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Tomato Bug, Tobacco Leaf Bug, Tomato Mirid, Green Tobacco Capsid *Nesidiocoris tenuis* Reuter (Insecta: Hemiptera: Miridae)[1]

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The Featured Creatures collection provides in-depth profiles of insects, nematodes, arachnids and other organisms relevant to Florida. These profiles are intended for the use of interested laypersons with some knowledge of biology as well as academic audiences.

Introduction

Nesidiocoris tenuis Reuter (Figure 1), is a small hemipteran about 5-6 mm in size present in tomato and many other vegetable crops and is considered to be a beneficial insect because of its predatory nature on many insect pests including aphids and thrips (Sanchez and Lacasa 2008, Gavkare and Sharma 2016, Kim et al. 2016). However, it also feeds on plants in the absence of its prey. In tomato, the feeding results in brown and eventually necrotic rings, which are sometimes evident on stems, flowers, and fruits (Figures 2 and 3) (Arno et al. 2006, Calvo et al. 2009, Kim et al. 2016).

Synonymy

Nesidiocoris tenuis was formerly called *Cyrtopeltis crassicornis* Distant, *Cyrtopeltis ebaeus* Odhiambo (1961), *Cyrtopeltis javanus* Poppius (1914), *Cyrtopeltis tenuis* Reuter (1895), *Dicyphus nocivus* Fulmek (1925), *Dicyphus persimilis* Poppius (1910), *Dicyphus tamaricis* Puton (1886), *Engytatus tenuis*, *Engytatus volucer* (Kirkaldy), *Gallobelicus crassicornis* Distant (1904), *Nesidiocoris tenuis* Kerzhner (1988) and *Nesidiocoris volucer* Kirkaldy (1902) (ITIS 2020, EPPO 2020, CABI 2020).

Figure 1. Adult tomato bug, *Nesidiocoris tenuis* Reuter.
Credits: Johanna Bajonero, UF/IFAS Southwest Research and Education Center, Entomology and Nematology Department

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Figure 2. Brown ring formed by feeding of *Nesidiocoris tenuis* on a tomato plant.
Credits: Rob Jacobson, Agriculture and Horticulture Development Board (http://www.robjacobsonconsultancy.co.uk/)

Figure 3. Tomato plant damage caused by feeding on stems and petioles.
Credits: Rob Jacobson, Agriculture and Horticulture Development Board (http://www.robjacobsonconsultancy.co.uk/)

Distribution

Nesidiocoris tenuis is particularly prevalent on tomato under protected structures (greenhouse, shade house) and field conditions (Arnó et al. 2006; Sanchez and Lacasa 2008). It is widely distributed in Mediterranean countries (Spain's and the Canary Islands), Europe, Asia, North Africa, Central America, South America, the Caribbean, and North America (Sanchez et al. 2009, Bhatt and Patel 2018). Specifically, it has been found to feed on the South American tomato leafminer *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae), an important pest of tomato in Algeria, Egypt, Cyprus, Egypt, France, Jordan, Iran, Israel, Italy, Morocco, Spain, Senegal and Turkey (El Arnaouty and Kortam 2012, Zappala et al. 2013, Sylla et al. 2016). *Nesidiocoris tenuis* was first discovered in Egypt preying on the tomato leaf miner, *Tuta absoluta* in an eggplant and tomato plantation in 2011 (El Arnaouty and Kortam 2012). In 2016, it was recorded in Senegal in tomato fields preying on the tomato leaf miner, *Tuta absoluta* (Sylla et al. 2016). Although, *Tuta absoluta*is currently not present in the United States, but it is a pest of concern (Tabuloc et al. 2019). Florida Cooperative Agricultural Pest Survey (CAPS) Program is actively monitoring the presence and arrival of this pest in Florida (Hodges, 2013).

Description and Life Cycle

Nesidiocoris tenuis can be used as a biological control agent for some agricultural pests including thrips, aphids, and mites. *Nesidiocoris tenuis* is characterized by the presence of a stylet (Figure 4), which is used for extracting liquid substances either from prey or plants and the ovipositor for depositing and inserting eggs in the plants (Wheeler 2001, Triplehorn and Johnson 2005, Whitfield and Purcell 2014). One generation of *Nesidiocoris tenuis* can take 14.9 days (35°C), 21.8 days (25°C), or 86.7 days (15°C) to develop depending on environmental factors like temperature and what they fed on (Sanchez et al. 2009).

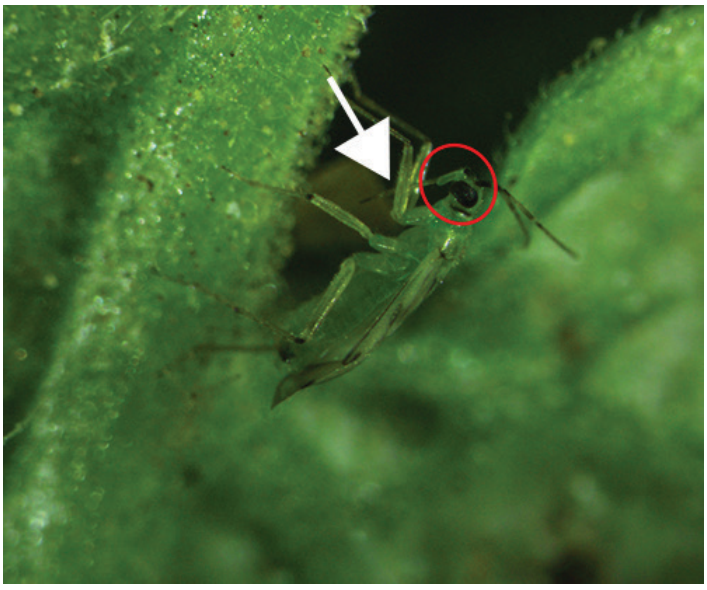

Figure 4. Head (red circle) and Stylet (white arrow) of *Nesidiocoris tenuis*.
Credits: Johanna Bajonero, UF/IFAS Southwest Research and Education Center, Entomology and Nematology Department

Egg

The female of *Nesidiocoris tenuis* lays a single egg on younger leaves and flowers (Bhatt and Patel 2018). The egg is oval, pellucid, and white when it is laid, and a few days after it darkens to red and eventually to brown before hatching (Patel 1974).

Nymphs

Nesidiocoris tenuis has five nymphal or immature stages before reaching adulthood. During the first stage, the insect is yellowish-white when they are newly hatched. At this stage, wings are absent, there is no differentiation between the three body regions (head, thorax, and abdomen) and no hardening of the exoskeleton, which is the external covering for the body. Hardening of the exoskeleton begins at the second nymphal stage, in which there is a clear difference between the three body regions. There are dark brown compound eyes at all nymphal stages. In the third and fourth nymphal stages, the wing buds are seen (Figure 5). At the fifth nymphal stage, many parts of the body of the insect resemble that of an adult (Kim et al. 2016, Sylla et al. 2016, Patel 1974). Nymphs are greenish but they lack the black spots and black bands present in adults (Vacante and Tropea 1994). All nymphal stages lack the scutellum, a triangle like shield found at the back of the adult (Figure 6) (Kim et al. 2016).

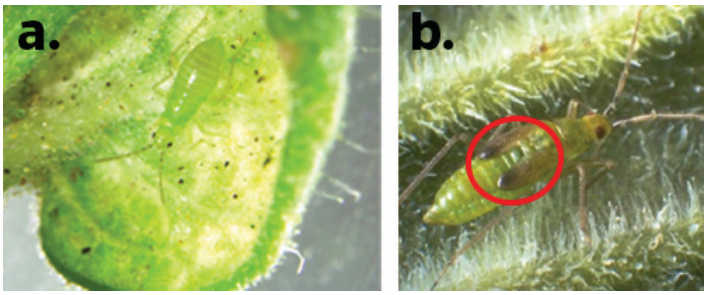

Figure 5. Nymphs: a) early nymphal stage of *Nesidiocoris tenuis* without wing buds; b) late nymphal stage of *Nesidiocoris tenuis* with wing buds (red circle).
Credits: a) by Johanna Bajonero, UF/IFAS Southwest Research and Education Center, Entomology and Nematology Department, b) Rob Jacobson, Agriculture and Horticulture Development Board. http://www.robjacobsonconsultancy.co.uk/

Adult

The adult of *Nesidiocoris tenuis* is green in color and varies from 6 -10 mm in length (Sylla et al. 2016). The body is elongated and slender, antennae are pale brown. The female is larger than male and has a more rounded oval shape body (El-Dessouki et al. 1976, Kim et al. 2016). What differentiates this species from other mirids is the black band at the back of the eyes. In the genus *Macrolophus*, the black band is absent (Figure 6).

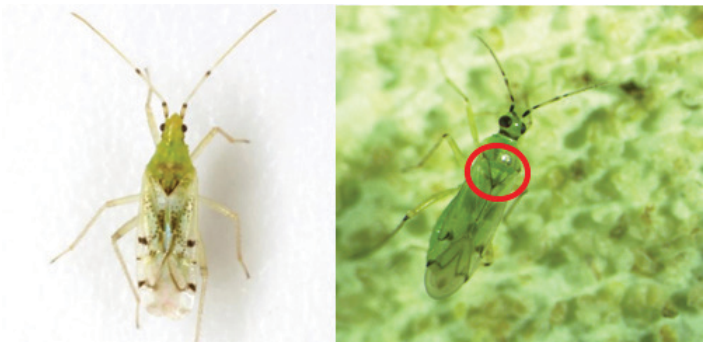

Figure 6. Presence and absence of black band behind the eyes. Left (*Macrolophus brevicornis* Knight).
Credits: Mike Quinn, http://www.bugguide.net. Right (*Nesidiocoris tenuis* Reuter) marked with a white arrow. Triangle-like shield (scutellum), marked with the red circle. Johanna Bajonero, UF/IFAS Southwest REC, Entomology and Nematology Department

Biology and Host Plants

Nesidiocoris tenuis has been reared under laboratory conditions on tomato plants and *Ephestia Kuehniella* (Sanchez 2008), and it has been used as a biocontrol agent under field and laboratory conditions. Adults and nymphs feed on plants and cause injury in the absence of prey. Feeding by *Nesidiocoris tenuis* affects plant growth and reduces the quality and quantity of yield (Castañe et al. 2011). Host plants of *Nesidiocoris tenuis* include but are not limited to tomato, sweet pepper, cucumber, zucchini, yellow squash, sesame, tobacco, aubergine, and potato (El-Dessouki et al. 1976, Biondi et al. 2016, Kim et al. 2016).

Prey insects

As a biological control agent, *Nesidiocoris tenuis* feeds on the eggs and larvae of *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae) (tomato fruit borer), *Keiferia lycopersicella* Walsingham (Lepidoptera: Gelechiidae) (tomato pinworm), *Manduca sexta* L. (Lepidoptera: Sphingidae) (tomato or tobacco hornworms), (leaf-eating caterpillars), *Symmetrischema tangolias* Gyen (Lepidoptera: Gelechiidae) (tomato stem borer), *Tuta absoluta* (tomato leaf miner) (Desneux et al. 2010, Urbaneja et al. 2009), *Bemisia tabaci* Gennadius (Hemiptera: Aleyrodidae) (Whitefly) (Alomar et al. 2006, Calvo et al. 2012, Bhatt and Patel 2018, Gavkare and Sharma 2014), thrips, aphids, and mites (Gavkare and Sharma 2016).

Economic Importance

Nesidiocoris tenuis has been shown to be a beneficial insect for managing populations of agricultural pests. In some countries like Egypt and France, *Nesidiocoris tenuis* is considered a pest of tomato while in Sicily, Spain, and many other countries it is considered to be a beneficial insect for biological control (Castañe et al. 2011). *Nesidiocoris tenuis*

has been used for successful control of whitefly in a multi-tunnel greenhouse (Calvo et al. 2012). Various experiments have been conducted in greenhouses to evaluate the effectiveness of *Nesidiocoris tenuis* on greenhouse pests. These pests include whitefly (*Bemisia tabaci* Biotype B on tomatoes, and thrips *Frankliniella occidentalis* Pergande (Thysanoptera: Thripidae) on sweet pepper (Calvo et al. 2012, Bouagga et al. 2018). Sanchez (2008) observed that *Nesidiocoris tenuis* population increases when whitefly population is high and vice versa. However, it is important to have the correct ratio of predator to prey to achieve successful control of the pests and reduce damage to plants when prey population is low or absent (Sanchez 2008, Desneux et al. 2010, Calvo et al. 2012, Kim et al. 2016).

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