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Eco-Friendly Candidate for Storage-Pest Management: Potential of *Olax zeylanica* Leaves in the Suppression of *Sitophilus oryzae* L. Infestations

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Abstract

Globally, significant losses of rice occur during post harvest storage due to rice weevil *Sitophilus oryzae* attack, which is considered the major insect pest of stored rice, in spite of growth of paddy production. In this investigation, repellent potential of leaf powder, solvent extracts and essential oil together with toxic activities of the latter were evaluated using *Olax zeylanica* (Mella) leaves as the need for developing green alternative approaches to synthetic insecticides against *S. oryzae* infestations is becoming ever so important. Efficacy of all plant products was determined by exposing one week old *S. oryzae* adults to leaf products, using un-infested white raw rice as the medium. Repellent effect of leaf powders was evaluated within an hour of exposure using a contact-repellency chamber by admixing powders with rice grains at 5 doses (3.33%, 10%, 16.67% and 23.33% w/w). Repellency of leaf extracts (extracted in methanol, ethyl acetate, hexane and water) were investigated at 10%, 50% and 100% (v/v) whereas the repellency of essential oil was assessed at same concentrations using area-preference method and all the observations were recorded after 30 minutes. Screening of essential oil in search of its contact and fumigation toxic impact was carried out and observations were taken 30 and 60 minutes after exposure. All tested plant products elicited significantly very high efficacy in *S. oryzae* when compared with the controls (0.00%). Leaf powder of *O. zeylanica* evoked 100% repellency at the highest dose (23.33% w/w) and the repellent rate increased with the increase in dose. In repellency assays using leaf extracts, methanol extract was found to be the most effective (96%) causing mortality in the weevils, followed by ethyl acetate (95%) and hexane (89%) whereas the aqueous extract was least effective (70%) indicating the lowest level of mortality. It was revealed that repellency rates among different leaf extracts were significantly similar with the exception of aqueous extract which elicited the lowest repellency in *S. oryzae*. Furthermore, three concentrations of the essential oil evoked extremely high responses in the weevils (94%, 99%, and 100% respectively) within 30 minutes. Both contact and fumigant toxicity assays with the essential oil were dose dependent and 100% adult mortalities were observed at the highest concentration after one hour of exposure. The overall results of the present study imply that *O. zeylanica* leaves could be utilized as a very successful candidate in the development of bio-insecticides in controlling *S. oryzae* infestations.

Keywords: *Olax zeylanica*, *Sitophilus oryzae*, Essential oil, Repellency, Toxicity