INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:
Assessment and alleviation of soil pollution through agro-ecotechnological interventions: role of areca nut husk biochar and vetiver grass

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SHORT ABSTRACT

Several anthropogenic activities have become the preeminent sources of contamination by heavy metals (HMs), and the resultant deterioration in soil quality. Thus, the present study attempts to address the issues of soil quality degradation and its management in an environmentally compatible manner. Further, it explores agro-ecotechnological measures to improve the soil quality utilizing locally available resources. In the present study, two contaminated areas were selected in Assam to assess soil quality impact on human health and identify suitable management options. To comprehend soil quality, different physico-chemical parameters, and estimation of HMs contamination were carried out using standard protocols. Results revealed that the soil quality in both areas were degraded by increasing HM concentrations and decreased levels of nutrients. Cadmium (Cd), and chromium (Cr) are the two crucial HMs which posed severe ecological and health risk to the surrounding areas. Thus, in the quest for indigenous solutions, the present study has attempted to prepare and characterize biochar (BC) from locally available crop refuse, i.e., areca nut husk (AH). Areca nut husk biochar (AHB) prepared at a lower temperature (250° C), has intermediate stability in soil and higher soil agronomic properties, rendering it ideal for mass production as a soil amendment. The present study also explored the potential of AHB to remediate HMs contaminated soils in conjunction with vetiver grass (*Chrysopogon zizanioides* L.), which is well known for its various environment friendly characteristics. Results showed that AHB, along with the vetiver, has an additive effect, which includes remediation of Cd and Cr, enhanced mycorrhizal growth, and glomalin production, along with nutrient enrichment. The results demonstrated that AHB at a dose of 15 t ha^{-1} was most suitable for soil rejuvenation, improving soil physico-chemical, and biochemical properties.