



Research Note

Incidence of parasitic mite, *Bochartia* sp. on zoophytophagous mirid bug, *Nesidiocoris tenuis* Reuter (Heteroptera: Miridae) at tetra-trophic level on tomato in India

V. SRIDHAR*, M. JAYASHANKAR and L. S. VINESH

Division of Entomology and Nematology, Indian Institute of Horticultural Research, Hessaraghatta Lake Post, Bengaluru 560 089, India.

*Corresponding author E-mail : vsridhar@iihar.ernet.in

ABSTRACT: Incidence of larvae of parasitic mite *Bochartia* sp. (Acarina: Erythraeidae) on zoophytophagous mirid bug, *Nesidiocoris tenuis* Reuter (Heteroptera: Miridae) is reported at fourth (tetra-) trophic level in the food chain comprising of tomato crop (first trophic level), insect pests viz., neonate larvae of *Spodoptera litura* and *Helicoverpa armigera* (second trophic level), predatory mirid bug, *N. tenuis* (third-trophic level).

KEY WORDS: *Nesidiocoris tenuis*; *Bochartia* sp; tomato; tetra-trophic level

(Article chronicle: Received: 18-09-2013; Revised: 20-12-2013; Accepted: 24-12-2013)

The structure, dynamics and function of food webs are influenced by parasites (Lafferty *et al.*, 2008) and parasitism is more common than traditional predation as a consumer lifestyle (De Meeus and Renaud 2002). However, parasites are generally not represented in food webs due to incorporation of easy-to-observe species only and lack of interdisciplinary integration, propelling the need for a parasitic inclusive food web concept (Lafferty *et al.*, 2008; Sukhdeo, 2012). Also, parasites are expected to drive an increase in species richness, trophic levels, and trophic chain length of the food web there by stabilizing community structure (Huxham *et al.*, 1995; Thompson *et al.*, 2005).

The present article reports the incidence of the parasitic mite, *Bochartia* sp. (Acarina: Erythraeidae) (Fig. 1A) on a zoophytophagous mirid bug, *Nesidiocoris*

tenuis (Reuter) (Heteroptera: Miridae) in tomato agro-ecosystem. *N. tenuis* is a predator of several agriculturally important pests including *Bemisia tabaci*, *Frankliniella occidentalis*, *Tetranychus urticae*, *Spodoptera litura*, *Ephestia kuehniella* and *Tuta absoluta* (Sanchez, 2009). Despite its reputation as a predator, it is reported as a pest on different crops in India viz., sesame, tobacco, bottle gourds, tomatoes and cucurbits (Raman *et al.*, 1984; Perdakis *et al.*, 2009; Sridhar *et al.*, 2012) in the absence of its insect hosts. Various hosts on which the parasite is reported include *Clavigralla gibbosa* Spinola in pigeon pea (Hemiptera: Coreidae) (Rawat *et al.*, 1969), *Amrasca biguttula biguttula* (Shir.) in brinjal (Ghai and Ahmed, 1975), mango mealy bug, *Drosicha mangiferae* Green (Margarodidae: Hemiptera) (Tandon and Lal, 1976), citrus psylla, *Psylla murrayi* Mathur (Homoptera: Psyllidae) (Lahiri and Biswas, 1982), Sorghum shoot bug, *Peregrinus*



A

B

C

D

Fig. 1. A. *Bochartia* sp.; B. *Bochartia* sp. on *N. tenuis*; C. On *O. oneratus*; D. On *Oxyopes* sp.

maidis (Ashmead) (Homoptera: Delphacidae) (Kumar and Prabhuraj, 2006).

The incidence of parasitic mite, *Bochartia* sp. and *N. tenuis* was recorded from December 2011 till March 2013 at weekly intervals at the Indian Institute of Horticultural Research, Bangalore (N 12°58' E 77°34'). Direct counting of the nymphs and adults of *N. tenuis* and its predation on the neonate larvae of *H. arimigera* and *S. litura* whenever existing in the field were observed on 25 plants selected randomly from one acre area. The immature stages of the mites were recorded on both nymphs (Fig. 1B) and adults of *N. tenuis*. Nymphs of *N. tenuis* were aggressively attacked by the mites and found adhering to different parts *viz.*, capitulum, ventral abdomen, legs and dorsum. Two to three mite larvae were observed on a single bug. The intensity of the mite during the present observations was found high during Standard Meteorological Week (SMW) 4 (18.2% bugs parasitized) and lowest during SMW 11 (0.8% bugs parasitized) in 2012.

Various hosts of *Bochartia* sp. recorded in different crop ecosystems in addition to *N. tenuis* include, cow bug, *Otinotus oneratus* on Yellow Myrobalan (*Terminalia chebula*) (Fig. 1C); spider, *Oxyopes* sp. (Fig. 1D) on tomato (*Solanum lycopersicum*), little bee, *Apis florea* and butterfly, *Eurema hecabe* on Physic nut (*Jatropha curcas*). Up to five parasitic mites on a single host were found on *O. oneratus*. Kumar and Prabhuraj (2006) recorded these mites on sorghum shoot borer at tritrophic level. However, the present occurrence of the *Bochartia* sp. at the tetra-trophic level in the tomato ecosystem is reported for the first time.

The morphometric measurements of three parameters *viz.*, total length, width and capitulum length of the mites (N=10) were undertaken using Olympus SZX7 stereomicroscope with Q-imaging software. The mean \pm SD values obtained were 0.59 ± 0.17 mm (total length), 0.2 ± 0.09 mm (width) and 0.17 ± 0.06 mm (capitulum length). The specimens are deposited at NPIB, New Delhi with RRS no (981/12, 982-984/12).

ACKNOWLEDGEMENTS

The authors are grateful to ICAR for funding the study under the project National Initiative on Climate Resilient Agriculture and Dr. Sushil Joshi, Insect Identification Service, IARI, New Delhi for identifying the mites. The authors are also grateful to the Director, IIHR for providing necessary facilities.

REFERENCES

De Meus T, Renaud F. 2002. Parasites within the new phylogeny of eukaryotes. *Trends Parasitol.* **18**, 247–251.

- Ghai S, Ahmed R. 1975. Larvae of *Bochartia* sp. (Acarina: Erythraeidae) parasitizing jassids. *Entomol Newsl.* **5** (5): 29–30.
- Huxham M, Raffaelli D, Pike, A. 1995. Parasites and food web patterns. *J Anim Ecol.* **64**: 168–176.
- Kumar LV, Prabhuraj. 2006. A seasonal incidence of sorghum shoot bug, *Peregrinus maidis* (Ashmead) (Homoptera: Delphacidae) and its natural enemies in Karnataka. *J Pl Prot Environ.* **3** (1): 95–100.
- Lafferty KD, Allesina S, Arim M, Briggs CJ., Leo G, *et al.* 2008. Parasites in food webs: the ultimate missing links. *Ecol Lett.* **11**: 533–546.
- Lahiri AR, Biswas S, 1982. Observation on the relative intensity of infection on three species of cultivated citrus plants by *Psylla murrayi* Mathur (Homoptera: Psyllidae) at Shillong, Meghalaya. *Bull Zool Surv India* **2** (2/3): 123–127.
- Perdikis D, Fantinou A, Garantonakis N, Kitsis P, Maselou D, Panagakis S, 2009. Studies on the damage potential of the predator, *Nesidiocoris tenuis* on tomato plants. *Bull Insectol.* **62** (1): 41–46.
- Raman K, Sanjayan KP, Suresh, G. 1984. Impact of feeding injury of *Cyrtopeltis tenuis* Reut. (Hemiptera: Miridae) on some biochemical changes in *Lycopersicon esculentum* Mill (Solanaceae). *Curr Sci.* **53**: 1092–1093.
- Rawat RR, Kapoor KN, Misra US, Dhamdhare SV. 1969. A record of predatory mite, *Bochartia* sp. (Erythraeidae: Acarina) on *Clavigralla gibbosa* Spinola. *J Bombay Nat Hist.* **66** (2): 403–404.
- Sancheza JA, 2009. Density thresholds for *Nesidiocoris tenuis* (Heteroptera: Miridae) in tomato crops. *Biol Control* **51**: 493–498.
- Sridhar V, Jayashankar M, Vinesh LS, 2012. Population dynamics of zoophytophagous mirid bug, *Nesidiocoris tenuis* (Reuter) (Heteroptera: Miridae) and its prey, *Bemisia tabaci* Genn. (Hemiptera: Aleyrodidae) on tomato (*Solanum lycopersicum* Mill.). *Pest Mgmt Hort Ecosyst.* **18**(1): 35–38.
- Sukhdeo VKM, 2012. Where are the parasites in food webs?. *Parasites Vectors* **5**(239): 1–17.
- Tandon PL, Lal B. 1976. New record of predatory mites on mango mealy bug, *Drosicha mangiferae* Green (Margarodidae: Hemiptera). *Curr Sci.* **45** (15): 566–567.
- Thompson RM, Mouritsen KN, Poulin R. 2005. Importance of parasites and their life cycle characteristics in determining the structure of a large marine food web. *J Anim Ecol.* **74**: 77–85.