



Research Article

Phytoseiid mite fauna associated with major vegetable crops of Thrissur District, Kerala

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ABSTRACT: A purposive survey was undertaken to explore the predatory mite fauna associated with the vegetable crops *viz.* amaranthus, brinjal, bhindi, bittergourd, chilli, cowpea, coccinia, cucumber, snakegourd and snap melon from major vegetable growing tracts of Thrissur district, Kerala during 2014-2015. A total of nine species of mites belonging to the family Phytoseiidae were identified. Faunal studies revealed highest species richness of mites on brinjal comprising nine species and the least species richness on bitter gourd, chilli, cucumber, snap melon and snakegourd with four species each. *Neoseiulus longispinosus* Evans was recognised to be the predominant predatory mite species on all the vegetables. The other important phytoseiid predators recorded in the study include *Amblyseius paraaerialis* Muma, *Amblyseius largoensis* (Muma), *Paraphytoseius orientalis* Narayanan, *Euseius macrospatulatus* Gupta, *Euseius* sp. nr. *prasadi*, *Typhlodromips syzygii* Gupta, *Phytoseius intermedius* Evans and *Scapulaseius* sp.

KEY WORDS: Predatory mite, Phytoseiidae, amaranthus, brinjal, bhindi, bittergourd, chilli, cowpea, coccinia, cucumber, snakegourd, snap melon

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INTRODUCTION

Mites are the most important group of non-insect pests of great significance in recent years due to their devastating damage potential. The average yield loss in vegetable crops due to mite pests in India was estimated to be around 25 per cent (Gupta, 1991). Farmers depend mostly on synthetic acaricides for managing the mite problems because of instant spectacular knock down effects. But this leads to several problems such as resurgence, development of resistance to acaricides and adverse effect on natural enemy fauna. Emphasis should now be given to safer alternative management strategies of which, biological control using predatory mites is emerging as a promising tactic against mite pests of vegetables. The plant inhabiting predatory mites mostly belong to the family Phytoseiidae under the order Mesostigmata. Members of the family have great economic importance, as several phytoseiid mites are used for biological control of mite pests (Moraes, 2002). Knowledge about the prevailing native predatory mite fauna in vegetable ecosystems is important for the identification of prospective species to be used in biological control programmes. However, information on the faunal composition of phytoseiid predators associated with phytophagous mites

infesting vegetable crops in Kerala is very much limited. In view of these facts, the study was carried out to provide a database on the important phytoseiid predatory species associated with major vegetable crops grown in Thrissur district, Kerala.

MATERIALS AND METHODS

The present study was undertaken at the Acarology Laboratory, Department of Agricultural Entomology, College of Horticulture, Vellanikkara during 2014 – 2015 to explore the diversity of predatory mite fauna in the vegetable ecosystems of Thrissur district, Kerala. Purposive surveys were conducted during August, 2014 to May 2015 in the farmers' fields of different vegetable growing tracts of Thrissur district namely Vellanikkara (26mMSL, 10.54°N, 76.27°E), Elanadu (62m MSL, 10.63°N, 76.39°E), Pazhayannur (62m MSL, 10.63°N, 76.39°E), Anthikkad (11m MSL, 10.45°N, 76.11°E), Chelakkara (30m MSL, 10.69°N, 76.35°E), Mala (52m MSL, 10.72°N, 75.42°E), Thanniyam (11m MSL, 10.41°N, 76.35°E), and Vadakkanchery (61m MSL, 10.59°N, 76.48°E) to collect predatory mites associated with ten major vegetable crops. Mite infested leaf samples were collected from randomly selected plants of

amaranthus, brinjal, bhindi, bittergourd, cowpea, coccinia, chilli, cucumber, snap melon and snakegourd separately in polythene covers (40cm × 30 cm and 50 μ) from each locality, labelled and brought to the laboratory for further examination and extraction of the mites.

In the laboratory, the leaves were observed under stereo binocular microscope with a magnification ranging from 10 to 35X. The mite specimens were collected using camel hair brush and preserved in 70 per cent ethyl alcohol with a few drops of glycerol taken in glass vials of 1.5ml

Table 1. Phytoseiid mite fauna in vegetable crops of Thrissur District, Kerala

Host plant	Phytoseiid species	Phytophagous mite	
		Genus/ species	Family
Amaranthus	<i>Neoseiulus longispinosus</i>	<i>Tetranychus truncatus</i> Ehara	Tetranychidae
	<i>Paraphytoseius orientalis</i>	<i>Brevipalpus phoenicis</i> Geijskes	Tenuipalpidae
	<i>Amblyseius paraaerialis</i>		
	<i>Amblyseius largoensis</i>		
	<i>Euseius macrospatulatus</i>		
	<i>Euseius</i> sp. nr. <i>prasadi</i>		
	<i>Typhlodromips syzygii</i> <i>Scapulaseius</i> sp.		
Okra	<i>Neoseiulus longispinosus</i>	<i>Tetranychus urticae</i> Koch	Tetranychidae
	<i>Amblyseius paraaerialis</i>	<i>Tetranychus macfarlanei</i> Baker	
	<i>Euseius macrospatulatus</i>	<i>Eutetranychus orientalis</i> Klein	
	<i>Euseius</i> sp. nr. <i>prasadi</i>		
Bitter gourd	<i>Neoseiulus longispinosus</i>	<i>T. truncatus</i>	Tetranychidae
	<i>Amblyseius paraaerialis</i>		
	<i>Euseius macrospatulatus</i>		
	<i>Typhlodromips syzygii</i>		
Brinjal	<i>Neoseiulus longispinosus</i>	<i>T. truncatus</i>	Tetranychidae
	<i>Amblyseius paraaerialis</i>	<i>T. macfarlanei</i>	Tetranychidae
	<i>Amblyseius largoensis</i>		Tetranychidae
	<i>Euseius macrospatulatus</i>		
	<i>Euseius</i> sp. nr. <i>prasadi</i>		
	<i>Typhlodromips syzygii</i>		
	<i>Paraphytoseius orientalis</i>		
	<i>Phytoseius intermedius</i> <i>Scapulaseius</i> sp.		
Chilli	<i>Neoseiulus longispinosus</i>	<i>Polyphagotarsonemus latus</i> (Banks)	Tarsonemidae
	<i>Amblyseius paraaerialis</i>		
	<i>Euseius macrospatulatus</i>		
	<i>Typhlodromips syzygii</i>		
Cowpea	<i>Neoseiulus longispinosus</i>	<i>T. truncatus</i>	Tetranychidae
	<i>Amblyseius paraaerialis</i>	<i>T. macfarlanei</i>	Tetranychidae
	<i>Amblyseius largoensis</i>	<i>P. latus</i>	Tarsonemidae
	<i>Euseius macrospatulatus</i>		
	<i>Euseius</i> sp. nr. <i>prasadi</i>		
	<i>Typhlodromips syzygii</i>		
Coccinia	<i>Neoseiulus longispinosus</i>	<i>Tetranychus</i> sp.	Tetranychidae
	<i>Amblyseius paraaerialis</i>		
	<i>Amblyseius largoensis</i>		
	<i>Euseius macrospatulatus</i>		
	<i>Typhlodromips syzygii</i>		
Cucumber	<i>Neoseiulus longispinosus</i>	<i>T. truncatus</i>	Tetranychidae
	<i>Amblyseius paraaerialis</i>		
	<i>Euseius macrospatulatus</i>		
	<i>Typhlodromips syzygii</i>		
Snake gourd	<i>Neoseiulus longispinosus</i>	<i>T. truncatus</i>	Tetranychidae
	<i>Amblyseius paraaerialis</i>	<i>T. macfarlanei</i>	Tetranychidae
	<i>Euseius macrospatulatus</i>		
	<i>Typhlodromips syzygii</i>		
Snap melon	<i>Neoseiulus longispinosus</i>	<i>T. truncatus</i>	Tetranychidae
	<i>Amblyseius paraaerialis</i>		
	<i>Euseius macrospatulatus</i>		
	<i>Typhlodromips syzygii</i>		

capacity and labelled. The predatory mites and associated prey mites were picked with fine syringe needles moistened with media and mounted on glass slides in Hoyer's medium. The mounted specimens were kept in an oven at 40°C for seven to ten days and dried specimens were then labelled and numbered serially for identification. The permanent slides prepared were observed under phase contrast microscope (Leica DM 500), taxonomic characters studied and images recorded with the help of image analyser software. Based on the taxonomic features, identification of the mite specimens were done upto the species level using standard taxonomic keys (Gupta, 2002; Chant and McMurtry, 2007; Gowda, 2009; Mallik *et al.*, 2010).

RESULTS AND DISCUSSION

A total of 9 species of Phytoseiid mites were recorded during the present study represented by the genera *Neoseiulus*, *Amblyseius*, *Typhlodromips*, *Euseius*, *Paraphytoseius*, *Phytoseius* and *Scapulaseius* (Table 1). The associated phytophagous prey mite families recorded were Tetranychidae, Tenuipalpidae and Tarsonemidae represented by the genera *Tetranychus*, *Eutetranychus*, *Brevipalpus* and *Polyphagotarsonemus*. The acarine faunal diversity of Phytoseiids on different vegetable crops in Thrissur district, Kerala is detailed below.

Phytoseiid mites were found to be the most common predators associated with phytophagous mites in the vegetable fields of Thrissur district, Kerala. Study conducted in Dharwad on the diversity of mites in brinjal ecosystem also revealed phytoseiid mites as the major predators of phytophagous mites (Prasanna, 2007). Among the Phytoseiid mites, *Neoseiulus longispinosus* Evans was the predominant species recorded in association with phytophagous mites in all the vegetable fields surveyed. Other species were *Amblyseius paraaerialis* Muma, *Amblyseius largoensis* (Muma), *Euseius macrospatulatus* Gupta, *Euseius* sp. nr. *prasadi*, *Typhlodromips syzygii* Gupta, *Paraphytoseius orientalis* Narayanan, *Phytoseius intermedius* Evans and *Scapulaseius* sp. The associated prey mites were *Tetranychus macfarlanei* Baker, *Eutetranychus orientalis* Klein, *Brevipalpus phoenicis* Geijskes and *Polyphagotarsonemus latus* (Banks). Several species of phytoseiid mites were reported as effective predators of plant feeding mites all over the world in many diverse crop ecosystems (Abhilash, 2001; Sadanandan and Ramani, 2006 and Karmakar and Gupta, 2010). A total of 7 species of predatory mites belonging to the family Phytoseiidae were reported from major vegetable crops in Thrissur, Kerala (Binisha and Bhaskar, 2013).

The study revealed highest species richness of phyto-

seiidmites in brinjal, with a total of nine species. Faunal studies conducted earlier during 2011 – 12 in the district in six vegetable crops also revealed highest diversity of mites in brinjal with three phytophagous and seven predatory mite species (Binisha and Bhaskar, 2013).

All the species collected during the present study except *Euseius* sp. nr. *prasadi*, and *P. intermedius* have been recorded from Kerala on different host plants (Haneef and Sadanandan, 2013 and Binisha *et al.*, 2013). Haneef and Sadanandan (2013) recorded the phytoseiidmites, *A. largoensis* and *T. syzygii* from North Kerala. *N. longispinosus*, *A. paraaerialis*, *E. macrospatulatus*, *T. syzygii*, *P. orientalis* and *Scapulaseius* sp. were recorded earlier from Thrissur district (Binisha *et al.*, 2013). *Euseius* sp. nr. *prasadi* and *P. intermedius* have earlier been reported from Karnataka (Zeiti, 2011). However, these are new records for Kerala.

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