Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Effects of Organic Manure and Crop Rotation Systems on the Grain Yield of Wheat (*Triticum aestivum* L.) in the Highlands of Ethiopia

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Abstract

Concerns on soil fertility degradation were resonating for decades in wheat growing highlands of Ethiopia. Important physicochemical properties of the soil have been below the critical level to support crop growth. As a result, low crop yields lead to a shortage of food supply, which is the dominant challenge of the region. Thus, an experiment initiated to improve the productivity of wheat through organic treatments and crop rotation systems. Four levels of organic treatments and annually varied crop rotation systems arranged factorially and laid out in a Randomised Complete Block Design (RCBD) with four replications. The organic treatments included V1= 0 t ha^{-1} FYM (farmyard manure); V2 = 2.5 t ha^{-1} FSB (fresh *Sesbania* biomass); V3=5 t ha^{-1} FYM and V4=5 t ha^{-1} FYM +2.5 t ha^{-1} FSB. In the first year, wheat was planted with different levels of organic treatments with undersowing lupine (R2) and sole wheat (R1). In the second year, wheat was planted with different levels of organic treatments. In the third year, the rotation systems include R3 = potato-clover-wheat; R4 = wheat under sown with lupine-potato under sown with lupine-wheat and R5= lupine-potato undersowing lupine-wheat. Data on plant height, thousand seed weight, and grain yield of wheat recorded and analysed using SAS. Results showed increasing grain yields of wheat over the period of the three years across all treatments. Among all, the highest grain yield of wheat (4.48 t ha^{-1}) was recorded at the interaction effect of 5 t ha^{-1} FYM +2.5 t ha^{-1} FSB and potato-clover-wheat rotation system in the third year and could be recommended as an alternative soil fertility management system to attain optimum yield in the highlands of Ethiopia.

Keywords: Cropping pattern, natural fertiliser, productivity, soil fertility

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