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Volatiles from host plant brinjal attract the brinjal Fruit and Shoot Borer -*Leucinodes orbonalis* Guenee

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ABSTRACT

Brinjal Fruit and Shoot Borer- *Leucinodes orbonalis* Guenee is a major insect pest on brinjal- *Solanum melongena* worldwide. An effective strategy used in developing pest controlling agents is the synergism between insect pheromones and host plant volatiles, which can increase the attraction of insect pest. The present study was aimed at investigating the chemical constituents and attractant effects of the volatiles extracted from different parts of the host plant brinjal on the behavior of adult *L. orbonalis*. Bioassay using Y-shaped olfactometer revealed that the one-day old virgin female, gravid female and male insects respond positively to the host plant volatiles extracted from fruits, leaves and shoots but not to that of flowers. It was shown that the gravid females were significantly attracted to all three volatiles ($p < 0.05$). Bioassay using X-shaped olfactometer identified that all three types of insects highly preferred the volatiles from fruits ($p < 0.05$). Gas chromatography-mass spectrometry analysis of volatiles indicated that brinjal plant produces volatile secondary metabolites, which include 2,2'-(Ethane-1,2-diylbis(oxy))bis(ethane-2,1-diyl) dibenzoate (12.11%), 3,7-dimethylocta-1,6-dien-3-ol (22.38%), Benzyl alcohol (22.9%) and Benzyl alcohol (27.06%) as major constituents from fruits, shoots, leaves and flowers respectively. Responses of insects to the volatiles from host plant in the absence of visual cues direct us to focus on the importance of host plant volatiles to locate the plant. Results of this study emphasize the major role that host plant volatiles play in the attraction of insect pests towards the plant.

Introduction

Brinjal plant is an economically important plant grown in Sri Lanka and other Asian countries, especially in Bangladesh, China, India, Pakistan, Philippines and Thailand (Gunawardena et al., 1989; Kumar et al., 2006). China leads world's brinjal production followed by India (Patel et al., 2015). In Bangladesh, brinjal is the second most produced vegetable after potato while in Sri Lanka, it covers the second large extent after ash plantain (Ahmad et al., 2009; Performance Report, 2016). Brinjal is available throughout most of the year (Cork et al., 2001). Further, brinjal is a well-known vegetable rich in fiber, low in calories and provides a wide range of nutrients, minerals and multivitamins (Raigon et al., 2008; Plazas et al., 2014).

In recent years, production of brinjal is under imminent threat due to the increased management cost of insect pest Brinjal Fruit and Shoot Borer (BFSB), which is the key insect pest that attacks brinjal plant

(Mainali, 2014). Larvae of this pest cause the damage, which at initial stages adversely affect the shoot growth, and in later stages diminish fruit quality thus making it unfit for consumption (Alam and Sana, 1962). A study conducted in 12 districts of Sri Lanka by Sandanayake has shown that this insect pest causes a mean damage level of 52.5% for brinjal fruits (Gunawardena et al., 1989). At present, farmers are completely dependent on chemical insecticides to control this pest (Kumar et al., 2006). Insects like BFSB possessing extremely diverse adaptations such as hidden, protected lifestyles in adult stage and concealed habits in the larval stage cannot be easily controlled with cover sprays of insecticides (Nusra et al., 2020). Indiscriminate use of synthetic chemicals causes many unwarranted problems (Patel et al., 2015; Ahmad et al., 2009).

There are evidence to suggest that ecological interaction, especially odours between insect pests and their host, aids in the development of the most effective insect pest control strategies (Chidawanyika et al.,

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