Insecticidal and Repellent Efficacy of Clove and Lemongrass Oils Against Museum Pest, Lepisma Saccharina (Zygentoma: Lepismatidae)

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Abstract : India is a tropical country, and it is estimated that biological and abiological agents are the major factors in the destruction and deterioration of archival materials like herbarium, paper, cellulose, bookbinding, etc. Silverfish, German Cockroaches, Termites, Booklice, Tobacco beetle and Carpet beetles are the common insect's pests in the museum, which causes deterioration to collections of museum specimens. Among them, silverfish is one of the most notorious pests and primarily responsible for the deterioration of Archival materials. So far, the investigation has been carried to overcome this existing problem as different management strategies such as chemical insecticides, fungicides, herbicides, nematicides, etc., have been applied. Moreover, Synthetic molecules lead to affect the ecological balance, have a detrimental effects on human health, reduce the beneficial microbial flora and fauna, etc. With a view, numbers of chemicals have been banned and advised not to be used due to their long-lasting persistency in soil ecosystem, water and carcinogenic. That’s why the authors used natural products with biocidal activity, cost-effective and eco-friendly approaches. In this study, various concentrations (30, 60 and 90 ml/L) of clove and lemongrass essential oil at different treatment duration (30, 60, 90 and 120-minutes) were investigated to test its properties as a silverfish repellent and insecticidal effect. The result of two ways ANOVA revealed that the mortality was significantly influenced by oil concentration, treatment duration and interaction between two independent factors was also found significant. The mortality rate increased with increasing the oil concentration in clove oil, and 100 % mortality was recorded in 0.9 ml at 120-minute. It was also observed that the treatment duration has the highest effect on the mortality rate of silverfish. The clove oil had the greatest effect on the silverfish in comparison to lemongrass. While in the case of percentage, repellency of adult silverfish was oil concentration and treatment duration-dependent, i.e., increase in concentration and treatment duration resulted in higher repellency percentage. The clove oil was found more effective, showing maximum repellency of 80.00% at 0.9ml/cm2 (highest) concentration, and in lemongrass highest repellency was observed at 33.4% at 0.9 ml/cm2 concentration in the treated area.

Keywords : adult silverfish, oils, oil concentration, treatment duration, mortality (%) and repellency
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