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EVALUATION OF BOTANICAL LARVICIDES FOR MANAGING *Cnaphalocrocis medinalis* INFESTATIONS IN RICE FIELDS

A. S. S. Jahan[a*], V. Sujarajini[a], M. H. Haroon[b] and A. L. M. Fairoje[b]

[a]*Department of Biological Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.*
[b]*Department of Chemical Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.*

[*]*samroothsaleem@gmail.com*

Abstract

One of the greatest pests of rice in Asia is the rice leaf folder (*Cnaphalocrocis medinalis*) whose control with synthetic insecticides has led to environmental pollution, resistance, and damage to non-target species hence the importance of developing environmentally friendly alternatives. This study evaluated the larvicidal potential of ten plant extracts against *C. medinalis* under laboratory conditions. The shade-dried fresh leaves of the chosen medicinal plants were ground into a fine powder and extracted using methanol (25 g/250 mL) at 350 rpm in 48 hours. Filtrates were concentrated to 40°C using a rotary evaporator and stored at 4°C to be used further. The extracts were assayed in five different concentrations (10-150mg/mL) on fourth-instar larvae of *Cnaphalocrocis medinalis*. The repetition was done five times on each treatment (100 mL solution + 10 ± 2 larvae) and mortality was observed after 24, 48, and 72 hrs. The corrected mortality was obtained through the Abbotts formula. The qualitative screening of methanol extracts was conducted in order to determine the key bioactive constituents by standard methods. The one-way ANOVA was used to confirm that the differences in larval mortality were highly significant in terms of the extracts at the 24 hours, 48 hours and 72 hours ($p < 0.001$). In the post-hoc test performed by Tukey at 72 hours, the Neem and Adathodai were significant while compared to the Henna and Avarai (mean differences = 5.0 and 3.6 respectively) caused dramatically lower deaths ($p < 0.001$). Probit analysis showed the trend of LC_{50}, LC_{90}, and LC_{99} being lowest in the case of Neem (25.8 µg/mL , 75.6 µg/mL ,120 µg/mL ,which also indicated that Neem was the most potent, and Henna had the highest value of LC_{50} (70.1 µg/mL) confirming its inferior potency. The Kaplan Meier survival analysis showed that although all the extracts caused mortality at 72 hours, Neem and Adathodai killed significantly faster ($p = 0.000$) in the range of 24-48 hours, though the value of Chi-square statistic ($p = 1.000$) did not show any significant difference in the overall survival time. The phytochemical composition showed that Neem, Adathodai and Pungai had more phenol, flavonoid and alkaloids level, which probably enhanced their insecticidal effect. These results indicate that both Neem and Adathodai, especially, provide potential, eco-friendly substitutes to synthetic insecticides in the control of *C. medinalis.* They should however be field-tested in order to determine their long-term effectiveness and capacity in taking over pest management schedules.

Keywords*:* *Botanical Extracts, Cnaphalocrocis medinalis, Larval Mortality, Probit Analysis, Sustainable Pest Management*