Effect of Biochar, Farmyard Manure, and Lime on Soil Properties, and on Growth and Nutrient Uptake of Wheat on Acidic Soils in Southern Ethiopia

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Abstract : This study assessed the effect of the interactions of biochar (BC), farmyard manure (FYM) and lime on soil chemical properties and on different wheat attributes in Southern Ethiopia. The experimental design was a randomized complete block in three replications. The site significantly ($p \leq 0.05$) influenced soil and wheat attributes. Biochar showed a large significant effect ($p \leq 0.05$) on soil organic carbon, cation exchange capacity, and exchangeable potassium (K), while lime showed a substantially significant ($p \leq 0.05$) effect on exchangeable Calcium (Ca) and acidity. Farmyard manure (10 tonnes ha^{-1}) had a significant effect on soil total nitrogen (TN). Biochar and lime showed a large significant effect on soil pH and available phosphorus (P) depending on the site. All amendments showed a significant ($p \leq 0.001$) effect on most wheat attributes, but the highest effect was from BC. Biochar produced highly significant ($p \leq 0.001$) effects on plant height, total number of tillers and productive tillers, number of seeds per spike, aboveground biomass, grain yield, and P and K content in wheat grain and straw. We accredited the greater effect of BC on wheat attributes to its influence on soil chemical properties. We recommend long-term studies on the impact of BC alone or in combination with FYM on acid soil types.

Keywords : grain yield, soil amendments, soil nutrients, soil organic carbon, Triticum aestivum
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