



Survey of Predatory Mites (Acari: Phytoseiidae) Associated With Economically Important Plants of North Kerala

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ABSTRACT: The paper embodies the results of a survey conducted on the predatory mite fauna associated with 32 species of economically important plants belonging to 27 genera and 21 families grown in three districts of North Kerala. The results yielded 15 species of predatory mites belonging to 6 genera viz., *Amblyseius*, *Typhlodromips*, *Euseius*, *Neoseiulus*, *Phytoseius* and *Paraphytoseius* which comes under the sub order Mesostigmata.

Keywords: Predatory mites, Phytoseiidae, North Kerala

INTRODUCTION

Predatory mites deserve special mention in an agricultural country like India, where agriculture is always under the threat of constant pest attack. Predatory mites of the family Phytoseiidae constitute a highly significant beneficial group on account of their vital role in the maintenance of pest population below economic injury level. Predatory mites are now valued with growers worldwide as natural enemies that provide effective pest control in greenhouses and on agricultural crops (Bjorson 2008). Phytoseiid mites have received global attention since the 1950's due to their importance as natural predators of phytophagous mites and small insects and therefore are useful in the biological and integrated control of crop pests (Swirskii *et al.*, 1997).

The widespread use of synthetic organic compound against insects as target pests has toxic effects on other non target organisms in both lower and higher trophic levels (Dejan *et al.*, 2011). Consumers worldwide are now strongly demanding agricultural products grown with few or no chemicals. Many farmers are aware of the dangers of excessive chemicals and are now trying to replace chemicals with natural enemies or organic pesticide. Biological control with natural enemies such as predators, parasites or pathogens is viable alternative to chemical control measures. Natural enemies can be native or introduced. The use of natural enemies prevents environmental risks associated with chemical pesticides, while sustainably protecting the crop, given that the biological control agent does not cause any harmful non-target effects. Predatory mites of the family Phytoseiidae are of economic importance because they efficiently control pest mites in many crops around the world (Sabelis, 1985).

The species of Phytoseiidae are potentially important as a biotic factor in the control of phytophagous mites particularly tetranychid and eriophyid mites. Mass multiplication methods have been developed to use these predators in commercial scale on a variety of crops. The most important predatory mites explored in this regard include members of Phytoseiidae, Cheyletidae, Cunaxidae, Stigmaeidae, Bdellidae, Tydeidae, Anystidae and Erythraeidae. Biological control of phytophagous mites by predatory mites (Family: Phytoseiidae) had been proved successful alternative to conventional chemical control, especially on green house crops (Gerson *et al.*, 2007).

Faunistic studies on Phytoseiidae of the country has fairly well progressed, 189 species have been reported from the country, compared to 2280+ species from the world (Mallik *et al.*, 2010). Despite of the relevance of predatory mites they have not acquired desired recognition in many parts of the world, especially in Kerala. Considering the above situation the present survey makes an attempt to unravel the predatory mite (Family: Phytoseiidae) population on economically important plants from three districts of North Kerala, viz., Wayanad, Kozhikode and Malappuram.

MATERIAL AND METHODS

The predatory mite fauna (Family: Phytoseiidae) harbouring on various species of economically important plants were collected by making extensive surveys covering different localities of Wayanad, Kozhikode and Malappuram districts. Sampling were carried out from October 2012 to March 2013.

A total of 32 species belonging to 27 genera and 21 families of economically important plants were surveyed.

They comprised fruit crops, vegetables, tuber crops and medicinal plants. Table 1 provides information on the various species of plants surveyed from three districts. Phytoseiid mites of comparatively larger size and fast moving nature were collected directly from the field with the help of hand lens and camel hair brush. They were preserved in 70% alcohol until permanent slides were prepared. Beating method was generally adopted for the collection of predatory mites directly from the field. The mite infested plant parts were beaten over dark coloured rexin sheet and the mites thus dislodged were picked up with a moistened camel hair brush. The mites picked up were stored in 70% alcohol containing a few drops of lactic acid. They were then upgraded in alcohol series and then mounted in Hoyers medium permanently. After mounting, the slides were kept in an oven at 40-45°C or under a table lamp for at least two days which hastens the clearing process and subsequent drying of the slides. The specimens were thoroughly examined and identified with the help of relevant literature and also seeking opinion from experts.

RESULTS AND DISCUSSION

The results of the survey revealed the occurrence of 15 species of mites belonging to 6 genera viz., *Amblyseius*, *Typhlodromips*, *Neoseiulus*, *Euseius*, *Phytoseius* and *Paraphytoseius* under the sub order Mesostigmata (Table 1). Under the genus *Amblyseius* 8 species were recorded viz., *A. aerialis*, *A. indirae*, *A. channabasavannai*, *A. kundurukkae*, *A. largoensis*, *A. orientalis*, *A. herbicolus*, *A. kulini*. Under the genus *Euseius* 2 species were recovered, *E. coccinea* and *E. alstoniae* respectively. *T. syzygii* is the only species recovered from genus *Typhlodromips*. The genus *Phytoseius* gave 2 species, *P. wainsteini* and *P. punjabensis* respectively. A single species was obtained from genus *Neoseiulus*, viz., *N. longispinosus*. *P. scleroticus*

is the only species obtained from genus *Paraphytoseius*.

The family Phytoseiidae has been reported as the largest family of Gamasida (Mesostigmata) with more than 1000 species described which has gained importance in biological control of Tetranychid mites in various agro-ecosystems. (Mc Murty, 1982; Mc Murty *et al.*, 1989). Phytoseiid mites are well known predators and have got immense significance in IPM programs to control different phytophagous mites, small soft bodied insects and their eggs.

Chant & Yoshida Shaul, 1992 have mentioned more than 1614 species of Phytoseiid's have been described in the world so far and they further opine that this trend would keep increasing mainly under the two sub families, Amblyseiinae and Phytoseiinae of the family Phytoseiidae.

However our knowledge on the Phytoseiid mite is still in its infancy as only 189 species were reported so far from India. In this context the result of the study appear to be quite encouraging as 32 species could be recovered during the survey. Further, results of the study revealed the prevalence and species diversity of the genus *Amblyseius* on various species of plants surveyed (Table 1).

The Phytoseiid mites, especially those belonging to genera like *Amblyseius*, *Neoseiulus* and *Euseius* have been considered as important predators of tetranychids, eriophyids, tarsonemids, thrips, white flies and so on (Mc Murty and Rodriguez, 1989). The distribution of species of *Amblyseius*, *Neoseiulus*, *Euseius* and *Phytoseius* as observed during the study in association with spider mites and insects like coccids white flies etc also supports the above findings.

The relative abundance of the various genera recovered during the survey could therefore be represented as *Amblyseius* > *Euseius* = *Phytoseius* > *Neoseiulus* = *Typhlodromips* = *Paraphytoseius*.

Table 1: Distribution of Phytoseiid mites with respect to host plants in various localities of Kozhikode district.

Sl. No.	Species	Host plant	Location
	Family: Phytoseiidae Berlese, 1952 Subfamily: Amblyseiinae Muma, 1961 Genus: Amblyseius Berlese, 1915		
1.	<i>Amblyseius indirae</i> Gupta, 1985	<i>Psidium guajava</i> L. <i>Cucurbita maxima</i> <i>Piper longum</i>	Wayanad Calicut Calicut
2.	<i>Amblyseius aerialis</i> (Muma), 1955	<i>Amorphophallus companulatus</i> Blume. <i>Citrus lemon</i>	Malappuram Malappuram Calicut
3.	<i>Amblyseius channabasavannai</i> Gupta and Daniel, 1978	<i>Citrus medica</i> <i>Cocos nucifera</i> <i>Abelmoschus esculentus</i> L.	Malappuram Wayanad Calicut
4.	<i>Amblyseius largoensis</i> (Muma).	<i>Tectona grandis</i> <i>Mangifera indica</i> <i>Piper nigrum</i> <i>Citrus sinensis</i> L. <i>Saraca asoca</i> (Roxb.) De Wilde	Calicut Wayanad Wayanad Calicut Malappuram
5.	<i>Amblyseius kulini</i> Gupta, 1978	<i>Vathria indica</i> <i>Murraya koenigii</i> <i>Capsicum annum</i>	Malappuram Calicut Calicut
6.	<i>Amblyseius kundurukae</i> Mary Anitha and Ramani, 2004	<i>Morus alba</i> <i>Achras sapota</i>	Calicut Wayanad
7.	<i>Amblyseius orientalis</i> Ehara, 1957	<i>Dolichos lablab</i> <i>Carica papaya</i> <i>Maranda arundinaceae</i>	Calicut Calicut Malappuram
8.	<i>Amblyseius herbicolus</i> Chant, 1959	<i>Pisum sativum</i> <i>Manihot esculenta</i> <i>Solanum melongena</i>	All three districts surveyed
	Genus: Euseius Wainstein, 1962		
9.	<i>Euseius coccineae</i> Gupta, 1975	<i>Dolichos lablab</i> L. <i>Luffa acutangula</i>	Calicut Wayanad
10.	<i>Euseius alstoniae</i> Gupta, 1975	<i>Artocarpus hirsute</i> <i>Jasminum gradiflorum</i>	Wayanad Wayanad
	Genus: Neoseiulus Hughes, 1948		
11.	<i>Neoseiulus longispinosus</i> (Evans), 1952	<i>Manihot esculenta</i> Crantz. <i>Solanum melongena</i> <i>Rosa indica</i>	Calicut Wayanad Malappuram
	Genus: Typhlodromips De Leon, 1965		
12.	<i>Typhlodromips syzygii</i> (Gupta), 1975	<i>Amaranthus viridis</i> L.	Calicut
	Subfamily: Phytoseiinae Berlese, 1916 Genus: Phytoseius Ribaga, 1904		
13.	<i>Phytoseius punjabensis</i> Gupta, 1975	<i>Ficus carica</i>	Wayanad
14.	<i>Phytoseius wainsteini</i> (Gomelaui), 1968	<i>Morus rubra</i>	Calicut
	Genus: Paraphytoseius Swirski and Shechter, 1961		
15.	<i>Paraphytoseius scleroticus</i> Gupta and Ray, 1981	<i>Abelmoschus esculentus</i>	Calicut

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