

Deciphering the chemical cues underlying the oviposition behaviour of spotted bollworm, *Earias vittella* Fabricius in Okra

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Insect pests that attack plants generally exhibit a strong preference for specific phenological stages of their host plants for feeding and oviposition. In this study, we examined the influence of different phenological stages volatiles of okra (*Ablemoschus esculentus*), namely pre-flowering, flowering and fruiting, on the behaviour of the notorious pest, spotted bollworm (*Earias vittella* Fabricius). To understand the olfactory response of *E. vittella*, we utilized a Y-tube olfactometer, gas chromatography electroantennographic detection (GC-EAD) and gas chromatography-mass spectroscopy (GC-MS) techniques. Among the three host plant phenological stages, the volatile cues from the fruiting stage were significantly attractive to *E. vittella*. The specific chemical cues responsible for this attraction were identified using GC-EAD/GC-MS. The electrophysiological studies revealed a total of 14 chemical cues that elicited a clear antennal response in the gravid female moths of *E. vittella*. Further, detailed olfactometer bioassays with synthetic compounds revealed that four compounds elicited a significant attraction in gravid female moths and one elicited significant repulsion response. The study provides valuable insights into the host plant preference of *E. vittella* and identifies the underlying potent attractive chemicals for its future management strategies.

pests are attracted to these VOCs and use them as prime signals for recognizing their host. Particularly, the herbivores that attack specific phenological stages of the host plant may have co-evolved with VOCs of the host plant emitted at that particular stage to ensure progeny fitness by laying eggs on suitable oviposition site⁵⁻⁹. Generally, during the flowering stages, terpenes and other phenolic compounds are emitted as floral scent compounds to mainly attract the beneficial pollinators and natural enemies of the pests. Some crop pests are also attracted to flowering plants for nectar resources such as pollen beetle¹⁰. Finally, plants emit fruit-specific volatiles like esters, aldehydes and alcohol at the fruiting stage. Fruit-devouring pests are highly attracted to these cues as they signal about food and egg-laying sites. However, these VOCs can also act defensively by attracting natural enemies such as parasites and predators^{11,12}. Thus, olfactory cues specific to different phenological stages impact the preferences of herbivores while selecting their host plant. Several studies confirmed that stage-specific volatile emissions are unique among the host plants and elicit significant behavioural changes in herbivores. The pollen beetle, *Brassicogethes aeneus* (Fab.) exhibited a higher preference for the flowering stage of oilseed rape in comparison with the bud stage¹⁰. Also, the Guatemalan potato moth, *Tecia solanivora*