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Response of Mung Bean (*Vigna radiata* (L.) Wilczek) to Different Source and Rates of Biochar Application on Acidic Soil in Western Ethiopia

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Abstract

Soil acidity is a serious problem in western parts of Ethiopia. It affects the plant growth, nutrient availability to the plants and reduces the crop production. A field experiment was conducted in Uke Wollega university research and demonstration station located in Guto Gida district to investigate effect of different sources and rate of biochar on growth and yield of Mung bean and selected physicochemical properties of acid soil during the off season by irrigation in 2018. The experiment was arranged in factorial experiment using randomised complete block design. The treatments consisted of different source (maize biochar, sesame biochar and soybean biochar) applied in different rates (control, 2, 4, 6, 8, and 10 ton ha⁻¹). After 3 months incubation period of the soil the results revealed that the highest mean of EC (0.087), Soil pH(5.73), organic carbon, (2.96 %), organic matter (5.1 %), total nitrogen (0.255 %), available K(16.76 %) and P (13.96 %), exchangeable Mg²⁺ (4.58), Ca²⁺(8.19) and K⁺ (2.05), CEC(27.18 Meq/100gm soil) and base saturation,(79 %) were recorded from biochar treated soil showed significant difference from the control. The effects of biochar on the days of emergence(8), number of leaf per plant (17),root length(24 cm), fresh shoot (5.96g), dry shoot (1.299g), fresh root weight(0.52g) root dry weight(0.181g), root to shoot ratio(14.19g), number of branches(5), number of seed per plant (14.6), 1000 seed weight (168g) and grain yield(628.49 kg/ha) were significantly different at $p < 0.05$. However days of flowering, maturity, plant height, pod length, number of pod per plant, biomass yield and Harvest index were statistically non-significant different at $p < 0.05$. All growth and yield parameters mungbean showed a positive correlation to the grain yield except days to maturity, plant height and number of branches. Among the different sources used for Biochar preparations sesame sources of biochar combination with 10 ton/ha rates of biochar application gave the highest grain yield than the other treatments and the control. Thus a biochar application reduces the soil acidity and improves the crop yield. The future studies should articulate towards the studies involving in different soil characteristics, different crop, under different soil characteristics.

Keywords: Acidic soil, biochar, grain yield, local variety