464. The effect of calcium concentration on culture medium for the production of biosandstones

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Microbial induced calcium carbonate ($CaCO_3$) precipitation (MICCP) is a promising technique for the production of building materials with lower environmental impact than traditional building materials. Sand cementation through microbial activity is a process that uses a microbial agent and nutritive medium as a source of calcium that enables the production of $CaCO_3$, which is used as an agglomerating factor for sand grains forming biosandstones. The present study proposes the formation of biosandstones using a filamentous fungus, *Penicillium brevicompactum*, as a microbial agent to carry out this process and to analyze the effect of calcium concentration in the nutrient media on the compressive strength and density. Biosandstones samples were produced using a *P. brevicompactum* spore's suspension, manually mixed with sand and nutrient medium with four concentrations of 20, 40, 60 and 80 mM of calcium lactate ($C_6H_{10}CaO_6$). The mixtures were placed in cylindrical molds with a diameter of 50 mm and height of 100 mm and six samples were produced for each experimental condition. The samples were weighed and measured to determine their densities and submitted to an unconfined compressive strength test after a 14-day treatment period. All medium used enabled the formation of biosandstones. Compressive strengths average showed values between 26 kPa to 325 kPa with a maximum coefficient of variation of 12% and densities ranged from 1.43 g/cm^3 to 1.65 g/cm^3 and a maximum coefficient of variation of 1.8%. The increase in calcium concentration enabled the production of sandstones with greater compressive strength and as expected, density. Nonetheless, the compressive strength results of the samples produced using the media with a concentration of 60mM and 80 mM did not show statistically significant differences, as the density of the samples that used medium with a concentration of 80 mM were higher than those produced with a concentration of 60 mM of $C_6H_{10}CaO_6$. Thus, it can be demanded that the increased availability of calcium in nutrient medium enabled greater bioprecipitation of $CaCO_3$ by the action of *P. brevicompactum*. Results showed the viability of using fungi for the production of building materials with lower environmental impacts than those used currently.