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Research Note

Predatory mites associated with phytophagous mites of temperate and sub-tropical fruit trees in Himachal Pradesh

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ABSTRACT: **Survey was conducted during 1999-2001 in different parts of temperate and sub-tropical zones of Himachal Pradesh. During the surveys ten species of predatory mites, *viz. Euseius finlandicus* Oudemnas, *Neoseiulus longispinosus* Evans, *Phytoseius crinitus* Swirski & Shechter, *Phytoseius intermedius* Evans & Macfarlane, *Typhlodromus homalii* Gupta, *Agistemus* sp., *Tydeus* sp., *Biscirus* sp., *Tyrophagus putrescentiae* (Schrank) and *Tyrophagus* sp. were found associated with phytophagous mites infesting temperate and sub-tropical fruit crops. Out of the above-mentioned species, the most common occurring species were *E. finlandicus*, *N. longispinosus*, *P. intermedius*, *Agistemus* sp. and *T. putrescentiae*. *E. finlandicus* was associated with *Panonychus ulmi* Koch, *Tetranychus urticae* Koch and *Brevipalpus californicus* Banks; *N. longispinosus* with *Tetranychus* sp., *P. intermedius* with *Aceria litchi* L. whereas, *T. putrescentiae* was collected from decaying leaves. Among the species reported *Phytoseius crinitus*, *P. intermedius* and *T. homalii* are new to Himachal Pradesh. *Agistemus*, *Tydeus* and *Biscirus* could be identified only up to the generic level.**

KEY WORDS: Fruit crops, predatory mites, phytophagous mites

In recent years there has been increased interest in the study of predators associated with crops in India because of the harmful effects of pesticides and partly because of increased research in integrated pest management (Singh, 1998). During the last two decades the role of phytoseiid predators of phytophagous mites in integerated pest management has been appreciated all over the world. Predaceous mites belonging to families Phytoseiidae and Stigmaeiidae are recognized as predators on *Tetranychus cinnabarinus* Boisduval, *Brevipalpus phoenicis* (Geijskes) and *Oligonychus* sp.) (Dhooria, 1998). Predatory mite species such as *Metaseiulus occidentalis* Nebsitt, *Typhlodromus pyri* Scheuten, *Amblyseius andersoni* Chant and stigmaeid mite, *Zetzellia mali* (Ewing) are reported to give effective control of European red mite, *Panonychus ulmi* Koch, two spotted spider mite, *Tetranychus urticae* Koch, *Eotetranychus* sp. and *Bryobia rubrioculus* (Scheuten) (Croft and Slone, 1997).

The agro-climatic conditions of Himachal Pradesh, which is called the "fruit bowl" of India, are suited for the production of various types of temperate and sub-tropical fruit crops. In the fruit belt of the State. *P. ulmi* and *T. urticae* have become prominent pests of apple (Kumar and Bhalla

1993). The phytoseiid mites - *E. finlandicus*, *N. longispinosus* and *Agistemus* sp. have been recorded to feed on *P. ulmi* and *T. urticae*. However, due to indiscriminate use of insecticides and acaricides on fruit crops the predator population has become very scarce. In order to avoid excessive use of insecticides and the problem of resistance there is an urgent need to exploit the pest control potential of predaceous mites. The present study was undertaken to identify the host range and distribution of predatory mites in different fruit growing regions of Himachal Pradesh, so that they can be mass reared and released in the field as an ecofriendly approach.

Periodic surveys for the incidence of predatory mites on fruit trees were undertaken in nine districts of Himachal Pradesh which is situated between 30°2" North latitude and 75°47" to 79°4" longitude and at altitudes varying from 350 – 7000 m amsl during the year 1999-2002. The elevations of the areas surveyed for the infestation of mites varied from 430-2290 m amsl. The mite infested plant parts (leaves and twigs) were collected in polythene bags/ vials, labeled and brought to the laboratory for processing. The mite infested plant parts were observed under a microscope. The predatory mites were found in association with phytophagous mites and were collected separately. The predatory mites are fast moving with long legs and can be easily identified. Only the adults with special attention to males of each species were collected. The specimens were cleared in lactic acid (35%) and mounted in Hoer's medium as per the method of Jeppson *et al.* (1975). The permanent slides prepared were observed under microscope for important taxonomic characters on the basis of which identification of the specimen is possible.

The results of mites associated with various fruit trees along with host plants and distribution are presented in Table 1 & 2. The data presented reveal the presence of ten species of predatory mites belonging to seven genera (*Amblyseius*, *Phytoseius*, *Typhlodromus*, *Agistemus*, *Tydeus*, *Biscirus* and *Tyrophagous*) and five families (Phytoseiidae, Stigmaidae, Tydeidae, Bdellidae and Acaridae). The predatory mite, *E. finlandicus* was

Table 1. Predatory mites associated with phytophagous mites of temperate and sub-tropical fruit trees in Himachal Pradesh

Mite species		Host plant	Locality
Predator	Prey		
Phytoseiidae			
Euseius finlandicus Oudemans	*Panonychus ulmi* Koch *Brevipalpus californicus* Banks	Apple, walnut Pecan nut, mango	Chirgaon
	Tetranychus urticae Koch	Apple	Sundernagar
Neoseiulus longispinosus Evans	*Tetranychus* sp.	Fig, Guava	Solan (Nauni)
Phytoseius crinitus Swirski & Shechter	*Brevipalpus phoenicis* (Geijskes)	Kharna Khatta	Una (Jackhera, Raipur)
Phytoseius intermedius Evans & Macfarlane	*Aceria litchi* Keifer	Litchi	Nagrota Bagwan Sundernagar
Typhlodromus homalii Gupta			Kangra (Shahpur, Ranital)

found to be associated with *P. ulmi, Brevipalpus californicus* and *Tetranychus* spp. on the fruit crops; apple (*Malus domestica* L.), pecan nut (*Carya illinoensis* (Wang)), walnut (*Juglans regia* L.) and mango (*Mangifera indica* L.) at Chirgaon and Sundernagar. The species was found to be non-specific in its predatory habit as stated by Gupta (1985). *N. longispinosus* was collected from Nauni (Solan) on apple and fig, which were infested with *Tetranychus* spp. The association of *E. longispinosus* with *Tetranychus* spp. on above mentioned host plants has been reported by Gupta (1985).

Phytoseius crinitus was sparse on guava (*Psydium guajava* L.) and Kharna Khatta (*Citrus karna* Raf.) at Una. In the present study, it was found associated with *B. phoenicis* infesting guava and kharna khatta. The latter species could be its possible prey. This species is not known to occur in India and reported from Hong Kong, Madagascar and Japan on an unspecified mite host (Gupta, 1985). *P. intermedius* and *T. homalii* were collected on litchi leaves with greenish brown erinium at Kangra district (Nagrota Bagwan, Shahpur, Ranital). Both the species were found co-existing on litchi leaves infested with the litchi mite. The distribution of *Agistemus* species was recorded from Chirgaon, Una and Kullu for the first time from H. P. The species primarily a predator was collected as mixed population along with the phytophagous mite *B. phoenicis.* It has been described as an effective predator of *B. phoenicis* in Indonesia (Ehara and Oomen, 1983).

Tydeus sp. was collected on litchi, mango and lemon (*Citrus limon* L.) at Sundernagar. The species has been found associated with lemon at Ludhiana (Gupta *et al.*, 1971). However, the association of this species with mango and litchi at Sundernagar area constitutes a new report. *Biscirus* sp. was found on guava and Kharna Khatta at Solan (Nauni). Krantz (1978) reported *B. uncinatus* as an effective predator of the clover mite *B. praetiosa* Koch in the Western United States and balsam fir in Canada. The identification of *Agistemus, Tydeus* and *Biscirus* spp. could be established up to the generic level only. *T. putrescentiae* was collected on walnut,

Table 2. Predatory mites associated with phytophagous mites of temperate and sub-tropical fruit trees in Himachal Pradesh

Mite species		Host plant	Locality
Predator	Prey		
Stigmaeidae			
Agistemus sp.	*Brevipalpus phoenicis* (Geijskes)	Guava	Una (Jackhera,
		Kharna Khatta	Basdhera, Raipur)
	Panonychus ulmi Koch	Apple	
Tydeidae Tydeus sp.	*Aceria litchi* Keifer	Litchi	Chirgaon
	Tetranychus sp.	Mango	Sundernagar (Harabag)
	Tetranychus sp.	Lemon	
Bdellidae			
Biscirus sp.	*Tetranychus* sp.	Grapes	Solan (Nauni)
	Tetranychus sp.	Lemon	
Acaridae			
Tyrophagus putrescentiae (Schrank)	*Tetranychus* sp.	Walnut	Rajgarh
		Litchi	Jachh
Tyrophagus sp.	*Tetranychus* sp.	Sweet lime	Mashobra
	Panonychus ulmi Koch	Apple	

litchi and sweet lime (*Citrus aurantifolia* Chirstm) at Rajgarh (Sirmour), Jachh (Kangra). It has been reported on a wide range of hosts, *viz.* fruit crops, rice, wheat, barley, apple and fungus (Gupta, 1985; Estebanes and Rodriguez, 1991; Chmielewski, 1998). *Tyrophagous* sp. was restricted to apple at Mashobra.

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