

(111)

Green Technology for Post-Harvest Pest Management: Potential of Three Citrus species as Natural Grain Protectants against Pulse Beetle, *Callosobruchus maculatus* (Fab.) [Coleoptera, Bruchidae]

Harshani H.S.* , Karunaratne M.M.S.C.

Department of Zoology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
**shanikaharshani98@gmail.com*

Abstract

Plant materials with insecticidal properties provide small-scale farmers with a locally available, ecofriendly and economical method of storage pest control. They are also touted as an excellent green alternative for synthetic insecticides. As a number of Citrus species have been identified as potential agents in controlling stored grain pests, the present study was planned to evaluate the effectiveness of fruit peel of three locally available Citrus species, *Citrus hystrix*, *C. nobilis* and *C. medica* in controlling cowpea bruchid, *Callosobruchus maculatus*, considered to be a notorious pest of economically important legume crops including cowpea, *Vigna unguiculata*. The three Citrus species were bio-assayed to evaluate their effect on oviposition, egg hatchability and adult emergence of *C. maculatus* under ambient laboratory conditions ($28\pm 2^\circ$ C and $84\pm 2\%$ RH). Oviposition deterrent effect was assessed by allowing two newly emerged females and males to oviposit on cowpea seeds treated with finely grated fruit peel (0.1, 0.2, 0.4 g/30 seeds), and the number of eggs laid were counted after 24 hours. Three doses (0.1, 0.2, 0.4 g) of grated peel were mixed with cowpea seeds to evaluate the effect of the Citrus species on egg hatchability and the total number of hatched eggs were counted after 7 days. The effect on F1 progeny emergence was assessed by introducing two males and females to treated cowpea seeds (0.1, 0.2, 0.4/30 seeds). After 24 hours, the number of eggs laid were counted. Daily observations were made and number of adults emerged were recorded. Each bio-assay was replicated 20 times. A dose dependent increase in oviposition deterrent effect was observed with all doses of the three Citrus species when compared to that of the control. Among the three plants tested, the highest deterrence in females was observed with the highest dose (0.4 g) of *C. hystrix* (2.80 ± 1.06) which was significantly much lower than the other two species and the control. *C. hystrix* (1.35 ± 0.67) exhibited the highest effect on egg hatchability when compared with the control (32.25 ± 2.83). A significant difference in adult emergence ($p<0.05$) was observed with all doses when compared with the control and the highest reduction (1.00 ± 0.80) was recorded with *C. hystrix* at the highest dose (0.4 g). The promising results obtained from the study suggest great potential of utilizing all three Citrus species, particularly *C. hystrix* as storage grain protectants to suppress *C. maculatus* populations effectively at farm-level.

Keywords: *Callosobruchus maculatus*, *Citrus hystrix*, *Citrus nobilis*, *Citrus medica*, Oviposition