

## Influence of volatiles from brinjal host on the attraction of brinjal fruit and shoot borer- *Leucinodes orbonalis* Guenee

M S F Nusra<sup>1,2</sup>, P A Paranagama<sup>2</sup>, L D Amarasinghe<sup>3</sup> and D N Udukala<sup>1\*</sup>

<sup>1</sup>College of Chemical Sciences, Institute of Chemistry Ceylon, Rajagiriya, Sri Lanka

<sup>2</sup>Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka

<sup>3</sup>Department of Zoology and Environmental Management, University of Kelaniya, Sri Lanka

\*Email: dinusha@icchemc.edu.lk

Brinjal fruit and shoot borer, *Leucinodes orbonalis* Guenee, is a major pest on brinjal, *Solanum melongena* in South and South-East Asia. Larvae cause enormous damage to brinjal pods and shoots and the population management is normally done with frequent application of insecticides. The synergism between insect pheromones and plant volatiles can increase the attraction of insect pests, offering new strategies for the development of more effective and reliable pest control programs. Volatile mediated foraging behaviour in insect pests is important when they target host plants. We hypothesized that the volatiles of brinjal may be functionally more important in host-finding behavior of their insect pest. Samples of brinjal ("Lena iri" variety) plant leaves, fruits, shoots and flowers were collected from the unsprayed brinjal field. Steam distillation method was used to extract the volatiles from shade dried brinjal leaves, shoots, flowers and fresh fruits. The behavioral responses of *L. orbonalis* moths were tested using host plant volatiles. Gas chromatography (GC) coupled with mass spectrometry (MS) technique was used for the identification of volatiles extracted from host plant brinjal. The GC oven was programmed at an initial oven temperature of 40 °C, increased at a rate of 1 °C/min to 50 °C, then increased at a rate of 4 °C/min to 210 °C, and then raised at a rate of 8 °C/min to a final temperature of 230 °C. MS data of eluted compounds were acquired and compared with the retention times of authentic standards and with mass spectra from NIST library. Bioassay using a modified Y-shaped olfactometer revealed that one day old virgin females, mated gravid females and males positively responded (attracted) to the host plant volatiles extracted from fruits, leaves and shoots but not to the volatiles of flowers. Each assay was repeated using 5 batches of insects (R=5), consisting of 6 insects per batch (n=6). It was shown that the mated gravid females were significantly attracted to all three volatiles (P<0.05). A minimum dose of 0.2 µl and maximum dose of 12 µl of leaf volatiles attracted 11% and 83% of mated gravid females, respectively while shoot

volatiles attracted 22% and 78% of mated gravid females to a minimum dose of 0.02 µl and a maximum dose of 8 µl, respectively. Fruit volatiles attracted 17% and 79% of mated gravid females to a minimum dose of 0.02 µl and a maximum dose of 8 µl respectively. The Multiple-Choice bioassay using a modified X-shaped olfactometer (n=15, R=5) revealed that all three types of moths highly preferred the volatiles extracted from fruits and among the three categories of moths, mated gravid females were highly attracted to all three volatiles. It was also shown that the peak activity of the adults was observed during 20.00 – 24.00 hrs and the experiments were conducted during the observed peak hours. GC-MS analysis of plant volatiles concluded that the volatile compounds belonging to different classes of organic compounds: hydrocarbons, green leaf volatiles (aldehydes, esters), alcohols, fatty acids and other volatiles. Responses of adult moths to the volatiles from host plant in the absence of visual cues or pheromone signals show us to focus solely on the importance of host plant volatiles to locate the plant.

### Keywords

*Leucinodes orbonalis* Guenee, GC-MS, host plant volatiles, olfactometer, behavioral bioassay