e-ISSN 1983-4063 - *www.agro.ufg.br/pat* - Pesq. Agropec. Trop., Goiânia, v. 43, n. 1, p. 110-113, Jan./Mar. 2013

RESEARCH NOTE

First reported occurrence of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) in Brazil[1]

Cecília Czepak[2], Karina Cordeiro Albernaz[2],
Lúcia Madalena Vivan[3], Humberto Oliveira Guimarães[2], Tiago Carvalhais[2]

RESUMO

Primeiro registro de ocorrência de *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) no Brasil

Neste trabalho, é relatada a primeira ocorrência de *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) no Brasil, que era considerada, até o momento, uma praga quarentenária. A notificação ocorreu nos Estados de Goiás, na cultura da soja; Bahia, em tiguera de soja; e Mato Grosso, na cultura do algodoeiro.

PALAVRAS-CHAVE: Praga quarentenária; Heliothinae; *Glycine max* L.; *Gossypium* spp.

ABSTRACT

In this study is reported the first occurrence, in Brazil, of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae), which was considered up till now a quarantine pest. The notification occurred in the Goiás State, in soybean; Bahia State, in volunteer soybean; and Mato Grosso State, in cotton.

KEY-WORDS: Quarantine pest; Heliothinae; *Glycine max* L.; *Gossypium* spp.

Helicoverpa (=*Heliothis*) *armigera* (Hübner) (Lepidoptera: Noctuidae) is geographically widespread, being present in Europe, Asia, Africa and Oceania (Zalucki et al 1986, Guo 1997). So far, there was no record of this lepidopteran in the American continent and it had been considered a quarantine pest in Brazil.

H. armigera is a highly polyphagous species. Its larvae have been reported in more than 60 species of cultivated and wild plants and in around 67 host families, including Asteraceae, Fabaceae, Malvaceae, Poaceae and Solanaceae (Pawar et al. 1986, Fitt 1989, Pogue 2004). Moreover, this herbivore can cause losses to different economically important crops, such as cotton, leguminous plants, sorghum, maize, tomato, ornamental plants and fruit trees (Reed 1965, Fitt 1989, Moral Garcia 2006).

H. armigera larvae feed on leaves and stems, although they prefer buds, inflorescences, fruits and pods (Reed 1965, Wang & Li 1984), causing damage in the vegetative and reproductive plant stages. According to Lammers & MacLeod (2007), the worldwide annual costs for controlling this pest, along with yield losses, reach US$ 5 billion. In India and China, 50% of pesticides in agriculture are used for controlling this pest. In Spain, *H. armigera* is one of the most harmful pests in tomato crops destined for industry (Arnó et al. 1999).

This pest has a high reproductive potential since each female can deposit 1,000 to 1,500 eggs, always laid singly on stems, flowers, fruits and leaves, preferentially at night, usually on the adaxial leaf face and hairy surfaces (EPPO 1981).

Its larval development period is composed of five to six instars and it can last from two to three weeks, depending on the climatic conditions. In the last instar, the larva reaches a length of 30.0 mm to 40.0 mm and its color varies from green to light yellow, reddish brown or black (EPPO 1981). It also presents a light brown head capsule, thin white stripes along the body and hairs (Matthews 1999).

From the 4th instar, larvae have a 'saddle'-like structure on their first abdominal segment, due to the presence of dark and visible abdominal tubercles (Figure 1a) (Matthews 1999). Another characteristic observed in this species is the tegument texture,

1. Manuscript submitted in Mar./2013 and accepted for publication in Apr./2013 (Protocol n°: PAT 23691).
2. Universidade Federal de Goiás (UFG), Escola de Agronomia, Goiânia, GO, Brasil. E-mails: ceciczepak@yahoo.com.br, kcalbernaz@gmail.com, humberto_og@hotmail.com, carvalhais.tiago@gmail.com.
3. Fundação Mato Grosso, Centro de Pesquisa Dario Minoru Hiromoto, Rondonópolis, MT, Brasil. E-mail: luciavivan@fundacaomt.com.br.

which is a little coriaceous, differing from all other Noctuidae species in Brazil. Moreover, when the larva is disturbed, it displays a peculiar behavior by bending its head capsule down until it reaches the first false legs pair and staying like that for a while.

The pupal stage takes place in the soil and it can enter diapause depending on climatic conditions (Karim 2000). Adults have a line with seven to eight spots on the forewings margins and, just above it, a wide, irregular and transversal brown stripe, and also a comma-like mark on their central part. Hindwings are light-colored with a dark brown border and a light spot in the center of the apical extremity (Figure 1b). For this species there is a strong sexual dimorphism, with the first pair of wings presenting a greenish--gray color, for males, and an orange-brown color, for females (EPPO 1981, EPPO 1996).

This species presents high mobility and capability for survival, even under adverse conditions. It can have several generations a year because its cycle from egg to adult lasts from four to six weeks (Fitt 1989). Furthermore, it can easily disperse because adults are natural migrants and can reach long-distance dispersal (up to 1,000 km) (Pedgley 1985).

The polyphagous feeding habit, associated with a high dispersion ability and adaptation to different crops, tends to benefit the *H. armigera* as a pest. Besides, the presence of alternative hosts in surrounding crops is decisive for the seasonal dynamics of insects, because they can give support to the permanence of pest populations in the field (Fitt 1989).

This study reports the first occurrence of *H. armigera* in Brazil, whose specimens were collected during January and February 2013, in the Goiás State (Palmeiras de Goiás, Fazenda Mutum, Imóvel Veneza, GO-156, 16º39”29”S and 49º56’13”W), attacking soybean fields (Figure 2a); Mato Grosso State (Rondonópolis, Fazenda SM2, BR-163, Km 94, 16º42’43”S and 54º39’43”W), attacking cotton fields (Figure 2b); and Bahia State (Correntina, Fazenda Nossa Senhora Aparecida, BR-349, Km 273, 13º27’33”S and 45º44’11”W), in volunteer soybean.

The specimens were collected in larval stage and kept under laboratory conditions and natural diet until pupation. Pupae were separated by sex and, after adult emergence, were sent for identification by Dr. Vitor O. Becker.

Adult external (pattern and color of wings) and internal (morphology of male genital organ) characters were considered for the identification process (Hardwick 1965, Pogue 2004). Genital organs were ground in a potassium hydroxide solution (10%) and mounted on microscope slides, which were deposited in the Becker Collection and identified as VOB5225 and VOB5226.

It is possible that this pest may be spread all over Brazil. At several locations, farmers have reported the presence of caterpillars with morphology and feeding habits similar to the ones observed in the places where the insect was collected and identified. Therefore, more efforts are needed to extend the collection and identification of caterpillars to different locations, in order to understand the dispersal process of this pest in Brazil and also provide subsidies for farmers, consultants and technicians to implement control tactics for this pest.

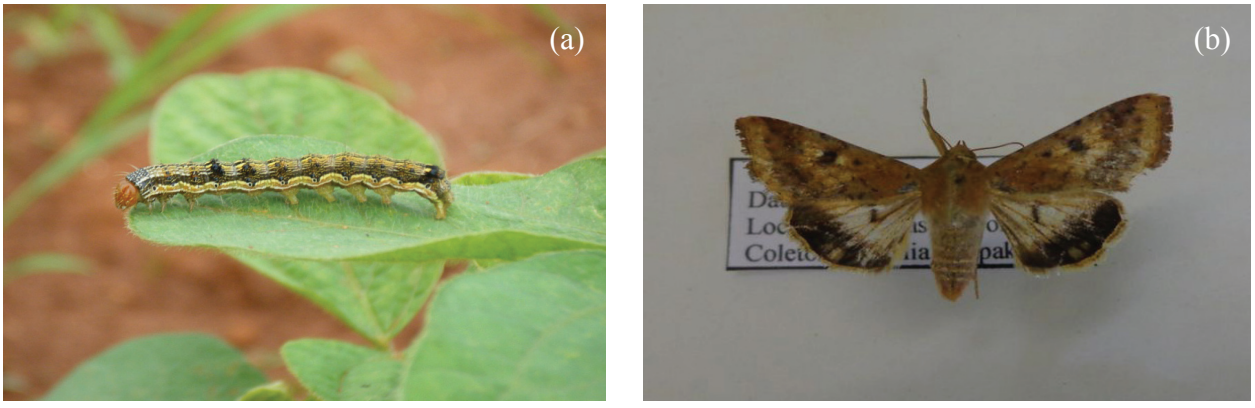

Figure 1. Lateral view of *H. armigera* at the larval stage (a) and superior view of *H. armigera* at the adult stage (b) (Palmeiras de Goiás, Goiás State, January 2013).

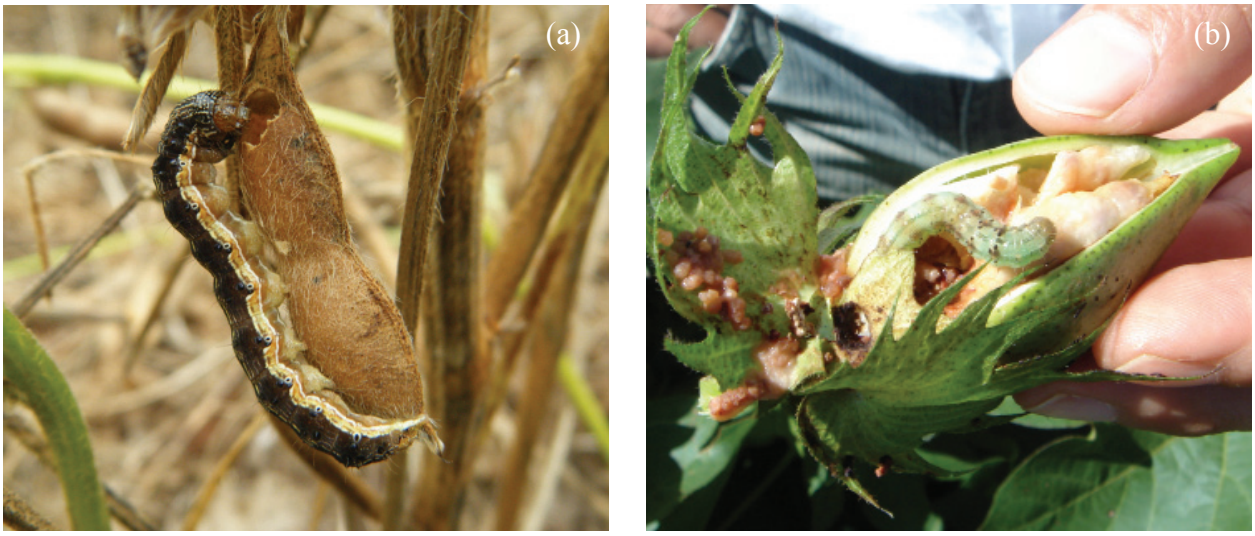

Figure 2. *H. armigera* caterpillar attacking a soybean pod (a), in Palmeiras de Goiás (Goiás State), and a cotton boll (b), in Rondonópolis (Mato Grosso State), in the 2012/2013 growing season.

H. armigera is a species externally similar to *Helicoverpa gelotopoeon* (Dyar), which occurs in the South of Latin America (Argentina, Chile, Uruguay, Paraguay and Brazil), and thus it can easily be misidentified. So, the descriptions and injuries imputed to *H. gelotopoeon*, in Argentina, are very similar to the ones ascribed to *H. armigera*. Therefore, further studies are recommended to elucidate this question, including the identification of specimens collected in Argentina.

This pest management is still at initial stages of establishment. Nevertheless, knowledge based on studies conducted in other countries, concerning the correct species identification and effective sampling techniques of eggs and caterpillars, or even pupae, is essential as subsidy for decision making on control tactics, with surveys being carried out in all host crops.

Considering the control tactics applied in other countries, it is possible to recommend the use of traps baited with the pest sexual pheromones; resistant cultivars, *Bt* or conventional; destruction of crop remnants; releasing of natural enemies, such as, for example, *Trichogramma* sp., which is intimately associated with *H. armigera*; and finally, selective pesticides, in order to keep natural enemies in agricultural areas. But it is also crucial to alternate pesticides with different modes of action, in order to reduce the selective pressure exerted by active ingredients, given that the pest shows a great ability to develop resistance (McCaffery et al. 1986, King & Coleman 1989, Duraimurugan & Regupathy 2005, Kumar et al. 2009).

ACKNOWLEDGEMENTS

We would like to thank the taxonomist Vitor O. Becker (Instituto Uiraçu, Camacan, BA), for identifying the *H. armigera* species, and the Universidade Federal de Goiás (UFG) students and researches and consultants from several public and private institutions, which somehow contributed directly or indirectly to this study.

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