

Carbon availability and density of prokaryotes in soils with different proportions of mining tailings and legume cultivation

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The organic carbon of the soil has been used as indicators of changes and soil quality. Specifically, the stock of microbial biomass are associated with the ecological functions of environments and are capable of reflect changes in land use. In this study we evaluated the total organic carbon concentration in soils containing different proportions of mining tailings from the rupture of the Fundão dam in Mariana / MG, with and without the cultivation of a leucaena (*Leucaena leucocephala*), and quantified the density of prokaryotes present. Sediments of this accident were added to the soil to obtain different concentrations forming the following treatments (T) 0%, 25%, 50%, 75% and 100% with five replicates each. Soil samples without legume cultivation at the same concentrations of the treatments were collected at the beginning of the experiment and after 8 months of legume cultivation. The samples in the legume treatments were collected from the rhizospheric region (10cm from the main trunk). For quantification of prokaryotes (bacteria and arches), the samples were weighed (0.5 g), sonicated three times in the amplitude of 110.7 μm for 60 s, and also centrifuged three times at 500 \times g speed for 5 min. The supernatant was collected, diluted 10x and filtered in a polycarbonate filter with 0.2 μm pore and then stained with DAPI for total microbial community quantification. Carbon was quantified by infrared sensor in a Total Organic Carbon Analyzer (SHIMADZU, model TOC-L A). The average density of prokaryotes found in non-plant rhizospheric soils ranged from $6.76 \pm 0.12 \times 10^8$ cells / g (T0%) to $2.89 \pm 0.62 \times 10^8$ cells / g (T100%). The densities of prokaryotes varied In the samples without the plant, after 8 months of leucine cultivation, from 17.9148×10^8 cells / g ± 0.6221 (T0%) 6.5931×10^8 cells / g ± 1.4814 (T100%). Carbon content in Leucena-free soils ranged from $17.10887133 \text{ g}^{-1} \pm 1.001498248$ (T0%) to $1.50913\text{g}^{-1} \pm 0.606922544$ (T100%), while in Leucena-containing soils the carbon concentration ranged from $22.21351151 \text{ g}^{-1} \pm 2.316872255$ (T0%) at $1.277587304 \text{ g}^{-1} \pm 2.3778181086$ (T100%). The results showed that the highest density of microorganisms were found in the lowest concentrations of

mining tailings and there was a higher relative carbon addition in the treatments containing only mining tailings with the legume. These variations in prokaryote density seem to be directly related to the availability of carbon in the soil when in the presence of the plant.

Key words: fertility, bacteria, mining waste

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