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Effect of Application of Composted Manures on Growth, Yield and Yield Components of Sorghum (*Sorghum bicolor* L.) in Sandy Desert Soil, North Kordofan State, Sudan

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Abstract

Sandy soils contribute significantly in production of important stable food crops. However, the agricultural utilization of such soils is based on improvement hypothesis of their constraints using organic manures. A two year field experiment was carried out at the Experimental Research Farm of the University of Kordofan (Sudan) to investigate the effects of composted manures and inorganic fertilisers on growth, yield, and yield components of two sorghum varieties (Butana and Arfa Gadmak) cultivated on a sandy soil. Treatments were (1) Control (without fertiliser application), (2) composted farm yard manure (FYM) applied at 20 t ha-1, (3) NPK (applied at the rate of 36 kg ha-1), combined with composted FYM at 20 t ha^{-1}, (4) composted chicken manure (CM) applied at 5 t ha^{-1}, (5) NPK (36 kg ha^{-1}) combined with composted CM at 5 t ha^{-1}, (6) NPK only (36 kg ha^{-1}), (7) composted (FYM) combined with composted CM applied each at 12.5 t ha^{-1} and (8) NPK (36 kg ha^{-1}) combined with composted mixed FYM and CM (applied each at 12.5 t ha^{-1}). Treatments were arranged in a split-plot design where varieties were designated to the main plots and fertilisers to the sub plots. Addition of composted manures significantly increased soil organic carbon (OC) by 50 % and available P between 43 to 105 %, whereas, pH and bulk density decreased by 2 % and 6 %, respectively. Integration of organic and inorganic fertilisers increased leaf area index (LAI) over the inorganic source only by 28%, whereas the highest LAI was recorded for sole application of CM (0.82) or CM supplemented with inorganic fertiliser (1.1) as compared to the NPK treatment (0.54). This study also showed differences between varieties. The Butana variety showed a much better nutrients use efficiency as the Arfa Gadmak variety. Incorporation of CM produced a significant higher head seed weight (8.49 g) than that obtained for the combined application of CM and NPK (7.92 g) or for the NPK only treatment (7.99 g). The overall grain yield showed the same pattern: CM > CM integrated with NPK > NPK. However, due to possible N immobilisation, sole application of FYM is not recommended since it decreased grain yield. Consequently, augmenting stable manure with inorganic N resource is recommended for improving sorghum performance. Based on the findings of the N mineralisation carried out in this study, it is recommended that compost application should be done 4 weeks before sowing.

Keywords: Compost, dryland, reclamation, soil fertility, yield

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