

Preliminary studies on pest status and insecticide resistance of *Sitophilus oryzae* (Coleoptera: Curculionidae) in grain rice of Sri Lanka

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It is estimated that more than 6% of the harvested paddy is lost due to the damages caused by stored grain pests. Among the various stored grain pests, the rice weevil, *Sitophilus oryzae* (L) is considered as a serious pest of rough and milled rice. At present, insecticides are being used extensively for the control of this pest. This is in spite of the adverse health and the impending insecticide-resistant strains of the pest. Very few reports are available on the insecticide resistance status of this insect. The objectives of this study were to determine the pest status in different rice types stored commonly in warehouses and the status of insecticide resistance in the field and warehouse populations of *S. oryzae* in Sri Lanka. Six weevil samples were used in this study, three CWE warehouse samples that have been frequently exposed to insecticides and the three farmer collected samples that have never been exposed to insecticides. Life cycle of the pest was studied using white rice. Four types of rice available in the market namely- red, white, nadu and samba were screened for their relative resistance. The length of the life cycle was 22 days under temperature 31 ± 2 °C and $76 \pm 4\%$ relative humidity. Embryo developed within the egg 3-4 days. The total duration of the larval stages was 13 days and the length of the larvae ranges from 1-3 mm. Larvae pupate within the kernel and adults emerged from the pupae in 4 days. The length of pupae and adult were $3.2 (\pm 0.013)$ mm and $3.5 (\pm 0.83)$ mm respectively. Nadu (par boiled rice) had the lowest index (6.48) of susceptibility. All four types of rice collected from the market reported ~14 % moisture which is considered to be more than the value recommended for the storage. LC_{50} levels, determined by the Probit analysis, for pirimiphos-methyl 500 g/l EC and permethrin 25 % g/kg WP to farmer collected (Galgamuwa) sample were respectively, $3.95 \times 10^{-3} \mu\text{g}/\text{m}^2$ and $2.24 \mu\text{g}/\text{m}^2$. The respective LC_{50} values to warehouse sample (Malligawatta) were $1.9 \times 10^{-1} \mu\text{g}/\text{m}^2$ and $1.34 \times 10^2 \mu\text{g}/\text{m}^2$. The LC_{50} values of the tested insecticides were significantly different ($P > 0.05$) in two samples, with higher insecticide resistance in the insects collected from warehouses than those collected from farmers. The Polyacrylamide Gel Electrophoresis (PAGE) analysis with high intensity α & β naphthyl acetate bands further suggested that warehouse samples have developed resistance to organophosphate as compared to field collected samples. Further studies are necessary to identify the underline insecticide resistance mechanisms responsible for these changes.

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