

Impact of Geoengineering on Soil Quality Bioindicators in the Córrego-Feijão Area, Brumadinho-MG

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In January 2019, a tragic disaster occurred in Brumadinho involving the rupture of the B1 dam, which contained tailings from the typical mining activities of the region. This event led to significant environmental, economic, and social consequences. The tailings covered almost 300 hectares of land, with over half of it being native vegetation. In 2020, an environmental recovery project was launched in the impacted area, with one of the objectives being the restoration of the Ferro-Carvão stream. This project reestablished the stream's path, recreating the original course using geoprocessing technologies. The stream channel was then reconstructed using geoengineering. To restore local biodiversity actions were taken, including monitoring soil microorganisms, which are vital for the function and the provision of ecosystemic services. Thus, the goal of this study was to assess the soil microbiota closest to the stream margins, and consequently more vulnerable to the alterations that were made. It was found that this area was more impacted than the soil farther away from the stream (but still within the affected area). The microbial activity was evaluated through Basal Soil Respiration (BSR) (Jenkinson and Powlson, 1976, Alef and Nannipieri, 1995), Microbial Biomass Carbon (MBC) (Tedesco, 1995), and metabolic quotient (qCO₂) (Anderson and Domsch, 1993) in 24 samples collected from the region affected by the tailings. Six transects were marked (3 on each side of the stream channel), each with three sampling points: one close to the margin, one intermediate, and one farther away. Two reference points were also sampled, in an area nearby but not affected by the disaster, with three points collected for each side of the stream. Multivariate analyses were conducted using the R software. The results indicated that points closest to the stream margins exhibited lower MBC, BSR, and qCO₂ performance when compared to the points farther away from the geoengineering intervention. This suggests that the alterations made impacted the soil microbiota negatively. Furthermore, when compared with values found in the reference area, the results were not divided by points (closer or farther from the stream margin), but rather by their relative position to the flow of the water body (upstream and downstream). The results suggest that the engineering possibly had a greater impact on the points closest to the margins, requiring greater attention and specific corrective measures for these areas, and a relatively longer time for the recovery of the microbiota and its ecosystemic services.

Key words: Tailings; Microbial Carbon Biomass; Basal Soil Respiration; Soil quality

Impacto da geoengenharia em bioindicadores de qualidade do solo na área do Córrego-Feijão, Brumadinho - MG.

O presente estudo teve como objetivo analisar o impacto da geoengenharia no solo próximo ao Córrego-Feijão, em Brumadinho, após a área ter sido impactada pelo rompimento da barragem B1 em 2019. Foi realizado a análise da Respiração Basal do Solo, Carbono da Biomassa Microbiana e o quociente metabólico de 16 amostras ao longo do corpo hídrico. Observou-se que, de fato, a performance das amostras mais próximas ao córrego foi pior quando comparada a amostras coletadas mais distantes. Estudos futuros são necessários para melhor compreender o impacto da geoengenharia na microbiota do solo.

Palavras-chave: Rejeito; Carbono da Biomassa Microbiana; Respiração Basal do Solo; Qualidade do solo.

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