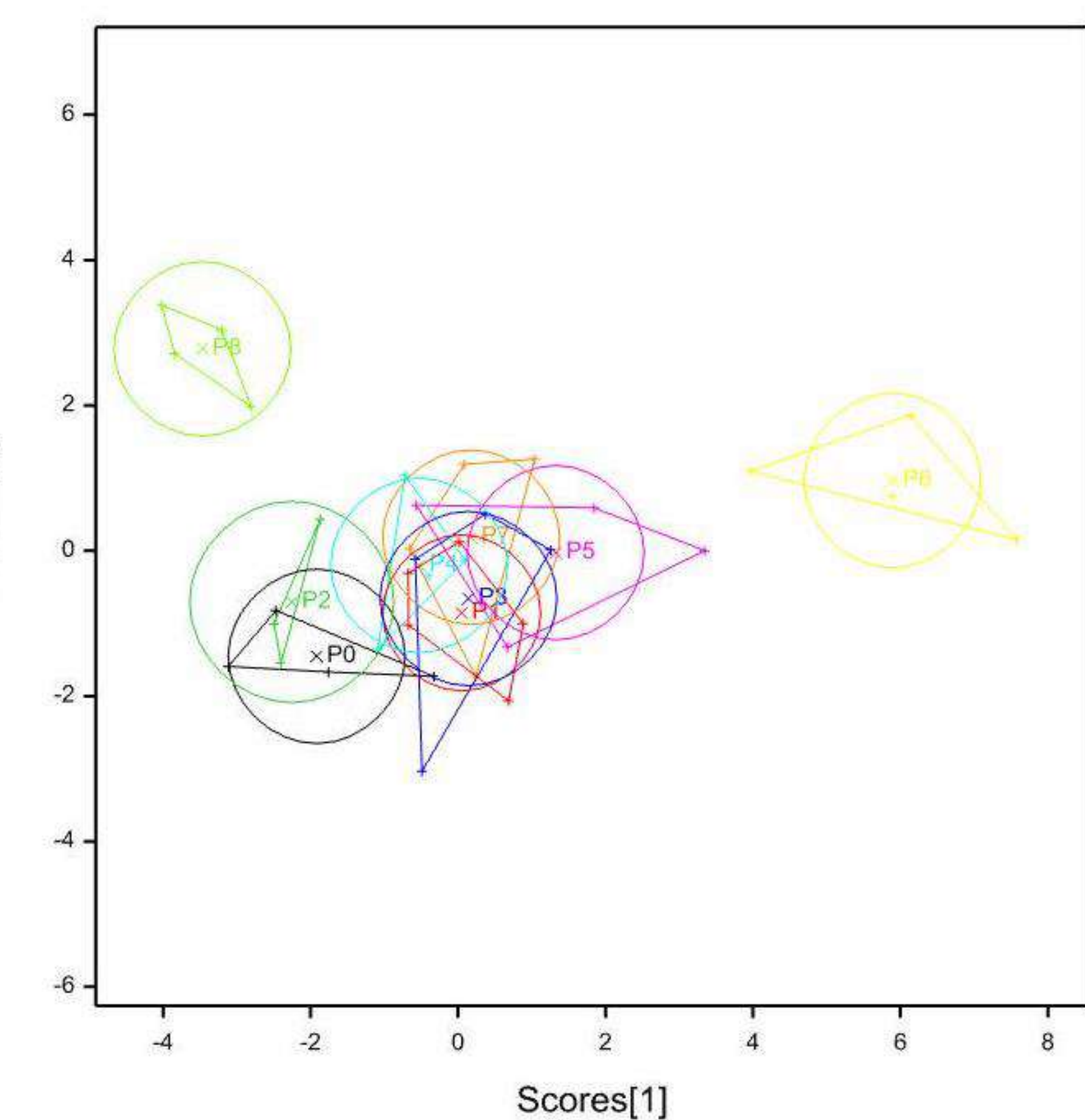
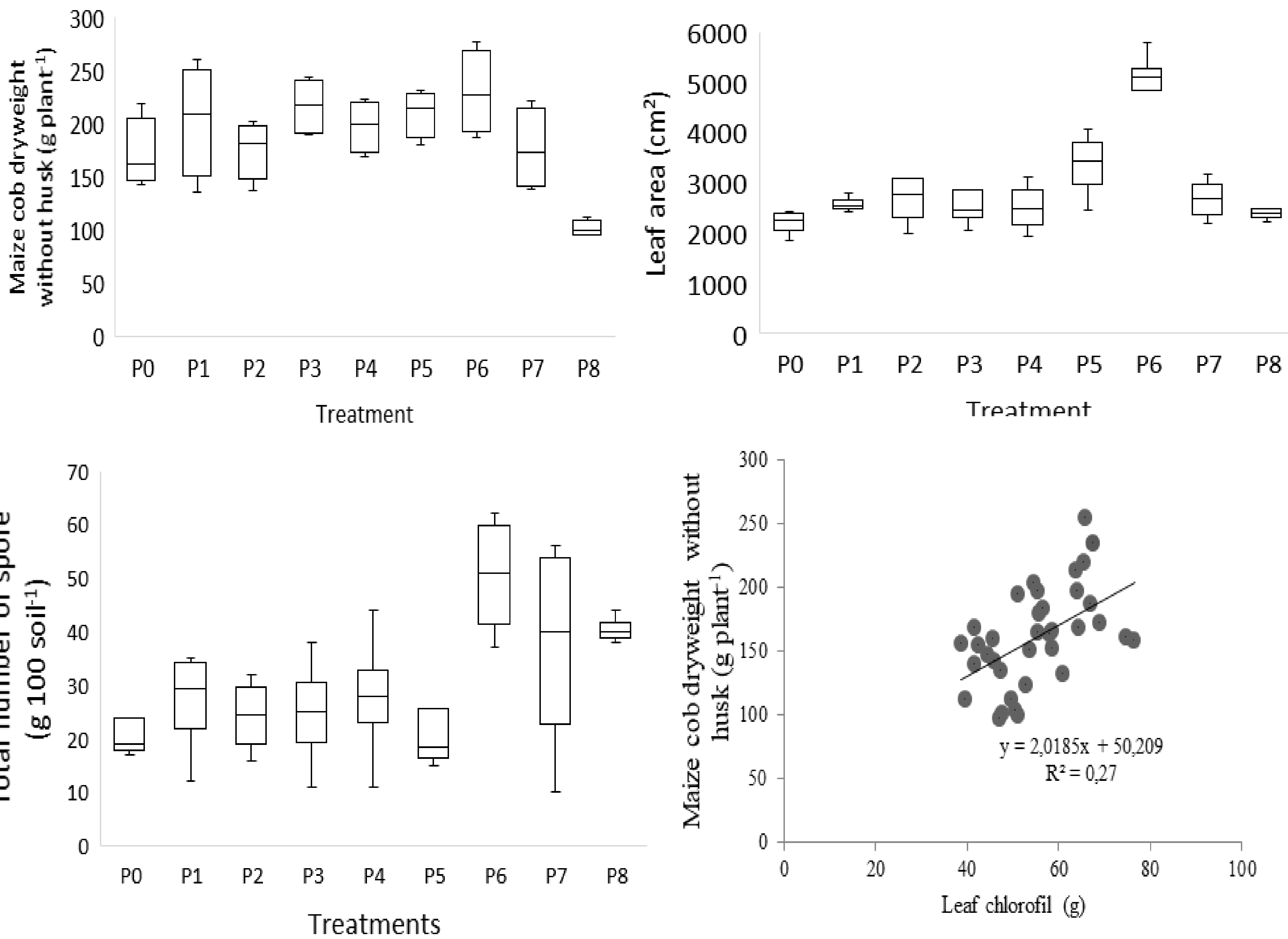


Figure 2. The impact of using biofertilizer under combination of anorganic fertilizer (NPK), micro elemnts and mycorrhizal application to selected crop variable such as (cob dryweight, leaf area indices, number of mycorrhizae spore) along with the relationship between leaf chlorophyll content and cob dryweight, MDS plot and mycorrhizal maize infection which mainly dominated by *Glomus sp*

Conclusion

The best treatment was detected under use of 100% biofertilizer, 100 % an-organic fertilizer and 100% micro nutrients (P6)