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B. NOTA CIENTÍFICA / SCIENTIFIC NOTES

First record of *Duponchelia fovealis* (Lepidoptera: Crambidae) in South America

Primer registro de *Duponchelia fovealis* (Lepidoptera: Crambidae) en América del Sur

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ABSTRACT

The European pepper moth *Duponchelia fovealis* Zeller (Lepidoptera: Crambidae) is reported for the first time in South America, in the State of Paraná, Brazil. *D. fovealis* causes damage to strawberries and weakens the plants. Three natural enemies controlling *D. fovealis* were found and identified as *Apanteles* sp. (Hymenoptera: Braconidae), *Hyaliodocoris insignis* (Heteroptera: Miridae) and the entomopathogenic fungus *Beauveria bassiana*.

Key words: Neotropical region, *Fragaria* × *ananassa*, European pepper moth, natural enemies.

RESUMEN

El primer reporte de Duponchelia fovealis *Zeller (Lepidoptera:Crambidae) fue por daños a la fresa* (Fragaria x ananassa) *en América del Sur en el Estado del Paraná, Brasil. Se encontraron tres enemigos naturales para controlar* D. fovealis *identificados como* Apanteles *sp. (Hymenoptera: Braconidae),* Hyaliodocoris insignis *(Heteroptera: Miridae) y el hongo entomopatogenico* Beauveria bassiana*.*

Palabras clave: *región Neotropical,* Fragaria × ananassa*, "Polilla del pimiento europeo", enemigos naturales.*

A significant problem of the strawberry plant is the diversity of insects and mites that attack the crop (Botton & Nava, 2010; Zawadneak *et al.*, 2014). High infestations of Crambidae larvae were reported in strawberry crops in 2010 in various regions of the State of Paraná, Brazil, causing damage to the crown, leaves, flowers and fruits of the plant. The lepidopteran insects were present throughout the year in the production areas, with food availability depending on the plant cycle. The aim of this study was to report the presence of *Duponchelia fovealis* in South America and of three natural enemies of the pest.

Strawberry plants were collected from areas with high insect concentrations in the municipality of São José dos Pinhais, Paraná, Brazil (25º37'05.32" S; 49º04'46" W). Insect larvae and pupae were maintained in the laboratory until the adult stage was reached. The adults that emerged did not resemble species previously described in the literature as strawberry or vegetable pests growing near strawberry fields. Specimens were sent to the Systematic Entomology Laboratory, Washington D.C. The species was identified as *Duponchelia fovealis* Zeller (Lepidoptera: Pyraloidea: Crambidae: Spilomelinae). This is the first report of this species in South America. This insect originated in the Mediterranean region and the Canary Islands; however there are records of its occurrence in different regions of Europe, Asia, Africa and North America (Epstein 2004; Bonsignore & Vacante, 2010; Brambila & Stocks, 2010; EPPO, 2010; Hoffman, 2010; NAPPO, 2010; Stocks & Hodges, 2011; CABI, 2015). *D.*

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fovealis has been reported to cause damage to strawberry fields in Portugal, France, Italy, and Turkey (Bonsignore & Vacante, 2010; Franco & Baptista, 2010; Efil *et al.*, 2014). Information on how the pest entered Brazil is unknown, but it may have been introduced by planting material from ornamental plants, which are significantly affected by the pest in Europe (Solis, 2006; Stocks & Hodges, 2011; CABI, 2015).

Adults are 9-12 mm in length with a 19-21 mm wingspan. The male abdomen is slender, while the female abdomen is robust (Figures 1A

Figure 1. *Duponchelia fovealis* (Lepidoptera: Crambidae). A. Dorsal aspect of the male (7.1× magnification). B. Dorsal aspect of the female (7.1× magnification). C. Eggs (6.5× magnification). D. 5th instar larvae (7.1× magnification). E. Pupa sheltered under senescent plant material at the base of the plant. F. Larvae damaging fruit. G. Initial damage by caterpillar feeding on the outside of the leaves (holes with irregular edges) and presence of excrement.

and 1B). The forewings are brown, darker on the apices, with two transverse lines, featuring a more outward line, and in the central region there is a spot toward the apex of the wing (Figures 1A and 1B). The hindwings are pale brown, with a thin wavy line across the middle of the wing (Figures 1A and 1B). The eggs are cream in color, measuring 0.3-0.6 mm on average, and oviposited singly or in groups of 3-10. After oviposition they have a cream color, and when near eclosion they have a reddish tone (Figure 1C). The larvae are white-cream to light-brown and measure approximately 20 mm in the last instar. The cephalic capsule is dark brown in color, with dark spots and sparse hair standing straight throughout the body; the pronotum is the same color as the head (Figure 1D). The pupa is obtected, measuring 9-12 mm, and is surrounded by strands of silk and covered with plant debris, soil particles, and excrement (Figure 1E). Near the emergence of the adult, the pupa is darker (Trematerra, 1990; Svensson, 1999; Bethke & Vander Mey, 2010; Bonsignore & Vacante, 2010; Brambila & Stocks, 2010; Hoffman, 2010; Stocks & Hodges, 2011; CABI, 2015).

D. fovealis is oligophagous, with more than 35 known hosts (Stocks & Hodges, 2011; CABI, 2015); however peppers, green peppers, tomatoes, corn, cucumber, squash, and strawberry are crops with higher risk of economic damage (Bethke & Vander Mey, 2010; Stocks & Hodges, 2011). The larvae parasitize leaves, stems, inflorescences, roots and fruit, occurring mainly in protected crops and nurseries (Bethke & Vander Mey, 2010; Bonsignore & Vacante, 2010; Stocks & Hodges, 2011; Zawadneak *et al.*, 2011; CABI, 2015).

In strawberry plants, the larvae feed on tissues from the crown, leaves and fruit, thus reducing plant strength, productivity, quality and the commercial value of the fruit (Figures 1F, 1G, 1H, and 1I). In the strawberry crown region the larvae open galleries, resulting in interruption of the sap flow, wilting, yellowing and death of the plant (Figure 1J). In the fruit, in addition to the damage caused by feeding, pulp exposure promotes microbial growth, thus increasing loss. Additionally, larval excrement compromises fruit health. Adults shelter under the plant leaves during the day, conducting short and infrequent flights when disturbed. When at rest, the moths keep their wings closed flat against the body and bend the abdomen upwards at nearly a 90º angle.

During the collection of *D. fovealis* individuals in various regions of the state, we observed parasitism of the larvae by *Apanteles* sp. (Hymenoptera: Braconidae) (Figures 2A and 2B), and predation of the eggs by nymphs and adults of *Hyaliodocoris insignis* (Stal) (Heteroptera: Miridae) (Figures 2C and 2D), in addition to the infection of the larvae and pupae of *D. fovealis* by *Beauveria bassiana* (Balsamo) (Hypocreales: Cordycipitaceae) (Figures 2E and 2F). These observations of recently identified beneficial organisms naturally controlling the pest provide new insights for future research on biological control with the aim of managing this species. Since this pest has been recently introduced in Brazil, insecticides have not yet been authorized for use against *D. fovealis*. Predatory mites *Stratiolaelaps miles* (Berlese) (Acari: Mesostigmata: Laelapidae), *Hypoaspis miles* (Berlese), and *Hypoaspis aculeifer* (Canestrini) (Acari: Laelapidae) (Brambila & Stocks, 2010; Stocks & Hodges, 2011), entomopathogenic nematodes *Heterorhabditis bacteriophora* (Poinar) and *Steinernema carpocapsae* (Weiser) (Nematoda: Rhabditida), and parasitoids *Trichogramma* (Hymenoptera: Trichogrammatidae) were reported to have potential for the control of *D. fovealis* (Brambila & Stocks, 2010; Stocks & Hodges, 2011).

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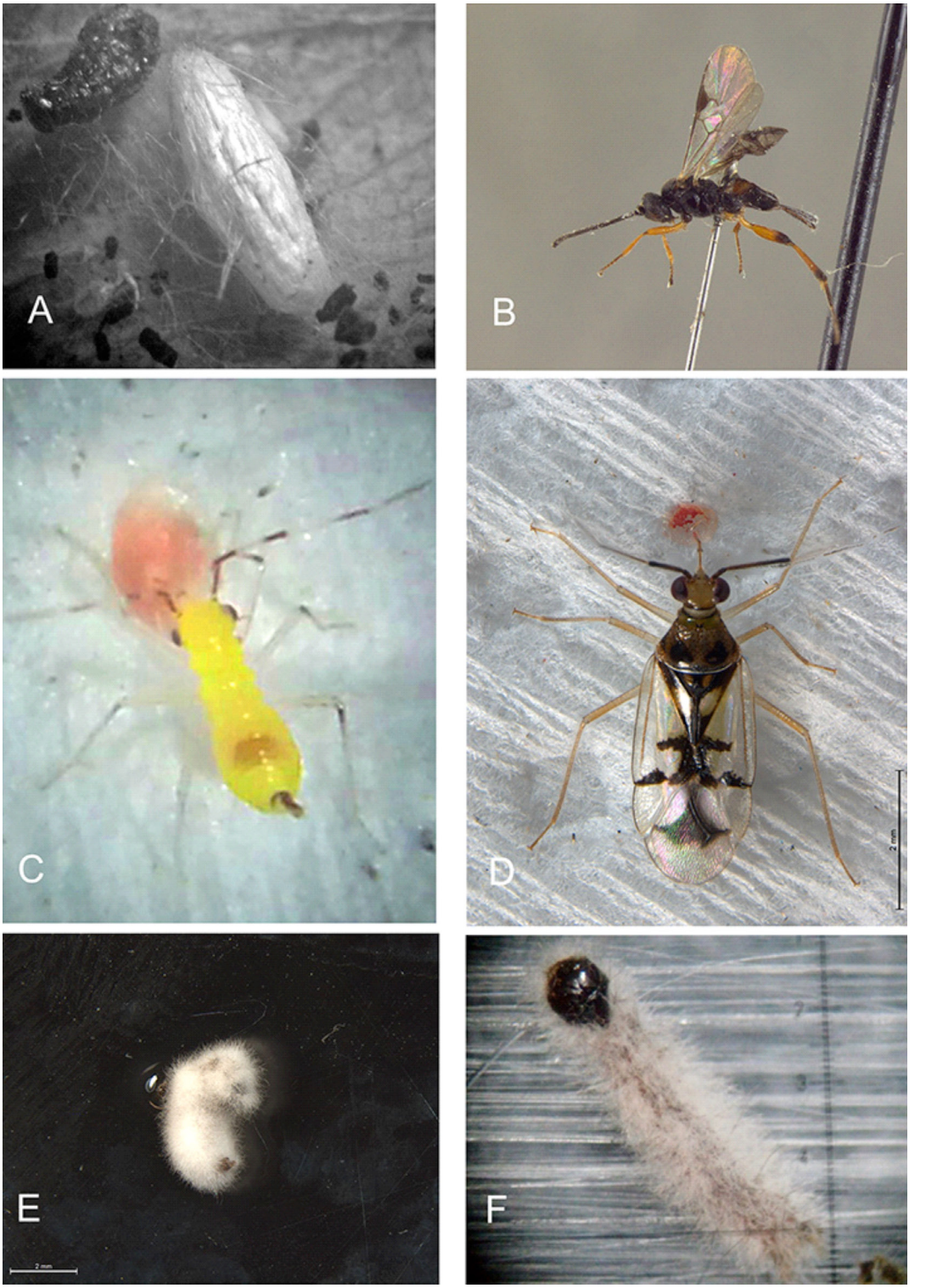

Figure 2. Natural enemies found with the potential to control *Duponchelia fovealis* in strawberry *(Fragaria × ananassa)* in the State of Paraná, Brazil. Larvae with a parasite and parasitoid cocoon (A) and side view (B) of *Apanteles* sp. (Hymenoptera: Braconidae); Nymph (C) and Adult (D) of *Hyaliodocoris insignis* (Heteroptera: Miridae) predating eggs; Larvae infected by *Beauveria bassiana* (Hypocreales: Cordycipitaceae) (E and F).

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