3.6 Biocide testing programme for control of lichens on archeological monuments at World Heritage sites in Sri Lanka

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ABSTRACT

Cultural monuments in the world heritage sites in Sri Lanka have suffered many disfigurements over the centuries due to a variety of threats. The main threats are the biological agents such as higher plants, bryophytes, algae, fungi and lichens. Lichen is a symbiotic association of a fungus with an alga that appears to be a single plant. These lichens attached firmly to the surfaces of monuments and as they grow and spread progressively weaken the surface making disfigurement of monuments.

This study focused on finding the safe and best effective treatment which can remove and control all the different types of lichens growing on stone monuments at Sigiriya and Anuradapura. The two acceptable methods for the removal of lichens from the archeological monuments are the physical removal and the chemical treatment for eradication. The application of biocide chemicals for the complete eradication of lichens have been considered as the most effective method than physical removal which allows remaining microscopic propagules eventually colonize monument surface making more denser cover than the previous colonization.

Therefore, seven commercially available biocides; "Captan, Mancozeb, Folicur, Hadonal D, Paraquat, Mergal S 89 and No More Mould" were tested on the stone monuments in three different locations at Sigiriya and one location at "Abayagiriya Monastry", Anuradapura. To begin treatments, the lichen inhabiting surface areas of 100cm^2 quadrates were marked on the stone monuments. Then randomly selected five quadrates in each location were assigned to each of the biocide treatment. The manufacturers recommended concentrations of the biocides were spayed at the rate of 0.03ml/cm^2 onto the lichens inhabiting surface area of the assigned quadrates using hand operated sprayers. The observations were recorded every three months intervals during the 18 months period.

Data were analyzed statistically using two-way ANOVA. The treatments showed highly significant effects on lichen control ($p< 0.001$). Further the Tukey's multiple comparison tests concluded that the product "No more mould" has highly significant positive control effect on the eradication of lichens in the treated areas. This product is an effective biocide recommended for the eradication of both partners (the fungi and algae) of the symbiotic association of lichens. Also, the treatment showed some kind of sealer effect to retard re-colonization of lichens and other growth forms for a minimum of one year period on the treated quadrates of the stone monuments.