Oviposition by *Copitarsia decolora* Guenée (Lepidoptera: Noctuidae) on and near the host plant

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The host plant selection process carried out by adult insects is related to the availability of the host plant for the development and survival of its progeny (Thompson & Pellmyr 1991; Knolhoff & Heckel 2014). However, a positive correlation between plant host selection for oviposition and larval development is not always observed (Potter et al. 2012), fluctuating according to ecological variables and selective pressures (Janz 2008). In moths, the females select the host plant for oviposition when it is suitable for development of the larvae (Shikano et al. 2010; García-Robledo & Horvitz 2012); however, females have been observed to modify their behavior, reducing the number of eggs placed on the host plant if it is not found to be in optimum condition for the development of the offspring (Thompson & Pellmyr 1991; Knolhoff & Heckel 2014). In the moth *Copitarsia decolora* (Guenée) (Lepidoptera: Noctuidae), which in Mexico feeds principally on cabbage, *Brassica oleracea* var. *capitata* L. (Brassicaceae), studies related to the acceptance of host plants for oviposition are scarce. Therefore, the objective of this study was to determine the oviposition preferences by mated females of *C. decolora* on or around cabbage plants. Five-d-old mated females were used; each female was introduced into a Plexiglas cage (100 × 80 × 60 cm), at 20 ± 2 °C, 60 ± 2% RH containing undamaged cabbage plants (30 to 40-d-old plants cultivated in a greenhouse at 20 °C and 60% RH). In each, pot an acrylic plate was adapted to hold the stem and isolate it from the soil. Twenty-four h after having introduced the mated female into the cage, the number of eggs deposited directly on and around the cabbage plant were recorded at intervals of 5 cm, up to a 30 cm radius. Each moth and cabbage plant were used once (n = 12). A larger number of eggs were deposited by females of *C. decolora* around the cabbage plant than actually on the plant. A significant difference was observed between the number of eggs found between a distance of 20 and 30 cm around the cabbage plant, when compared with the number found directly on the plant and up to a distance of 15 cm around the plant (F = 185.190; df = 6,83; P = 0.001) (Fig. 1).

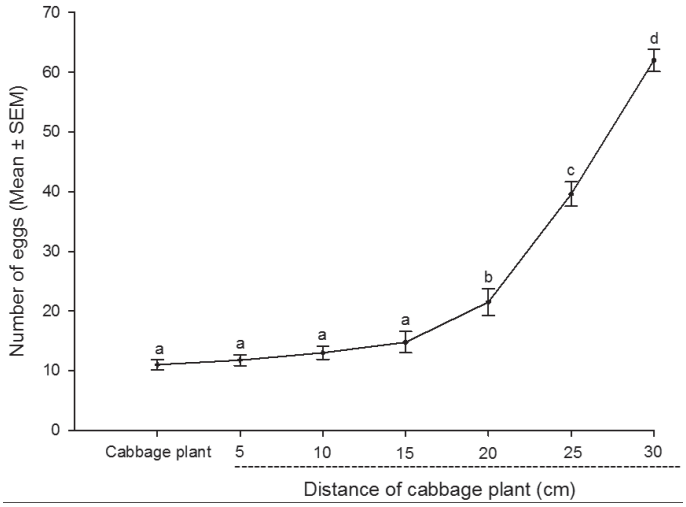

Fig. 1. Number of eggs (mean ± SEM) of paired females of *C. decolora* on and near the host plant. Different letters indicate mean values significantly different at $P < 0.05$ (Tukey), n = 12.

In some moth species, such as *Cydia pomonella* (Linnaeus) (Lepidoptera: Tortricidae), oviposition occurs at 20 cm from the host plant, and once emerged, the larvae are attracted by the plant volatiles (Landolt et al. 2000). In the case of *C. decolora*, the females similarly deposited a greater number of eggs up to a distance of 30 cm away from the cabbage plant, and a lesser quantity on the "heart" of the cabbage, the part that is principally consumed by the larvae. In contrast, *Helicoverpa zea* (Boddie) (Lepidoptera: Noctuidae) oviposit their eggs on a portion of the plant that is essential for the nutrition of the larvae, even though this results in a higher risk of predation (Takeuchi et al. 2009). Accordingly, the hypothesis that the female always selects the host plant in "optimum" condition, enabling the larvae to attain their maximum development, is applicable to the majority of specialist herbivorous insects. However, in the case of generalist herbivores such as *C. decolora*, this is not the case, because these insects can select a sub-optimal host plant for oviposition. The larvae can stay, feed, and develop poorly on the host plant chosen by the moth, or the larvae may subsequently search for, and select, another host plant for adequate larval development (Jaenike 1978; Barron 2001). Host plant selection preferences demonstrated by insects are not determined only by maximum larval development, because other ecological variables and selective pressures could influence host plant selection (e.g., in order to avoid predators and parasitoids) (Hilker & Meiners 2002; Hilker et al. 2002). Other studies have reported that the females prefer to oviposit on plants that are free from natural enemies, rather than on plants providing optimal conditions for development of the larvae (Jeffries & Lawton 1984).

In this research, fewer eggs were recorded on the cabbage. Females of *C. decolora* landed on the plant for contact and recognition of oviposition stimulants; these actions possibly could activate the

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emission of volatile compounds that attract egg predators and parasitoids to the plant (Jeffries & Lawton 1984; Singer et al. 2004), providing a possible explanation as to why *C. decolora* oviposits more eggs in the immediate area of the plant. The maximum distance of 30 cm around the plant, where the majority of eggs were recorded, concurs with observations for cabbage plant crops on farms, where individual plants along a row are separated by 25 to 30 cm. Establishing the strategy of oviposition conducted by females of *C. decolora* could prove to be beneficial in the development of appropriate management alternatives for this insect pest, where oviposition behavior could be interrupted.

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Summary

Oviposition preferences by *Copitarsia decolora* (Guenée) (Lepidoptera: Noctuidae) were studied by counting individual eggs on and around the host plant. The females deposited significantly more eggs on the soil around the cabbage plant than on the plant. Oviposition strategies conducted by this insect pest and its ecological implications are discussed.

Key Words: moth, oviposition, cabbage plant

Sumario

Se estudió la preferencia de oviposición de *Copitarsia decolora* (Guenée) (Lepidoptera: Noctuidae) mediante el conteo de huevecillos sobre y alrededor de su planta hospedera. Las hembras ovipositan significativamente mayor cantidad de huevecillos alrededor de la planta hospedera que sobre ésta. Se discuten las estrategias de oviposición en este insecto plaga y sus implicaciones ecológicas.

Palabras Clave: palomilla, oviposición, planta de col

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