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Recovery of a soil degraded by deep excavation using plantation of tree species and a cellulose by-product as amendment

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Organic by-products obtained from the cellulose industry have been used as costs effective fertilizers in agricultural and forest soils and also as amendments for recovery of abandoned land. The construction of a power plant in the Paraná River (Brazil) motivates the deep excavation of a soil profile under native forest. Once exposed, the saprolite beneath the natural soil was abandoned, without any reclamation measure. The land left after engineering works was a harsh environment, where secondary vegetation hardly or not at all recovered. The objective of this study was to tests the efficiency of recycling a composted product obtained from cellulose waste to reclaim the abandoned saprolite material. A field trial was carried out following a classical split-split plot experimental design. In this design plantations plantations of *Eucalyptus urograndis* (a hybrid Eucalyptus species, considered here as exotic) and *Mabea fistulifera* (a native species) were the main plots. Within each main plot, subplots were six fertilizer treatments including an external control treatment, without any intervention, a control treatment, without fertilization, a mineral fertilizer treatment and three treatments amended with compost from cellulose applied at the rates of 10, 15 and 20 Mg ha^{-1}. There were four replications per treatment. The recovery of the soil profile under the different treatments studied was assessed by indices obtained from analysis of soil physical and chemical properties. Variables such as tree species development, litter and plant debris fall, return of nutrients from vegetation to soil and epigeal fauna were also characterized. Increasing dose of amendment with cellulose by-product showed a trend to improve water infiltration and soil resistance to penetration. Treatment with 20 Mg $ha^{-1}$of cellulose compost showed the highest nutrient availability, but also exhibited an important increase in soil pH. The greatest development of planted trees was recorded in the treatment with mineral fertilization, whereas a dose of 10 Mg ha^{-1} of amendment by cellulose by-product was the most promising for tree growth. Return of litter, plant debris and nutrients to the soil and epigeal fauna increased with increasing as the dose of the cellulose by-product increased.