STUDIO DI PRODOTTI NATURALI PER LA DEVITALIZZAZIONE DEI LICHENI INCROSTANTI SULLE PAVIMENTAZIONI IN *OPUS SECTILE* IN UN CONTESTO ARCHEOLOGICO

MATTIA PASCARELLA[1], VERONICA FONDI[2], FEDERICA ANTONELLI[3]

([1]) Accademia di Belle Arti L'Aquila, Via Leonardo da Vinci, snc, 67100 L'Aquila (AQ); m.pascarellarestauro@gmail.com,

([2]) Ministero della Cultura, Istituto Villa Adriana e Villa d'Este, Piazza Trento, 5, 00019 Tivoli (RM); veronica.fondi@cultura.gov.it

([3]) Bio.Co.Ré. lab, via reatina 10, 67068 Scurcola Marsicana (AQ); fedantonelli@gmail.com

Abstract.
Monuments and artifacts located in archaeological areas are often subject to biological degradation representing a serious problem for their conservation not only because of obvious aesthetic damage but also for chemical alterations and physical damages. To devitalize and remove biodeteriogens colonizing stone materials exposed outdoors, commonly chemical biocides are used. Despite enabling high levels of surface disinfection, biocides are often characterized by a medium or high level of environmental toxicity. The present study analyzed the possibility that natural products could represent a viable alternative to chemicals. The tests were carried out to set a restoration procedure for the *opus sectile* floors of the Nymphaeum with Temple of Venus in Hadrian's Villa in Tivoli (Rome). The pavements' readability was largely impaired by a significant biological attack represented by lichens (93%), mosses (6%) and microorganism patinas (1%). The study compared the chemical biocide Preventol RI 50, widely used for disinfecting biological patinas, and two green products based on essential oils, Biotersus and Essenzio. Two application methodologies of these products were investigated: poulticing and brushing.
The biocidal efficacy of the tested products and the cleaning effect were evaluated by noninvasive investigations: evaluation of chlorophyll autoflorescence of lichen thalli observed by UV transmitted light microscope; microbiological analyses; biochemical quantification of ATP and colorimetric measurements. Furthermore, cost analysis was carried out to evaluate the differences in treating the *opus sectile* floor with the natural products applied by poultice or by brush.
The obtained results showed that the most effective way to treat the biodeteriogens on the pavement was by Essenzio applied by poultice.

Keywords: *green restoration, biodeterioration, essential oil-based products, lichens, efficacy test*