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## Effect of Biochar and Organic Amendments on Acid Saline Soil

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Soil degradation due to salinization is one of the major environmental concerns, threatening the sustainability of world's agricultural production and threats to global food security. Moreover, salinity and acidity also causes nutritional disorders and limits the uptake of essential plant nutrients (N, P, K, Ca, Mg, etc.). High salt concentration negatively affects soil microbial activity as well as soil chemical and physical properties, thus causing a decline in soil productivity. The overall goal of this research was to assess the reclamation potential of Gliricidia sepium biochar, sold waste composts and municipal sewage sludge as organic amendments for acid saline soil and evaluate the most suitable amendment based on soil quality parameters. In this experiment 16 treatments were prepared by biochars manufactured at three different temperatures (300, 500, & 700 °C), compost and sludge application as 1.0, 2.5, 5.0% w/w and control as respectively. Treated soils were subjected to laboratory incubation for 120 days at room temperature (26±1 °C). Electrical Conductivity (EC), pH, NO3-, PO4-3, Cation Exchange Capacity (CEC), Exchangeable Sodium Percentage (ESP), Total Organic Carbon (TOC), Acid phosphatase (Acidpht), Alkaline phosphatase (Alkpht) and Catalase activities (CA) were tested to characterized the amendments.

Application of organic amendments to soil was successful restoring both salinity and acidity levels simultaneously up to some extent. Findings indicated that the maximum EC reduction was 19.0% (1.0 dS/m) at the application of sludge, ESP by 17.6% (11.9 units) at 700 BC and pH increment by 53.7% (2.1 units) at compost. Maximum increment of PO4-3 by 95.9% (5.2 mg/kg) at 500BC, NO3- .by 5 times (1.5 mg/kg), CEC by 50.5% (14.40 cmol/kg), Acidpht: by 54.4% (86.0 units) at compost, Alkpht: by 49.5% (30.15 units) at 300 BC and CA by 158.0% (1.60 units) at 700 BC, are an evidences of the potential of organic amendment to enhance nutritional availability and microbial activity. When considering about all amendments highest performance was observed at 5% amendment compared to 1.0 and 2.5%. Upon the findings of this study, compost followed by 500 BC are the most suitable soil amendments for saline soils, since they improved soil physical, chemical and biological properties. Hence, a composite of both compost and 500BC might be a good hybrid for the saline soil restoration.

Key words: Electrical conductivity, Salinity, Acidity, Biochar, Organic amendments