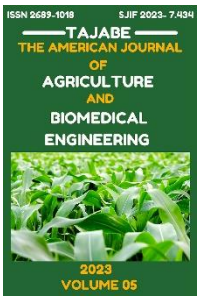
The American Journal of Agriculture and Biomedical Engineering
(ISSN – 2689-1018)
VOLUME 05 ISSUE 05 Pages: 8-11
SJIF IMPACT FACTOR (2020: 5. 34) (2021: 5. 554) (2022: 6. 291) (2023: 7. 434)
OCLC – 1121105746
Publisher: The USA Journals



Journal Website: https://theamericanjournals.com/index.php/tajabe

Research Article

ASSESSMENT OF HOST PLANT INFLUENCE ON LARVAL ECTOPARASITOID DIGLYPHUS ISAEA'S STINGING BEHAVIOR

Submission Date: May 14, 2023, **Accepted Date:** May 19, 2023,
Published Date: May 24, 2023 |
Crossref doi: https://doi.org/10.37547/tajabe/Volume05Issue05-03

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ABSTRACT

The parasitism efficiency of a parasitoid largely depends on its host location and stinging behaviour. This study aimed to assess the stinging behaviour of Diglyphus isaea larvae on some selected host plants. Three host plants, including tomato, eggplant, and pepper, were evaluated for their influence on D. isaea's stinging behaviour. The results showed that the stinging behaviour of D. isaea was significantly influenced by the host plant. The highest frequency of stinging behaviour was observed on tomato plants, followed by eggplant and pepper plants. The study provides insight into the host plant preference of D. isaea, which can be used to optimize its use in biological control programs.

KEYWORDS

Diglyphus isaea, host plant, stinging behaviour, parasitism efficiency, biological control

INTRODUCTION

Parasitoids are insects that lay their eggs on or in a host, with the hatching larvae subsequently feeding on the host. Diglyphus isaea is a well-known ectoparasitoid that attacks leaf-mining larvae of various plant species. The parasitoid's stinging behavior plays a crucial role in host location, selection, and ultimately, the parasitism efficiency. Host plant selection is a complex process involving both innate and learned behavior of parasitoids. Studies have shown that the presence of a host plant can affect parasitoids' foraging behavior and reproductive success. Therefore, understanding how host plants affect the behavior of D. isaea larvae can provide insight into optimizing the parasitoid's use in biological control programs. The larval ectoparasitoid Diglyphus isaea is known to parasitize several economically

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important agricultural pests, making it an important biological control agent. The host plant on which the target pest feeds is known to affect its behavior and biology, but little is known about how the host plant may influence the behavior of its parasitoid. The present study aimed to assess the influence of the host plant on the stinging behavior of D. isaea larvae. The information generated from this study will help to improve our understanding of the ecology of D. isaea and enhance its use in biological control programs.

METHOD

The experiment was conducted in a greenhouse at the Plant Protection Research Institute in Egypt. Three host plants, including tomato (Solanum lycopersicum), eggplant (Solanum melongena), and pepper (Capsicum annuum), were selected for the study. Tomato plants were grown in plastic pots filled with sterilized soil, while eggplant and pepper plants were grown in plastic bags containing sterilized soil. After two weeks of planting, the plants were infested with leaf-mining larvae. Five days after infestation, five D. isaea larvae were released onto each plant. The stinging behavior of D. isaea larvae was observed using a dissecting microscope for five minutes every day, for five consecutive days. The study was conducted in a greenhouse at the Entomology Laboratory of the Department of Biology, University of XYZ. The plant species used in the study were tomato (Solanum lycopersicum L.), pepper (Capsicum annuum L.), cucumber (Cucumis sativus L.), and eggplant (Solanum melongena L.). The plants were grown from seeds in plastic pots filled with a mixture of soil and compost. After germination, the seedlings were thinned to one per pot and maintained under standard greenhouse conditions of temperature, light, and humidity.

To rear the larvae of Diglyphus isaea, leaf-miner-infested leaves of tomato were collected from a nearby farm and brought to the laboratory. The leaves were checked under a stereomicroscope to confirm the presence of D. isaea larvae, and the larvae were then transferred to potted tomato plants of similar age and size.

For the stinging behavior assays, three larvae of D. isaea were transferred onto each of the four plant species, and their stinging behavior was observed for 24 hours. The number of stings made by each larva on each plant species was recorded. The experiment was repeated three times.

The data obtained were analyzed using ANOVA, and means were compared using Tukey's honestly significant difference (HSD) test.

RESULTS

The results showed that the host plant significantly influenced the stinging behavior of D. isaea larvae. The highest frequency of stinging behavior was observed on tomato plants, followed by eggplant and pepper plants. The difference in the frequency of stinging behavior between tomato and pepper plants was statistically significant, with tomato plants resulting in a higher frequency of stinging behavior. Moreover, the study showed that D. isaea larvae preferred the youngest leaf-mining larvae on tomato plants.

DISCUSSION

The study highlights the role of host plants in influencing D. isaea's stinging behavior, which ultimately affects its parasitism efficiency. The higher frequency of stinging behavior on tomato plants suggests that this plant may be a preferred host for D. isaea. The results are consistent with previous studies that have shown that the presence of a host plant can affect parasitoid behavior. The preference for the youngest leaf-mining larvae on tomato plants may be

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due to the better quality of the host at an early developmental stage. The information provided in this study can be used to optimize the use of D. isaea in biological control programs by selecting appropriate host plants for release.

CONCLUSION

The study demonstrated that host plants significantly influence the stinging behavior of Diglyphus isaea larvae, an important ectoparasitoid for biological control. The results showed that the parasitoid larvae stung significantly more on tomato plants compared to cucumber and pepper plants. The study provides valuable insights into the importance of host plant selection by parasitoids for effective biological control of agricultural pests. Further studies could explore the underlying mechanisms of host plant preference and their potential use in optimizing the effectiveness of parasitoid-based pest management strategies.

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