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Efficacy of Leaf Extract of *Citrus aurantifolia* (Christm) against Pulse Beetle *Callosobruchus chinensis*(L.) on Green Gram Seeds

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The pulse beetle *Callosobruchus chinensis* is the major pest of pulses in storages. In order to reduce the usage of synthetic chemicals, the biodegradable plant products have gained attention as a substitute to chemicals. Citrus leaves, peel powder and peel oil found to be effective protectants against stored product pests. The effectiveness of plant extract may vary according to the solvent which was used for extract preparation. Therefore the present study was undertaken to evaluate the effect of different solvent extracts such as acetone, diethyl ether, ethanol and aqueous leaf extract of *Citrus aurantifolia* on the oviposition and adult emergence of pulse beetle *C. chinensis* on green gram seeds.

Air-dried leaf powder of *C. aurantifolia* was extracted with acetone (2:10 w/v) by cold extraction. Solvent was removed and resultant residue was used to prepare 5 concentrations (0.5, 0.9, 1.3, 1.7 and 2.1 mg/ml) of extract. Likewise diethyl ether, ethanol and aqueous leaf extracts were prepared. Five grams of pest free green gram seeds were treated with five concentrations of extracts and were tested along with the solvent and untreated controls against one day old 5 pairs (5 female and 5 male) of *C. chinensis*. After 7 days of exposure all dead and alive insects were removed and number of eggs laid and adult emergence counted. Five replicates were carried out under laboratory conditions at 28-31 $^{\circ}$ C and 70-75 RH and 12:12 L:D photoperiod. Data were analyzed by using ANOVA, t-test and LSD.

Result showed that the higher concentrations 1.7 and 2.1 mg/ml of all extracts showed significant ($P<0.05$) reduction in oviposition and adult emergence than the controls. From the LSD test at 2.1 mg/ml all solvent extracts showed equal effect on oviposition but significantly lesser number of adults emerged on green gram treated with acetone leaf extract than the ethanol, aqueous and diethyl ether extracts. At 2.1 mg/ml, 7%, 33%, 35% and 46% of adult emergence were observed on green gram treated with acetone, ethanol, aqueous and diethyl ether leaf extract respectively while solvent controls and untreated showed over 50 % adult emergence.

From this study it was concluded that acetone, ethanol and aqueous leaf extracts of *C.aurantifolia* at high concentration (2.1 mg/ml) showed reduction in oviposition and adult emergence (<36%) and can be used to control the pulse beetle in green gram storages.