



Effect of the application of SiO₂-based consolidant enriched with TiO₂ and Ag on the granite susceptibility to biocolonisation

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The aim of the present study was assessing the bioreceptivity of granite samples treated with different consolidation treatments. The bioreceptivity of untreated stones (control) was compared with that observed after application of a SiO₂-based consolidant, the same consolidant enriched with silver, with titanium dioxide and enriched with both products. Control and consolidated samples were inoculated with a multi-species phototrophic culture and subjected to standardized growth conditions. The colonization was monitored by using two complementary techniques: chlorophyll fluorescence and colour measurements. Twenty three days after inoculation, only the untreated samples showed biofilm growth. After a reinoculation, greater growth was observed on untreated samples than on treated samples for the first month, but no significant differences were found, in terms of F0 (minimal fluorescence of dark-adapted cells), between treated and untreated samples three months after inoculation. However, throughout the experiment, significant differences were found in the photosynthetic yield (Fv/F0) of the samples treated with consolidant enriched with both Ag and TiO₂ compared to the samples treated with the pure consolidant and untreated samples. Moreover, assessment of the total colour variations showed differences between the control and the different treatments in terms of a* (greenness-redness variation). Thus, during the first weeks, control samples showed a greener colour than treated samples. This trend began to change after one month of incubation and at the end of the experiment we found significant differences between the control and the rest of the treatments, showing the first one a redder color. These results point to an effect of the SiO₂-based consolidant on the susceptibility to biocolonisation of granite related with its hydrophobicity more than with the addition of TiO₂ and Ag. However, the addition of both products seems to affect the physiological state of the biofilm.