THE IMPACT OF FINE SEDIMENTS AND HEAVY-METALS FROM A MINING MAJOR DAM DISASTER ON RHODOLITH FORMING ALGAE.

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FIGUEIREDO; Marcia Abreu de Oliveira [1], TÂMEGA; Frederico Tapajós de Souza [2], REYNIER; Marcia [3], COSTA; Rafaela [4], COUTINHO; Ricardo [5]

RESUMO

The rhodolith calcareous algae form major coastal habitats seeking protection based on threats, sensitivity and ecological significance worldwide. At the shallow turbid waters they are stressed and may not survive metals and biocides adsorbed by fine estuarine sediments. In this work, the sensitivity and resilience of rhodoliths were tested simulating the effect of metals from the mining dam disaster at Rio Doce, southeastern Brazil. The simulated impact was produced smothering rhodolith samples to combined amounts of contaminated estuarine mud and coarse carbonate sand and sensitivity and resilience were measured after a short-term exposure. Six rhodolith samples were placed upon sediments in each culture-dish (1L) with filtered seawater. Different amounts of the contaminated mud (0, 1, 5, 10ml) were added in each dish over the substratum (100ml) of natural coarse sand. Treatments and controls were replicated (n=4). Metals in rhodolith and sediment samples were analyzed by field-portable x-ray fluorescence. The photosynthetic responses expressed rhodolith sensitivity and resilience. Oxygen and fluorescence readings were measured. Nutrient metals (Fe, Mn) and toxic metals (Al, As, Cr) were up to two-fold high in the impacted sediments from Espirito Santo than back-ground area of Rio de Janeiro. Overall, rhodolith thallus concentrated extreme low levels of toxic metals under mud or coarse sands. Nutrient metals are important for their metabolic functions, but it remains unknown which Fe levels limit these calcareous algae photosynthesis and respiration. Significant differences among treatments were found for oxygen and fluorescence in early readings. Fv/Fm were 0.387–0.540 under controls and drastically reduced to 0.191–0.261 at 5–10ml of toxic mud exposure. Fully recovered fluorescence was achieved by rhodolith in 60 days after removing mud. The chemical stress on rhodolith by smothering sediments was harmful but not lethal once the impact ceased.

PALAVRAS-CHAVE: Rhodoliths, toxic mud, resilience

[1] Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, marcia.aofigueiredo@gmail.com
[2] PósDOC CNPq/BIOTECMAR/IEAPM, fredtamega@gmail.com
[3] Laboratório de Toxicologia, LABTOX, Rio de Janeiro , marciavreynier@gmail.com
[4] Laboratório de Toxicologia, LABTOX, Rio de Janeiro , rafaela.costa.bio@live.com
[5] Departamento de Biotecnologia Marinha - BIOTECMAR/IEAPM, rcoutinhosa@yahoo.com.br

[1] Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, marcia.aofigueiredo@gmail.com
[2] PósDOC CNPq/BIOTECMAR/IEAPM, fredtamega@gmail.com
[3] Laboratório de Toxicologia, LABTOX, Rio de Janeiro , marciavreynier@gmail.com
[4] Laboratório de Toxicologia, LABTOX, Rio de Janeiro , rafaela.costa.bio@live.com
[5] Departamento de Biotecnologia Marinha - BIOTECMAR/IEAPM, rcoutinhosa@yahoo.com.br