



## **Optimization of organic substrates of forest and urban wastes for the restoration of degraded lands**

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The revaluation of waste as soil amendment fertilizers in the restoration of land improves environmental quality. This practice also represents an opportunity to promote economic activity in depressed areas. However, logistical aspects and those derived from technology limit the conditioning of waste so that they can be used in soils.

The project focuses on waste from the forestry industry, mainly biomass ash, and sludge from water treatment from forest industries and small population centers. These residues were subjected to different types of conditioning. Different formulations were optimized to obtain quality substrates for use in degraded lands. Three plots will be established: a) quarry in the process of restoration, b) marginal agricultural land abandoned and c) soil degraded by fire. In each of these three cases, a monitoring area was established, with a small area (1000-2000 m<sup>2</sup>). The technosol applications varied between 5 and 50 L m<sup>2</sup> (2-20 cm thick). The experimental design followed a random block design, with three repetitions per treatment. In each case, herbaceous species and / or forest species were established.

Analysis of macronutrients, total heavy metals, organic compounds (BTEX + S, HAP, total hydrocarbons, etc), levels of microorganisms (Salmonella, E. coli), toxicity tests, with seeds were analyzed. Additionally, the quality of the organic matter was evaluated using C13 CPMAS NMR and infrared (FT-IR), as well as with novel calorimetry techniques (DSC-TG).