

Potentials of Biochar as a Soil Amendment in Comparison to Some Other Materials

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Continuous practice of organic farming is associated with several problems in soils and in plant growth such as nutrient imbalances, increasing soil pH and very high C: N ratios of the soil. Incorporation of soil amendments is considered as one of the best solutions to overcome some of these problems. Biochar, a recently introduced soil amendment, made by thermal decomposition of organic materials under limited oxygen supply and at temperatures around 700 °C (i.e. pyrolysis), is claimed to be having its own unique properties on improving soil physical, chemical and biological properties.

The suitability of locally available biochar as a soil amendment was evaluated in comparison with some other materials in two experiments. The experiment was conducted at Dodangolla Experimental Station during May to August 2011. The treatments used were the plant species {i.e. tea (*Camellia sinensis* L. (O.) Kuntze, cultivar TRI 4006) and tomato (*Lycopersicon esculentum* L. variety Thilina)} and the amendments {Biochar 1 (3mm particles), Biochar 2 (2.5cm particles), Natural Zeolite, Chena Charcoal and Activated Carbon}. Natural Zeolite was mixed with the soil at the rate of 1% fresh weight basis and other four amendments at 0.2% fresh weight basis. Compost application was done prior to the planting at the rates of 2kg per plant for tea and 400g per plant for tomato. The treatments were arranged as a two factor factorial in a complete randomised design.. Plant growth and soil parameters were measured up to 12 weeks after planting.

Tomato yield was significantly higher ($p < 0.05$) with biochar 2 amendment, only at 12 weeks after planting. The yield with all other treatments was not statistically significant. This was also reflected in the plant growth, i.e. the number of leaves and leaf area, which were significantly higher ($p < 0.05$) with biochar 2. Other treatments did not show a significant difference with the control. In tea, none of the growth parameters analysed showed a significant difference. The pH, electrical conductivity, available phosphorus and calcium of the soils showed a significant difference ($p < 0.05$) between the two plant species. Soil potassium and calcium showed significant differences among the five amendments. All the other soil parameters analysed did not show a significant difference between the treatments.

In conclusion, any of the soil amendments used in the given rates did not show promising results, except biochar 2 with tomato. Further experiments will be required to check for reasons and for consistency of results. The reason for not seeing any response in tea may be due to its perennial nature. Growing tea for a longer period of time with these amendments can be recommended. Also, in this experiment, only one rate was used for the amendments. Expanding this experiment for different numbers of rates can be suggested for obtaining better results.