



NATURAL ENEMIES ASSOCIATED WITH SORGHUM SHOOT BUG *PEREGRINUS MAIDIS* (ASHMEAD)

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ABSTRACT

This study on the potential natural enemies associated with sorghum shoot bug *Peregrinus maidis* (Ashmead) revealed that among the predators, the predatory bug [*Creontiades* sp. and *Tytthus parviceps* (Reuter)] and neuropterans [*Chrysoperla* sp. and *Micromus timidus* (Hagen)] were found predated over eggs and nymphs. Beetles of Coccinellidae [*Cheilomenes sexmaculata* (Fab.)] and Chrysomelidae [*Monolepta signata* (Olivier)] were also found predated but only on nymphs. Six spiders were observed predated over nymphs and adults- these include *Callitrichia* sp. (Linyphiidae), *Cheiracanthium approximatum* (Cheiracanthiidae), *Marengo* sp. (Salticidae), *Neoscona* sp. (Araneidae), *Plexippus petersi* (Salticidae) and an unidentified Linyphiidae. A parasitoid *Anagrus* sp. (Hymenoptera: Mymaridae) was on the eggs and a mite *Erythraeus* sp. (Trambidiformes: Erythridae) was noticed adhering to the adults. This study is the first record of *Creontiades* sp.

Key words: *Peregrinus maidis*, sorghum, *Cheilomenes sexmaculata*, *Creontiades*, *Erythraeus*, *Marengo*, *Monolepta signata*, *Neoscona*, parasitoid, *Tytthus parviceps*

Shoot bug *Peregrinus maidis* (Ashmead) (Hemiptera: Delphacidae) is a major sucking pest of sorghum in the northern dry zone of Karnataka, given only minor importance earlier, but now it is a major pest status in rabi sorghum causing direct and indirect loss. The nymphs and macropterous females are more efficient transmitters of maize stripe virus of sorghum (MStV-S), maize mosaic virus of sorghum (MMV-S) and sorghum stripe disease virus (SStdv) compared to its males. The occurrence of MStV-S was first reported in India during the 1990s (Peterschmitt et al., 1991). The use of insecticides to tackle *P. maidis* in rabi sorghum by small and marginal farmers under rainfed situations is not a reasonable option because of its prohibitive cost and low returns in addition to toxicity hazards to the environment (Sharma et al., 2003). Unlike brown plant hopper *Nilaparvatha lugens* (Stal.), the natural enemies associated with *P. maidis* under field situation and their role in suppressing shoot bug population was not fully understood although they belong to the same family. Further, the reports relating to natural enemies are scanty and need to be focused. The present study identifies the natural enemies associated with *P. maidis* to enable biological control.

MATERIALS AND METHODS

This study was done at Vijayapura in the Northern Dry Zone (Region-II, Zone-3) of Karnataka (16°

49'N, 77°20'E, 398.37 masl) during rabi 2020-21 on the Hathi Kunta, a susceptible sorghum variety. The crop was sown under unprotected conditions in 20 m² plots in three locations at the Regional Agricultural Research Station (RARS), Vijayapur. The parasitoids and predators observed associated with *P. maidis* at different intervals were recorded, collected, and preserved. These were evaluated for predation under laboratory conditions. The collected specimens were sent to the Department of Agricultural Entomology, University of Agricultural Sciences, GKVK, Bangalore and NBAIR, Bangalore for identification.

RESULTS AND DISCUSSION

Results of the present study on the natural enemies of *P. maidis* revealed a parasitoid fairy fly, *Anagrus* sp. (Hymenoptera: Mymaridae) collected from the parasitized eggs (Table 1). The adult was very small, 1 mm in width (Fig. 1a), like a miniature ant with reddish brown coloured body and hardly noticeable with naked eyes. *Anagrus* sp. parasitizes the eggs which were already inserted inside the midribs of sorghum leaves by inserting its ovipositor (Fig. 1b). The adult parasitoid parasitized one egg/ min. Similar observations were made by Guppy (1914) who reported hymenopteran parasite *Anagrus flaveolus* (Watson) parasitising eggs of *P. maidis* to the extent of 75 to 80%. Muir (1917) and Perkins (1905) also reported that the eggs were

parasitised by *Paranagrus* sp. The predators collected from the sorghum ecosystem revealed that predatory bug, *Creontiades* sp. (Fig. 2) predate on the eggs and nymphs in the sorghum whorls. Several mirid bugs had been earlier reported as egg predators but this study observed *Creontiades* sp. as both egg and nymphal predator. The predation was high in case of egg stage with ten eggs/ min whereas, it fed only single nymph for more than a minute. The adult was 13 to 15 mm long and 3-5 mm in width, with abdomen being 7-9 mm long; adult is slender, pale green with translucent wings; antennae longer than the body and similarly, the wings also ascend the abdomen which bears membranous part apically black; abdomen is telescopic in which the segmentation was clearly distinct. Another predatory bug *Tytthus parviceps* (Reuter) (Hemiptera: Miridae) (Fig. 3) was found predated on both eggs and nymphal stages during the vegetative and flowering stages; the former is larger than the latter with more predation being from *Creontiades* sp. Neuropteran predators viz., *Chrysoperla* sp. (Chrysopidae) and *Micromus timidus* (Hagen) (Hemerobiidae) predate on nymphs. Similar observations on two mirid bugs i.e., *Tytthus mandulus* Bredd. and *T. parviceps* (Reut.) predated over the eggs of *P. maidis* was made in sorghum- Swezey (1936), Carnegie and Harris (1969), and Napompeth (1973); Swezey (1936) reported *Chrysoperla basalis* Walker (Neuroptera: Chrysopidae) predated on both nymphs and adults. Rioja et al. (2006) observed *Chrysoperla* sp. and *Chrysoperla 7-punctata* var. *brucki* on nymphs.

The Coccinellidae predators such as *Cheilomenes sexmaculata* (F) and the Chrysomelidae *Monolepta*

signata (Olivier) were observed on the nymphs, found all the three crop growth phases; the coccinellids were highly polyphagous over soft bodied insects, and were found feeding on aphids; their grubs are very active and predated all body parts including head; but the chrysomelid was found feeding only on the soft body parts i.e., the abdomen of nymphs. These results corroborate with those of Singh et al. (1993) on *C. sexmaculata*. Predatory mite *Erythraeus* sp. (Trombidiformes: Erythridae) (Fig. 4b) was noticed on the adults and found adhering or clinging on the thoracic region (Fig. 4a). Kulkarni et al. (1979) from Dharwad identified the predacious mite *Erythraeus* sp. feeding on *P. maidis*. Some spiders found feeding on the nymphal and adult stages include- *Callitrichia* sp. (Araneae: Linyphiidae) (Fig. 5), *Cheiracanthium approximatum* (Araneae: Cheiracanthiidae) (Fig. 6), *Marengo* sp. (Araneae: Salticidae) (Fig. 7), *Neoscona* sp. (Araneae: Araneidae) (Fig. 8) and *Plexippus petersi* (Araneae: Salticidae) (Fig. 9)- these were found predated on nymph and adult stages. Of these *Callitrichia* sp. was smaller, and found abundantly with high predation rate. Similar findings were also made by Napompeth (1973) who reported *Hasarius adansoni* (Aud.) of Araneidae predated on both adult and nymph in Hawaii. This study further hinted a rich community of spiders belonging to the families Lycosidae, Linyphiidae and Tetragnathidae as potential predators of nymphs and adults.

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Table 1. Parasitoids and predators observed on *P. maidis*

Species identified	Order	Family	Stage of predation	No. of eggs/ nymphs predated/ min
<i>Anagrus</i> sp.	Hymenoptera	Mymaridae	Egg (parasitisation)	1 egg
<i>Cheilomenes sexmaculata</i> (Fabricius)	Coleoptera	Coccinellidae	Nymphs	1 nymph
<i>Creontiades</i> sp.	Hemiptera	Miridae	Egg & nymphs	10 eggs & 1 nymph
<i>Tytthus parviceps</i> (Reuter)	Hemiptera	Miridae	Egg & nymphs	5 eggs & 1 nymph
<i>Chrysoperla</i> sp.	Neuroptera	Chrysopidae	Nymphs	1 nymph
<i>Micromustimidus</i> Hagen	Neuroptera	Hemerobiidae	Nymphs	1 nymph
<i>Monolepta signata</i> (Olivier)	Coleoptera	Chrysomelidae	Nymphs	1 nymph
<i>Erythraeus</i> sp.	Trombidiformes	Erythridae	Adults	----
<i>Callitrichia</i> sp.	Araneae	Linyphiidae	Nymphs & adults	1 nymph/ adult
<i>Cheiracanthium approximatum</i>	Araneae	Cheiracanthiidae	Nymphs & adults	1 nymph/ adult
<i>Marengo</i> sp.	Araneae	Salticidae	Nymphs & adults	1 nymph/ adult
<i>Neoscona</i> sp.	Araneae	Araneidae	Nymphs & adults	1 nymph/ adult
<i>Plexippus petersi</i>	Araneae	Salticidae	Nymphs & adults	1 nymph/ adult
Unidentified	Araneae	Linyphiidae	Nymphs & adults	1 nymph/ adult

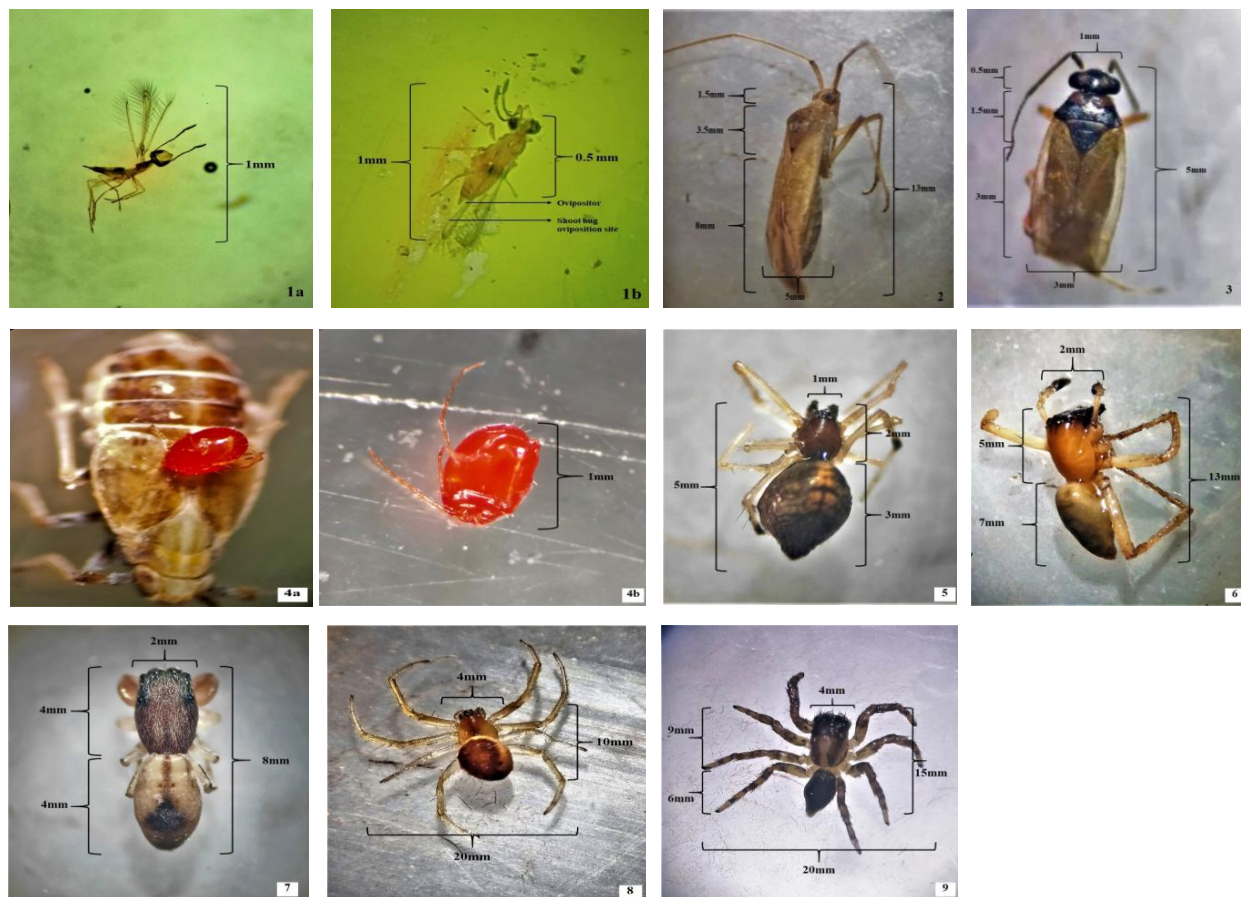


Fig. 1a. *Anagyrus* sp. 1b. *Anagyrus* sp. parasitizing shoot bug egg; 2. *Creontiades* sp.; 3. *Tyththus parviceps*; 4a. *Erythraeus* sp. clinging to thoracic region of shoot bug; 4b. *Erythraeus* sp.; 5. *Callitrichia* sp.; 6. *Cheiracanthum approximatum*; 7. *Marengo* sp.; 8. *Neoscona* sp.; 9. *Plexippus petersi*

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