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First record of *Heliothis virescens* (Lepidoptera: Noctuidae) damaging table grape bunches

Maurício Ursi Ventura, Sérgio Ruffo Roberto, Adriano Thibes Hoshino, Mateus Gimenez Carvalho, Fernando Teruhiko Hata, and Werner Genta*

Viticulture is an important and extensive horticultural activity in Brazil. In the state of Paraná, viticulture occupies 5,800 ha, and the northern Paraná contains 20% of the total grapevine growing area in Brazil and 80% of the state's grapevine area. Marialva City is the most important viticultural area in the state, which produces 50% of all table grapes (*Vitis vinifera* L.; Vitales: Vitaceae). The varieties most cultivated are 'Italia', 'Benitaka', and 'Rubi' (Kishino et al. 2007). However, other crops such as soybean (*Glycine max* L. Merrill; Fabales: Fabaceae) are widely cultivated in this area, and a considerable amount of pesticides is used to control certain pests and diseases.

Heliothis virescens (F.) (Lepidoptera: Noctuidae) was initially found damaging table grape bunches on 15-I-2013 on a farm in Marialva County (23°30'08.08"S, 51°48'43.65"W, 581 m asl) (Fig. 1). Larvae were collected and taken to the laboratory, where they were fed soybean leaves until pupation, and when the adults emerged their identification was confirmed. In this region, 'Itália' table grape and its natural mutants are grown in close proximity to annual crops including soybean, which was the case when *H. virescens* was found feeding on table grapes. In that case, the grapevines had been in full bloom 18 d previously.

After this first occurrence, other attacks were observed in several vineyards in Marialva and neighboring municipalities (up to 20 km away). Bunches were damaged internally as well as berries on the periphery; so the attack was easily observed. One to five larvae were found per bunch (Fig. 1). The presence of the larvae, their damage, and their feces rendered the grape clusters totally worthless for the fresh market (Fig. 2). The holes in the berries were also easily perceived because the mouthparts of *H. virescens* (Fig. 3) are larger than those of other caterpillars that appear in vineyards. These later appearing caterpillars are smaller [*Cryptoblabes gnidiella* (Millière, 1864) (Lepidoptera: Pyralidae) and *Argyrotaenia sphaleropa* (Meyrick) (Lepidoptera: Tortricidae)], which damage the bunches internally and weave a net that protects them (Kishino et al. 2007).

Although *H. virescens* were more exposed (without a net on the peripheries of the grape bunches) than the other pest species of the vineyards, the ordinary treatment with the pyrethroid ζ-cypermethrin (Mustang©, 14.28 mL/100 L) failed to reduce the pest population. However, control was obtained with another pyrethroid, bifenthrin (Talstar©, 50 mL/100 L). This observation confirms the general experience that it is difficult to control *H. virescens* by chemical insecticides. Intense use of chemical insecticides against heliothine pests resulted in intense selection that generated resistance to traditional groups of insecticides, including the pyrethroids (McCaffery 1998). *Heliothis virescens* insecticide resistance has reduced the efficiency of chemical applications, and has required more frequent applications and changes in the active ingredients (Fitt 1989).

In recent years, changes in the agricultural landscape have induced changes in the magnitudes of populations of insect pests on crops. The increase in the damage to wheat and corn by the green stink bug, *Dychelops melacanthus* (Dallas) (Hemiptera: Pentatomidae) has been attributed largely to the growth in adoption of the no-till production system (Chocorosqui & Panizzi 2004). Furthermore, populations of some secondary species of caterpillars have erupted in several regions. Initially, these pests appeared more intensely in the Midwest region and later became generally distributed. Several factors may be related to the increased prevalence of this pest group, among them the incorporation of extensive areas of cultivation in monoculture; the neglect of integrated pest management as a guiding strategy; frequent use of preventive insecticide applications; lack of crop rotation; the application of fungicides to control soybean rust, *Phakopsora pachyrhizi* Syd. & P. Syd. (Uredinales: Phakopsoraceae), which negatively affects entomopathogenic fungi such as *Nomuraeae rileyi* (Farlow) Samson (Hypocreales: Clavipitaceae); and corn cultivation in late summer. The adoption of transgenic *Bt* cottons also exerts suppressive effects on populations of caterpillars and their natural enemies, while allowing other pest species to become more damaging (Lu et al. 2010; Hagenbucher et al. 2013).

This whole scenario of changed environmental conditions is exerting different selection pressures. Thus in some regions, polyphagous pests become "pests of the production systems," which goes beyond the concept of "pests of agricultural crops," because they may attack several cultivated hosts, as is the case with the genera *Heliothis* and *Spodoptera*. *Heliothis virescens* was reported for many years in Brazil as a pest of cotton. However, recently, *H. virescens* attacks have been occurring also on soybean. The ability of *Heliothis* spp. to adapt to diverse cropping systems, together with a wider geographic range, its polyphagous nature, and resistance to insecticides have transformed this species group into one of the major pest problems worldwide (McCaffery 1998).

On soybean, *H. virescens* larvae feed on pods and eventually cause defoliation (Panizzi et al. 2013). The growth of the *H. virescens* population on soybean has provided the conditions for it to utilize alternative food sources, in this case, the vine. About 8 plant families are included in the spectrum of host plants of *H. virescens*,

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Fig. 1. Larva of *Heliothis virescens* damaging grape bunches.

and more than 100 plant species are considered to be hosts, of which 20 species are of economic importance (Blanco et al. 2008). Typically, the use of these alternative hosts by *H. virescens* is related to the presence of abundant food resources that determine the population growth (Capinera 2012). According to this author, alfalfa (*Medicago sativa*), clover (*Trifolium* spp.), cotton (*Gossypium hirsutum*), flax (*Linum usitatissimum*), soybean, and tobacco (*Nicotiana tabacum*) are main hosts, whereas secondary attacks occur mostly on vegetable and flower crops.

On young grape bunches *H. virescens* usually bores into buds, blossoms, and small fruits. In general, larvae prefer plant structures with higher levels of nitrogen, including reproductive structures such as cotton buds and bolls, corn ears, tobacco buds, and sorghum (*Sorghum bicolor*) heads, and this feeding habit contributes to its severe pest status (Fitt 1989).

Summary

Heliothis virescens (F.) was observed damaging table grape bunches (18 d after onset of the flowering period), in Marialva County, Paraná State, Brazil. The pest fully ruined the bunches for the fresh market, and the damage was characterized as quite different from that of other lepidopteran larvae on grapes. Proximity to soybean (*Glycine max* L. Merrill) fields in which *H. virescens* developed was the probable cause of its occurrence on grapes.

Key Words: plant damage; host plant; tobacco budworm; new occurrence

Sumário

Heliothis virescens (F.) foi observada causando danos em cachos de uva de mesa (18 dias após o início de florescimento), na cidade de Marialva, Paraná, Brasil. Os cachos foram completamente danificados, impossibilitando sua comercialização *in natura*, além disso, estes danos foram muito diferentes dos encontrado anteriormente por lagartas similares. A proximidade com lavoura de soja (*Glycine max* L. Merrill), onde *H. virescens* se desenvolve, pode ter sido a fonte de dispersão destas lagartas em direção à videira atacada.

Palavras Chave: dano à planta; planta hospedeira; lagarta-da-maçã; nova ocorrência

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Fig. 2. Grape bunch damaged by *Heliothis virescens* worthless for the fresh market.

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Fig. 3. Holes made by *Heliothis virescens* in berries of a grape bunch.

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