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Potential of Rosemary crop in a recovery system of sulfide-rich wastes with designed Technosol

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Nowadays, the strategy for the rehabilitation of contaminated areas must include environmental improvements in an integral way, i.e. all the components of the ecosystem (soil, water and vegetation), and an economic approach. This can be achieved with the combined application of designed Technosols, which are done with organic/inorganic residues without an economic value or valorisation, and an agriculture system with tolerant plants with commercial value. The objective of this study was to evaluate the potential of rosemary crop (*Rosmarinus officinalis*), a plant species with aromatic and medicinal plant, in a recovery system of sulfide-rich wastes based on the superficial application of Technosols (layer with 20 cm of depth). For this, a mesocosm assay under controlled conditions and greenhouse was carried out during 18 months. The transplant survival and development of rosemary and its ecophysiological status was evaluated as well as the chemical characteristics of the Technosol and mine wastes located under it. Value-added compounds in bioextracts obtained from plants also were evaluated.

The rosemary transplant had 100 % of survival in the Technosol and a great plant growth at medium-long term (18 months) was achieved (Height: 35-57 cm; Fresh biomass of shoots: 76.1-93.8 g). In fact, the plant development was significantly higher than in plants growing in peat under the same conditions (Height <36 cm; Fresh biomass of shoots: 24.1-40.9 g). The roots system in plants growing in the Technosol was dense and with significant growth reaching the mine wastes. This mine wastes already presented a chemical improvement as result of the superficial Technosol application. Plants from Technosol did not show visible signs of phytotoxicity or nutritional deficiency and elements concentrations in shoots were in normal range considered to general of plants species. The Technosol maintained the initial properties and characteristics. The rehabilitation system with a designed Technosol was efficient and can contribute to the recovery, economically attractive, of unproductive and contaminated areas through a rosemary crop.

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