Spoil characteristics under five years old native woody plantations and unplanted dump in dry tropical environment, India

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Abstract: Present study was conducted to investigate spoil characteristics under 5-yr old high-density plantations of three native trees (Albizia lebbeck A. procera and Tectona grandis) and one fast growing woody grass (Dendrocalamus strictus) species on coal mine spoils and same age unplanted mine spoil dump at the same area. We examined physical characters such as soil bulk density, water holding capacity, soil texture (sand, clay and silt) and chemical characters such as pH, total nutrients (C, N and P) and exchangeable cations (Ca, Mg, K and Na) in chronosequence of spoil depth (0-50 cm) at 10 cm interval under plantations and unplanted dump. A significant effect of plantations on physico-chemical characteristics (except soil bulk density) of mine spoils was found. Among species, A. lebbeck exhibited substantial improvement in mine spoil soils followed by D. strictus, A. procera and T. grandis plantation. Although chemical characteristics especially total concentrations of soil C, N and P and their ratios were significantly different due to species and spoil depth, plantations of all species studied had ability to improve soil chemical qualities at young stage of establishment. Compared to unplanted dump, plantation of A. lebbeck showed highest concentrations of total nutrients (C, N and P) and exchangeable cations with respect to spoil depth followed by D. strictus, A. procera and T. grandis, which confirms that some species have suitable qualities for the modification of spoil characteristics during rehabilitation process.

Keywords: Albizia lebbeck; Albizia procera; Dendrocalamus strictus; Tectona grandis; unplanted dump; Mine spoil.