ACTA SCIENTIFIC AGRICULTURE (ISSN: 2581-365X)

Volume 2 Issue 11 November 2018

Opinion

Biochar: A Novel Approach for Sustainable Crop Production and Soil Health

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Received: October 09, 2018; **Published:** October 25, 2018

Biochar (BC) is the porous carbonaceous solid produced by thermo chemical conversion of organic materials in oxygen depleted atmosphere, which has physiochemical properties suitable for safe and long-term storage of carbon in the environment and potential for soil fertility improvement [1]. Pyrolysis condition and type of biomass (raw materials) used can greatly affect the nutrients contents of biochar. Different sources i.e. agricultural wastes (corn cobs, olive husks and tea wastes), woody materials, green wastes, animals' manure and other wastes can be used for biochar production. Soil shows different response toward biochar produced from organic materials under different pyrolysis conditions [2]. Similarly, plants response to biochar also varies due to the diverse nature of biochar produced from different biomass sources under different pyrolysis conditions.

Biochar application is getting considerable attention due to its vital role in sequestration of carbon, increasing soil physical and biological conditions, enhancing nutrients uptake while reducing soil compaction and emission of nitrous oxide. It also acts as soil fertilizers because its application to soil improves soil fertility status and maintain balanced soil ecosystem. Changes in soil physical and chemical properties and increase in nutrients availability determines the significant effect of biochar on crop growth and production. Biochar addition reduces emission of greenhouse gases from soil, improves plant growth and soil quality by decreasing soil nutrients losses specially nitrogen and phosphorus. Unlike other organic sources of plant nutrients, biochar carbon is very resistant to microbial decomposition thus it can seize carbon in soil and which lasts for decades. Lehmann., *et al*. [1] has reported that pyrolyzed products such as biochar have great potential for mitigating emission of greenhouse gases by securely sequestering carbon in soil due to the resistant nature of biochar toward rapid microbial decomposition. Biochar has potential to improve soil fertility status by reducing leaching of nutrients, bulk density and soil bulk density and increasing moisture retention capacity, N and P availability and efficiency. Biochar also facilitate seedling biomass gain and water holding capacity of soil and has potential for improving quality of degraded soil and yield of crops [3].

Conclusively, there are wide range of experiments conducted on biochar has indicated the potential of biochar application for improving soil health and crop productivity. However, its adaptability for small-scale farming in resources poor farmers is very low and challenging. Therefore, practical trainings on biochar production and access to the published work (translated in local language) revealing the positive effects of biochar amendments on soil fertility and crop productivity should be provided to illiterate and small-scale farmers to adapt this technology.

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