

SCIENTIFIC NOTE

**First Record of *Nesidiocoris tenuis* (Reuter) (Heteroptera: Miridae), as a Predator of the Tomato Leaf Miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae), in Senegal**

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ABSTRACT

The recent detection in Senegal of the tomato leaf miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) and its rapid geographic spread, is a real concern for tomato production in Africa south of the Sahara. Deployment of effective biological control in the newly invaded area is urgently needed. The predatory species, *Nesidiocoris tenuis* (Reuter, 1895) (Heteroptera: Miridae), was collected, for the first time in Senegal, from tomato fields infested with *T. absoluta*. Laboratory feeding bioassay confirmed a potential of *N. tenuis* as a biocontrol agent of *T. absoluta*.

**Key words:** *Nesidiocoris tenuis*, predator, *Tuta absoluta*, Fauna, Senegal.

*Nesidiocoris tenuis* (Reuter, 1895) (Heteroptera: Miridae) is a common mirid predatory bug found on tomato plants, *Solanum lycopersicum* L. (Solanaceae), and a number of vegetable crops (Urbaneja *et al.*, 2005) and tobacco (Perdikis *et al.*, 2011) in South and North America, West Indies, Africa including Senegal, Mediterranean basin to Europe, Asia, Australia and Pacific Islands (Alomar *et al.*, 2002; Arno *et al.*, 2006; Sanchez *et al.*, 2009; Guenaoui *et al.*, 2011 and Mollá *et al.*, 2011). As many Dicyphini plant bugs, *N. tenuis* is omnivorous and referred sometimes as a plant pest or as a beneficial natural enemy on the same crop plants including tomato (Wheeler, 2000). In southern France, it is considered as a tomato pest of greenhouse tomatoes (Trottin-Caudal, 2011). Perdakis *et al.* (2009) reported that this predator has low potential to cause damage on tomato stems and flowers even at high densities. However, exclusive feeding on plant sap negatively affects female fertility (Urbaneja *et al.*, 2005).

The adult is a small (6-8 mm long) green bug (Goula and Kurz, 1994). Head is oval and conspicuous with a black transversal stripe on the vertex and black rings on the antennae. Clypeus is dark. Femora and tibiae are often yellowish with a conspicuous black spot at the base of the tibiae and the apex of the tarsi is dark. The 1<sup>st</sup> and 2<sup>nd</sup> nymphal instars have no wings, whereas 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> nymphal instars have wing pads. Each nymphal instar is fully green with black eyes (Fig. 1).

Duration of whole cycle of *N. tenuis* ranges from 14.9 days at 35°C and 21.8 days at 25°C, to 86.7 days at 15°C (Sanchez *et al.*, 2009). At 25°C, eggs require 7 days before hatching and nymphs need 12.9 days to reach the adult stage, when fed on eggs of *Ephestia kuehniella* Zeller, as a substitute prey (Sanchez *et al.*, 2009). The developmental cycle was shorter when nymphs of *N. tenuis* feed exclusively on whiteflies than when they feed on thrips or mites (Calvo *et al.*, 2012). Its fertility reached 60-80 nymphs per female when temperature ranged between 20 and 35°C and was greatly reduced at 15 and 40°C (Sanchez, 2009).

*Nesidiocoris tenuis* is commercially produced as a biological control agent worldwide (van Lenteren, 2012). It is known as an effective natural enemy for controlling whiteflies of both *Trialeurodes vaporariorum* (Westwood) and *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodiade) (Sanchez, 2009) and to a lesser extent thrips, leafminers, aphids, mites and eggs of lepidopteran pests (Perdikis and Lykouressis, 2002; Calvo and Urbaneja, 2003 and Urbaneja *et al.*, 2005).

The invasive tomato leaf miner, *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae), has been recorded as a prey for *N. tenuis* in Europe and North Africa (Mollá *et al.*, 2011; Al-Jboory *et al.*, 2012; El Arnauty and

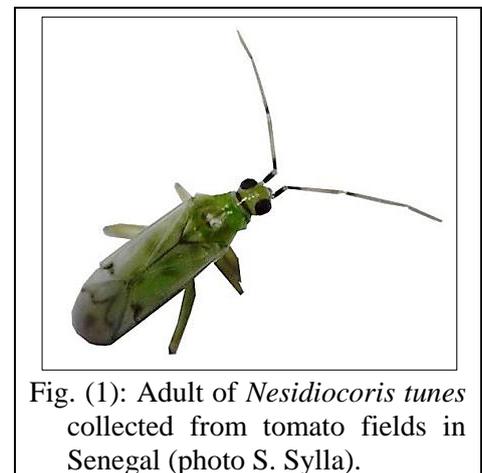


Fig. (1): Adult of *Nesidiocoris tunes* collected from tomato fields in Senegal (photo S. Sylla).

Kortam, 2012 and Mollá *et al.*, 2014). Under laboratory conditions, *N. tenuis* adults can prey on more than 100 eggs per day (Mollá *et al.*, 2014) and less than 2 first-instar larvae (Urbaneja *et al.*, 2009). *T. absoluta* was recently detected in Senegal (Pfeiffer *et al.*, 2013), where it causes significant damage to field-grown tomatoes (Brévault *et al.*, 2014). To date, no effective predator has been identified. *N. tenuis* was found for the first time in November 2014 in four tomato fields in the main vegetable-producing area (Niayes): Lac rose (14°50'0.34"N, 17°13'9.59"W), Keur Mbir Ndao (14°57'6.48" N, 17°4'24.60" W), Tieudem (14°54'0.03" N, 17°5'24.70" W), and Dieguène (14°50'60.01" N, 17°30'0.10" W). Specimens were sent to INRA-CBGP (Montpellier-sur-Lez, France) for further identification. Subsequent monitoring (plant shaking) of a set of 25 tomato fields in the Niayes area in April 2015, all infested by *T. absoluta*, showed that *N. tenuis* was present in 80% of sampled fields.

To address the capability of *N. tenuis* to prey on *T. absoluta*, a preliminary feeding bioassay was conducted in the laboratory. Five starved adults of *N. tenuis* were placed individually for 24 h in Petri dishes (6 cm diameter) with a small tomato leaflet inside. They were offered *T. absoluta* in the form of (a) 20 eggs, (b) 10 first-instar larvae, or (c) 10 eggs and 5 first-instar larvae. Mean predation was 51% of eggs in (a) with all *N. tenuis* adults feeding at least one egg, 14% of first-instar larvae in (b) with four *N. tenuis* adults feeding at least one first-instar larva, and 48% of eggs and 8% of first-instar larvae in (c) with all *N. tenuis* adults feeding at least one egg or one first-instar larva. This result indicates that *N. tenuis* can consume various stages of *T. absoluta*, with significant preference for eggs over larvae ( $\chi^2 = 8.47$ ,  $P < 0.01$ ).

Biological control programs in greenhouses based on the use of polyphagous predators like *N. tenuis* have made the management of key tomato pests possible such as whiteflies, and also the invasive leaf miner *T. absoluta* (Urbaneja *et al.*, 2009 and Mollá *et al.*, 2014). Provided *N. tenuis* does not cause damage to tomato crops, its occurrence in Senegal is a great opportunity for developing conservation biological control programs against *T. absoluta* through habitat management and use of selective insecticides.

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