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## New record of larval parasitoids and predatory spiders on fall armyworm *Spodoptera frugiperda* (J.E. Smith) (Noctuidae: Lepidoptera) in Tamil Nadu

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**Abstract**

Maize is widely cultivated food and fodder crop in Tamil Nadu. Fall armyworm (*Spodoptera frugiperda*) is considered as an invasive pest of maize throughout India. Random survey was made during *Kharif* 2019 and *Rabi* 2019 -20 at different locations of Ariyalur and Perambalur districts of Tamil Nadu to study the natural occurrence of parasitoids and predators on FAW. Four parasitoids namely *Peribeae* sp (Diptera: Tachinidae), *Euplectrus* sp. nr. *Xanthocephalus* Girault (Hymenoptera: Eulophidae), *Temelucha* sp. (Hymenoptera: Ichneumonidae) and *Microplitis demolitor* Wilkinson (Hymenoptera: Braconidae) were identified on *S. frugiperda* first time in Tamil Nadu. Two spider species discovered were Jumping spider (Salticidae: Araneae) and Striped lynx spider *Oxyopus javanus* (Oxyopidae: Araneae).

**Keywords:** maize, fall armyworm, predator, parasitoid, *Kharif* and *Rabi*

**Introduction**

The Fall Armyworm (FAW), *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae), is native of tropical and subtropical regions of the Americas which is highly mobile and economically destructive pest. Being polyphagous in nature, it feeds on more than 80 species of crops including maize, sorghum, millet, rice, sugarcane, cotton and vegetable crops (Assefa, 2018)<sup>[2]</sup>. The first infestation of *S. frugiperda* was reported formally in Africa during 2016 and spread to several parts of the African continent. The estimated loss in maize production have been 2.5 to 6 million US \$ in Africa during 2017 (Day *et al.*, 2017)<sup>[3]</sup>. It has potential to inflict a loss of 8 to 20 million tonnes of maize every year in the absence of effective control methods and it has invaded 44 African nations already (Rwomushana *et al.*, 2018). *S. frugiperda* affected the food security and livelihoods of several million smallholder farmers in Africa (Padhee and Prasanna, 2019)<sup>[9]</sup>. In India, the pest was first reported in Karnataka in July, 2018 (Sharanabasappa *et al.*, 2018)<sup>[11]</sup>. Natural enemies plays a vital role in the management of FAW in its native habitat and resulted substantial reduction in the population.

**Materials and Methodology**

Surveys were conducted to explore the natural occurrence of parasitoids and predators on *S. frugiperda* at major maize growing in Tamil Nadu during 2019-20. Plants with obvious FAW attack symptoms were selected and examined for the presence of FAW larvae in each area. Plant leaves, whorls, and upper and lower surfaces were well examined. FAW larvae of various stages were collected from infested maize plants, along with a piece of fresh leaf to allow the larvae to continue feeding. Individual FAW larva was collected in separate plastic cover (10x15 cm) to avoid cannibalism and brought to Plant Protection Laboratory, Anbil Dharmalingam Agricultural and Research Institute, Tiruchirappalli, Tamil Nadu. In the laboratory, larvae were transferred to individual petriplates. Bottom of the petriplates were provided with moistened whatsmann filterpaper No 41 to avoid drying of maize leaves. At two days interval food material was changed and fecal matter and remaining food materials were removed. Larvae were monitored for emergence of parasitoid at six hours interval. Emerged parasitoids were killed and stored in 70 per cent ethanol for identifying the specimen. Predatory spiders feeding on FAW larvae were collected from field. Spiders were killed in killing bottle and stored in 70 per cent ethanol for identification. The parasitoid specimens were identified by Dr. J. Poorani, Scientist, National Research Center for Banana, Tiruchirappalli.

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## Results and Discussions

During survey four larval parasitoid species and two spider species were recorded first time on FAW in Tamil Nadu. The parasitoids identified were *Peribeae* sp (Diptera: Tachinidae), *Euplectrus* sp. nr. *Xanthocephalus* Girault (Hymenoptera: Eulophidae), *Temelucha* sp. (Hymenoptera: Ichneumonidae) and *Microplitis demolitor* Wilkinson (Hymenoptera: Braconidae). Jumping spider (Salticidae: Araneae) and Striped lynx spider *Oxyopus javanus* (Oxyopidae: Araneae) were recorded as predators on FAW larvae in maize ecosystem during *Kharif* 2019 and *Rabi* 2019-2020.

*Microplitis demolitor* Wilkinson (Hymenoptera: Braconidae) was first time reported on *S. frugiperda* in Tamil Nadu by our study. *M. demolitor* was a solitary braconid larval parasitoid of FAW. The early stage of larvae were attacked and few days after attack the host stopped feeding. The parasitoid larva exit the host and pupate. The adult longevity period was 7 days. In India, *Microplitis manila* Ashmead was earlier reported by Firake and Behere (2020) [4]. Shepard *et al.* (1983) [13] reported FAW larvae were parasitized by *M. demolitor* in Queensland. *Euplectrus* sp.nr. *Xanthocephalus* Girault was first reported on FAW in Tamil Nadu through our study. *Euplectrus* sp. nr. *Xanthocephalus* Girault was a larval ectoparasitoid and koinobiont in nature. Grubs were above the epidermis of FAW second and third instar larvae. It grew

outside the larval body and moved down the dead host body when they were ready to pupate, started to spin the cocoon. The adult longevity was seven days. *Euplectrus platyhypenae* Howard (Hymenoptera: Eulophidae) was earlier reported in Argentina, Americas and Caribbean basin, Taxes, Mexico and Florida by Murua *et al.* (2009) [7], Molina-Ochoa *et al.* (2001) [6], Vickery (1929) [14], Ruiz-Najera *et al.* (2007) [11], Ordonez-Garcia *et al.* (2015) [8] and Hay-Roe *et al.* (2016) [5] on FAW. *Peribeae* sp. was the larval dipteran parasitoid first time reported on FAW in Tamil Nadu. The maggot fed on host larvae and it reached the final instar and left their host body and pupate outside. Tachinid parasitoid *Peribeae orbata* was earlier reported on *S. litura* up to 24 per cent under field condition (Rao and Satyanarayana, 1989) [10]. *Temelucha* sp. was larval parasitoid and first time recorded on FAW in Tamil Nadu. Second and third instar larvae were attacked by *Temelucha* sp. Three per cent parasitization by *Temelucha* sp. on FAW was reported earlier by Ashley (1986) [1]. Striped lynx spider *Oxyopus javanus* (Oxyopidae: Araneae) was first time reported in Tamil Nadu through our study. The predatory nature of *Oxyopus birmanicus* on FAW larvae was earlier reported by Firake and Behere (2020). Native larval parasitoids and predatory spiders should be considered as good candidate to achieve significant reduction in FAW population.



*Temelucha* sp.



*Microplitis demolitor*



*Euplectrus* sp.



*Peribeae* sp.

Striped lynx spider - *Oxyopus javanus* Predatory - Jumping spider**Table 1:** List of new record of FAW Parasitoids and predatory spider

S. No	Parasitoids and predators	Order-Family	Type
1	<i>Peribeae</i> sp.	Diptera: Tachinidae	Larval parasitoid
2	<i>Euplectrus</i> sp. nr. <i>Xanthocephalus</i> Girault	Hymenoptera: Eulophidae	Larval parasitoid
3	<i>Temelucha</i> sp.	Hymenoptera: Ichneumonidae	Larval parasitoid
4	<i>Microplitis demolitor</i> Wilkinson	Hymenoptera: Braconidae	Larval parasitoid
5	<i>Oxyopus javanus</i>	Oxyopidae: Araneae	Predatory spider
6	Jumping spider	Salticidae: Araneae	Predatory spider

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