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Review of the Responses of Various Soil Amendments in Sandy Soils

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Abstract

The primary constraints with sandy soils are low soil organic matter content, poor nutrient availability, heavy losses of applied nutrients and lower water holding capacity. Improving the productivity of sandy soils, particularly in developing countries, could be a viable solution to food insecurity and poverty. Large extent of sandy soil is one of the major constraints for crop production in the Eastern Province of Sri Lanka. Meanwhile, various soil amendments can be applied to improve the performances of cropping systems in sandy soils. Nevertheless, a comprehensive knowledge on which soil amendment would work better across different scales is not well known. To address this knowledge gap, this review was conducted using published literature. Systematic review approach was adopted, and the data were extracted from 65 highly relevant papers. The data were analyzed to calculate the percentage changes on crop yields, soil organic matter and soil carbon, in response to the applications of different soil amendments. The review highlighted the potential of several soil amendments to improve the crop performances in sandy soils. Interestingly, rice straw biochar and the municipal solid waste compost have greatly increased crop yields especially in rice at the rate of 0.9% w/w and 3% w/w in soil weight basis, respectively. Highest improvement in soil organic matter and soil carbon was observed under the applications of compost and spent grain, respectively. Therefore, rice straw biochar and compost could be evaluated to improve the productivity of sandy soils, especially in the Eastern region of Sri Lanka. Although the spent grain was promising, the availability for large scale applications may be limited in Sri Lanka. Testing of these soil amendments would require long-term experiments incorporating different crops and cropping systems.

Keywords: Compost, Biochar, Sandy soil, Soil amendments