

Production of Aqueous Biochar Biocatalyst for Agricultural Sustainability

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Addition of biochar during composting will reduce the loss of nitrogen and produce nutrient stabilized organic fertilizer. Better results can be obtained by using biologically activated/catalyzed biochar. Therefore, a study was conducted to produce and add activated biochar during the active phase of composting process. To produce an aqueous biocatalyst, slurry was prepared by mixing shredded *Gliricidia sepium* leaves (1 kg), water (3 L) and Eppalawa rock phosphate (8 g). The biocatalyst was prepared under aerobic conditions in an aerobic reactor which was fabricated using a 25 L plastic container, Perspex pipes, and an aerator. 1.5 kg of biochar produced from *Gliricidia sepium* wood in a pyrolyzer was added to the slurry intermittently until it reaches neutral pH. It took 24 days to reach a neutral pH value. The highest available nitrogen of 243 mg/L, total potassium of 8,125 mg/L and total phosphorus of 53.4 mg/L was obtained on 15th day at the pH 6. Through a repeated experiment, it was found that biocatalyst can be produced within 5 days. Two compost piles were prepared using fresh immature *Panicum maximum* grass (18 kg) and *Gliricidia sepium* leaves (2 kg)/ pile. Cultured biochar biocatalyst was mixed with 6% dry weight basis to one pile and raw biochar (6%) was incorporated to the other pile. N, P, K levels of all compost piles after 8 weeks were within the recommended levels. The highest nitrogen of 20.3 g/kg, and potassium of 83.71 g/kg remained in 6% biocatalyst compost. Phosphorus content of 6% biocatalyst compost was 0.67 g/kg of dry compost and it was 0.72 g/kg in 6% biochar compost. The pH value of produced compost with biochar biocatalyst was 8.8 and it was 9.2 in compost with 6% biochar. The made compost is very suitable and perhaps cost-effective for acidic soils to improve soil nutrient status unlike the addition of lime.

Key words: Acidic soils, Biocatalyst, Biochar, Compost