



Mite pests of vegetable crops under protected cultivation in Kerala

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ABSTRACT: Survey conducted to document the diversity of mite pests and their natural enemies associated with vegetables grown under polyhouse, recorded tetranychids - *Tetranychus truncatus* on cucumber and amaranthus, *T. urticae*, *T. okinawanus* and *Eutetranychus orientalis* on cucumber and *T. macfarlanei* on cowpea and French bean and tarsonemid, *Polyphagotarsonemus latus* on cowpea, chilly, tomato, capsicum, cucumber, bittergourd and amaranthus. Insect predators - *Stethorus pauperculus*, *Oligota* sp., *Scolothrips* sp. and an unidentified species of Cecidomyiidae and predatory mites - *Neoseiulus longispinosus*, *Amblyseius paraaerialis*, *Tydeus gossabaensis*, *Agistemus garrulus*, *Cunaxa* sp. and *Cheyletus* sp., as natural enemies.

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Polyhouse cultivation is being promoted in a big way in the state by providing 75 per cent of the cost as subsidy to the farmers and now there are more than 600 polyhouses in Kerala for vegetable cultivation. The climate inside the polyhouse is very much suitable for the rapid development and multiplication of pests especially the sap feeding species. The most notorious among the sucking pests affecting polyhouse vegetables are the mites. Due to their small size, mites are often overlooked on crops at early stage of infestation. Short life cycle and high fecundity of mites along with the conducive microclimate inside the polyhouse often lead to heavy population buildup of mites on vegetable crops in polyhouses. Farmers usually resort to application of synthetic acaricides for mite management in polyhouses which results in resurgence and residue problems. In this context, the present study was carried out with the objective

of documenting the diversity of major species of mite pests and their natural enemies on vegetable crops grown in polyhouses of Kerala.

The work was carried out during 2013-2015 to explore the species diversity of mites and their natural enemies associated with major vegetable crops grown under protected cultivation in Kerala. Random roving surveys were carried out in the polyhouses and rain shelters located in five districts of Kerala, namely Thrissur, Palakkad, Wayanad, Trivandrum and Ernakulam to collect phytophagous mites and their natural enemies on major vegetable crops *viz.*, cucumber, cowpea, chilly, tomato, capsicum, cabbage, cauliflower, bitter gourd, French bean and amaranthus. Mite infested leaf samples were collected in polythene bags from randomly selected plants representing different vegetable crops from each polyhouse and brought to the

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laboratory. In the laboratory, the leaves were observed under stereomicroscope and 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 capacity and labeled. The prey and predatory mites collected in the survey were mounted in Hoyer's media to prepare permanent slides, labeled and numbered serially for identification. The permanent slides prepared were observed under phase contrast

microscope for species determination. The insect predators associated with the mites were also collected in polybags and brought to the laboratory where they were examined under stereo binocular microscope and identified.

Six species of phytophagous mites belonging to two different families namely, Tetranychidae and Tarsonemidae were recorded from different vegetable crops grown under protected cultivation

Table 1. Mite pests of vegetable crops in polyhouse

Mite species	Family	Host	District
<i>Tetranychus urticae</i> Koch	Tetranychidae	Cucumber	Thrissur, Wayanad
<i>Tetranychus truncatus</i> Ehara	Tetranychidae	Cucumber, Amaranthus	Thrissur, Palakkad, Wayanad, Ernakulam, Trivandrum
<i>Tetranychus okinawanus</i> Ehara	Tetranychidae	Cucumber	Thrissur
<i>Tetranychus macfarlanei</i> Baker and Pritchard	Tetranychidae	Cowpea, French bean	Thrissur, Wayanad
<i>Eutetranychus orientalis</i> (Klein)	Tetranychidae	Cucumber	Thrissur
<i>Polyphagotarsonemus latus</i> Banks	Tarsonemidae	Chilli, capsicum, tomato, cowpea, cucumber, bitter gourd	Thrissur, Trivandrum, Wayanad, Ernakulam

Table 2. Natural enemies of mite pests of vegetable in polyhouse

Species	Family	Order	Host
<i>Stethorus pauperculus</i> (Weise)	Coccinellidae	Coleoptera	Cucumber, amaranthus
<i>Oligota</i> sp.	Staphylinidae	Coleoptera	Cucumber, amaranthus
<i>Scolothrips</i> sp.	Thripidae	Thysanoptera	Cucumber, amaranthus
Unidentified	Cecidomyiidae	Diptera	Cucumber, amaranthus
<i>Neoseiulus longispinosus</i> (Evans)	Phytoseiidae	Mesostigmata	Cucumber, cowpea, amaranthus,
<i>Amblyseius paraaerialis</i> (Muma)	Phytoseiidae	Mesostigmata	Cucumber, cowpea, amaranthus
<i>Agistemus garrulus</i> (Chaudhari)	Stigmaeidae	Prostigmata	Cucumber, cowpea, chilly
<i>Tydeus gossabaensis</i> Gupta	Tydeidae	Prostigmata	Cucumber, cowpea, chilly
<i>Cunaxa</i> sp.	Cunaxidae	Prostigmata	Cucumber, cowpea
<i>Cheyletus</i> sp.	Cheyletidae	Prostigmata	Cucumber



Fig.1a. White speckling on cucumber

Fig. 2a. Infestation of *Polyphagotarsonemus latus* on cowpea

Fig. 3a. Stunted growth and bronzing of terminal leaves in chillies



Fig.1b. Spider mite infestation on cucumber

Fig. 2b. Bronzing and curling of leaves due to *P. latus*Fig. 3b. Damage by *P. latus* on chillies

in Kerala (Table 1). Four species of insect predators and six species of mite predators were recorded during the study, associated with mite pests of vegetables under protected cultivation (Table 2).

Phytophagous mites: Of the different species of spider mites collected on vegetables, *T. truncatus* was found to be predominant. It was recorded from all the localities surveyed during the study. Its hosts included cucumber and amaranthus. In cucumber, the mite preferred middle and lower leaves and infestation was pronounced during late vegetative stage. White speckling followed by yellowing and drying of the leaves were the associated symptoms (Fig.1a and 1b).

The tarsonemid mite, *Polyphagotarsonemus latus* Banks was recorded in polyhouses and rainshelter on cowpea, capsicum, chilli, cucumber, tomato and bitter gourd. However, severe infestation was found only on cowpea, capsicum and chilli. The mite infestation on tender terminal leaves lead to bronzing, curling and crinkling of terminal leaves followed by stunted growth and failure in flower

production. Severe infestation of *P. latus* on cowpea in a polyhouse at Mathilakam, Thrissur district during 2014 lead to complete failure of the crop (Fig. 2a and 2b). Similarly, chilli crop was completely destroyed by the mite species in a polyhouse at Anthikkad, Thrissur district during September, 2015 (Fig. 3a and 3b).

Natural enemies of mites: Four species of insect predators and six species of mite predators were recorded associated with mite pests of vegetables under protected cultivation during the study (Table 2).

Phytophagous mites are now becoming aggressive pests of most crops especially vegetables. The survey revealed six species of phytophagous mites infesting crops under protected cultivation. *T. truncatus* was first recorded in India from the Northwestern Himalayan regions of Jammu and Kashmir and Himachal Pradesh on *Dahlia* sp. (Rather, 1983). Later, the mite species was reported from Karnataka infesting mulberry leaves (Srinivasa *et al.*, 2012). During the study, *T. okinawanus* was

also recorded on cucumber. *T. truncatus* and *T. okinawanus* were reported from Kerala only very recently (Bennur *et al.*, 2015 and Lenin *et al.*, 2015). The two spotted spider mite, *T. urticae*, which was reported as the predominant species of mite infesting different vegetable crops of Kerala (Binisha and Bhaskar, 2013) was recorded in the study only on cucumber from Thrissur and Wayanad districts. *T. macfarlanei* was recorded on leguminous crops, cowpea and French bean. It was first reported from India during 1975 on brinjal (Pande and Yadava, 1976). Later, it was reported as a new pest of medicinal plants namely, *Clitoria ternatea* L. and *Justicia adhatoda* L. Nees. from India (Gupta, 2005). The mite species is now emerging as a major pest on a wide range of hosts, many of them being economically important (Ullah and Gotoh, 2013). *P. latus* was reported on a wide range of host plants belonging to more than 60 families. The vegetable hosts reported include chilli, beans, cowpea, cucumber, capsicum, brinjal, potato and tomato. The economic yield loss due to the broad mite was estimated to be 11 to 75 per cent in chilli (Dhandapani and Jayaraj, 1982).

The grubs and adults of *S. pauperculus* and *Oligota* sp. preyed on different stages of tetranychid mites. *S. pauperculus*, *Oligota* sp. were reported to be the efficient predators of spider mites in Coimbatore. Adult of *S. pauperculus* and the grub of *Oligota* sp. consumed maximum number of *T. urticae* in the laboratory (Jeyarani and Ramaraju, 2012). *N. longispinosus* is a potential predator of tetranychid mites, which can be successfully used for its management, especially under protected cultivation. The mass rearing techniques has been standardized by rearing *T. urticae* on bean plants (Sharma and Chauhan, 2013). The number of available natural enemies is considerable for developing an alternative management strategy of mite management for polyhouse crops. Early detection of mites is the most significant decision in the management strategy. Regular monitoring of the crop would help in early detection and there by timely intervention of management methods.

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