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AN ASSESSING OF THE QUALITY OF BIOCHAR PRODUCED FROM COCONUT HUSK WASTE

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Biochar is an organic amendment with the potential for long term carbon restoration and improving fertility in agricultural soils. The types of feedstock and pyrolysis conditions affect biochar properties. A study was conducted to assess the suitability of coconut-husk based materials to produce biochar. Waste material from the Growrite Substrate (Pvt) Ltd. was collected and biochar was produced in four batches using the retort method developed at the Rubber Research Institute of Sri Lanka. Air dried biochar with <2mm particle size were analyzed for available and total phosphorus and potassium, total carbon and nitrogen, cation exchange capacity (CEC), water holding capacity, and particle size distribution. Electrical conductivity (EC) and pH were measured in 1:5 water suspensions. The effect of biochar, applied to soil at 0.0, 0.5, 1.0 and 2.0% rates (w/w), on lettuce (*Lactuca sativa L*.) seed germination was assessed. The quality of the biochar was evaluated against those of biochar produced from sawdust (*Alstonia macrophylla*). Biochar particles >2 mm were crushed and sieved through 2 mm sieve and characterized. Reproducibility of biochar with coconut-husk waste was evaluated by comparing the properties of four batches. The effect of coconut husk based and sawdust biochar on maize growth was tested in a greenhouse pot experiment by adding biochar (0.5 and 1.0% rates) along with fertilizers into an Ultisol collected from Nuwera-Eliya.

Pyrolysis efficiency of coconut-husk biochar (CB) was 37±4% and C:N ratio was 59±5. Feedstock materials resulted 40% of <2 mm size particles. Ash content, low temperature volatile matter content, apparent fixed carbon of CB were 16±0.2%, 16±1.2 % and 68±1.4%, respectively. Exchangeable K, available P, pH, EC and CEC of CB were 30281±3 mg kg^{-1}, 174±17 mg kg^{-1}, 10.24±0.01, 5.57±0.02 dSm^{-1} and 21.9±0.0 cmol $_{(+)}kg^{-1}$, respectively. Water holding capacity was 380±9%. Characters of originally <2mm size CB particles and crushed-sieved CB were comparable. Production of CB was reproducible. Quality of CB was comparable to that of sawdust biochar. Lettuce seed germination was not suppressed at 0.5% rate of CB. The application of 1 and 2% CB reduced germination by 50 and 60%, respectively. The best performance of maize seedlings was at 1% CB application with fertilizers. Biochar application increased soil pH from 4.37 to 4.93 after one month of incubation. Results indicate coconut husk waste is suitable to produce biochar with moderate quality.

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