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# Diversity of mite fauna associated with various agro-horticultural crops in Jharkhand

**Suvash CH Bala, Krishna Karmakar and Sunil Kr Ghosh**

**Abstract**
The present study was conducted to explore and identify the predatory mites as well as phytophagous mites associated with different crops, weeds and forest plants in Jharkhand in March, 2017. A total of six species of predatory mites belonging to the order Mesostigmata viz., *Euseius alstoniae* (Gupta, 1975), *Euseius* sp1, *Typhlodromus* (*Anthoseius*) sp1, *Typhlodromips syzygii* (Gupta, 1975), *Amblyseius largoensis* (Muma, 1955) and *Scapulaseius asiaticus* (Evans, 1953) were recorded which belong to the family Phytoseiidae. Among them, *E. alstoniae* (Gupta) was found as the predominant species. The other important predatory mites belong to the families Stigmaeidae, Tydeidae, Bdellidae and Ascidae under the order Prostigmata was observed during the period of investigation. The phytophagous mites belong to the families Tetranychidae, (*Tetranychus urticae*, Koch, *Eutetranychus orientalis*, Klein and *Oligonychus* sp.) Tenuipalpidae (*Brevipalpus phoenicis*, Geisk) and Tarsonemidae, (*Polyphagotarsonemus latus*, Banks) under the same order Prostigmata were identified and found as a key mite pest in various plants in surveyed areas of Jharkhand.

**Keywords:** Plant mites, host, survey, Jharkhand

## 1. Introduction
The state Jharkhand is suitable for growing a large number of vegetables and ornamental crops including different forest plants. Due to introduction of high yielding varieties and adoption of modern cultural practices mite pest problem has been increasing day by day and affecting different crops, weeds and forest plants. Consequently, mite pest has been appeared one of the major threats in successful crops cultivation [2] in diverse agro-ecosystem in India. Among them, spider mite problem is a serious concern for commercial cultivation of solanacious and cucurbit vegetables [12, 8]. The average yield loss was estimated around 9.15-100% in vegetable crops due to severe infestation of spider mite [4, 8, 10, 9, 11, 14] in different agro-climate regions of India. In terms of predatory mites belong to the family Phytoseiidae constitute a significant beneficial group of mite due to their notable role for maintaining the harmful phytophagous mites and insect pests population below the economic threshold level. However, the predatory mites are now being accepted by the farmers as a tremendous potential natural enemy in worldwide [1]. The predatory mites have received global attention since 1950 due to their significance as natural predators of phytophagous mites and small soft bodied insects. Therefore, they could be adopted in the biological control and integrated pest management strategies against different crop pests [13]. Biological control of phytophagous mites could be an alternative option instead of conventional chemical pesticide especially in green house crops [3]. Though, very scanty information is now available concerning predatory mite fauna on phytophagous mite in fruits, vegetables and ornamental crops in Jharkhand. Keeping this view, the present investigation was carried out to explore the diversity of phytophagous mite as well as their related predatory mite complex in crops of Jharkhand.

## 2. Materials and methods
A faunistic survey was conducted during March, 2017 in different locations of Jharkhand. The presence of mites was confirmed with the help of hand lens (20X) and leaf infested with mites collected in individual polythene bag and brought to the laboratory for detailed studies. In case of phytoseiid mites, direct beating method was adopted i.e. simply beating the plant parts over a black card board and collected the dislodged mite by using single hair brush. Thereafter, the mite specimens were preserved in separate small plastic vial containing 70% alcohol mentioning the name of the host and the location.

In laboratory, collected mite specimens were poured in a cavity block and mounted in a drop of Hoyer's medium as per method given by Jeppson *et al*. [6] Then the slides were dried in oven at 35-40 $^0$C for 4-5 days. Clearing was done in 70% lactic acid for 4-6 hours in cavity block at 40-60 $^0$C. Tetranychid mite specimen was cleaned by lactic acid and lignin pink in cavity block by placing it on electric slide warmer (40-60 $^0$C) for 1-2 hrs [5]. Lactic acid inflated the body and lignin pink made the specimen translucent that enable the specimen visible clearly under binocular microscope and subsequently identification of the specimens was done under phase contrast microscope (Olympus BX 41).

## 3. Result and Discussion

In the present investigation the following agro-horticultural plants like water melon, guava, chilli, dolichos bean, garlic, debdaru, sal, jackfruit, hibiscus, duranata, citrus, palm tree, ghetu, antirrhinum, mango, kanchan, *Termenialla cadappa*, pomegranate, ber and some unknown forest plants were examined for the presence of predatory mites as well as phytophagous mites (Table 1). Three plant feeding mite species viz. *Tetranychus urticae*, *Eutetranychus orientalis* and *Oligonychus* sp. belong to the family Tetranychidae, one phytophagous mite species namely *Polyphagotarsonemus latus* under the family Tarsonemidae and another phytophagous mite i.e *Brevipalpus phoenicis* (Geisk) belonging to the family Tenuipalpidae under the order Prostigmata were recorded from the above mentioned plants. In addition to this, six species of phytoseiid mite belong to the genera, *Amblyseius, Typhlodromips, Euseius* and *Scapulaseius* under the order Mesostigmata (Table-1) were identified. Furthermore, under the genus *Amblyseius* one species, *Amblyseius largoensis* and under the genus *Euseius*, two species viz. *Euseius alstoniae* and *Euseius* sp1. were recorded from the same order. *Typhlodromus syzygii*, *Typhlodromus* (*Anthoseius*) sp1. are the phytoseiid mite specie that was recorded from the genus *Typhlodromips*. Similarly, *Scapylaseius asiaticus* is only the phytoseiid mite that was recorded form the genus *Scapulaseius*. Besides that, some predatory mites belonging to the family Stigmaeidae, Tydeidae, Bdellidae, Ascidae under the order Prostigmata were recorded during the period of investigation in association with various phytophagous mites in Jharkhand (Table-1). The present study revealed that the agro-horticultural flora of Jharkhand is harboured very diverse range of phytophagous mite fauna as well as predatory mite fauna. The major and predominant phytophagous mites *Tetranychus urticae* and *Eutetranychus orientalis* were found in association with watermelon, dolichos bean, garlic, chilli, Kanchan, debdaru, citrus, hibiscus and unknown forest plants (Table 1). The phytoseiid mites belonging to the genera *Amblyseius, Euseius, Typhlodromus and Scapulaseius* have been considered as important predator of *Polyphagotarsonemus latus, Tetranychus urticae, Eutetranychus orientalis, Brevipalpus phoenicis* as well as thrips, white flies [7] which is a confirmatory of the present findings.

**Table 1:** Plant mites fauna associated with Agro-horticultural plants in Jharkhand.

| Predatory mite order Mesostigmata, Family: Phytoseiidae | Name of the prey mites and insects | Host habitat | Distribution in Jharkhand | Geographical location |
|---|---|---|---|---|
| *Euseius alstoniae* (Gupta) | *Polyphagotarsonemus latus, Tetranychus urticae* | *Psidium guajava, Capsicum annum, Bauhinia acuminata,* | Ramghar | 23° 36'03.10"N/ 85°30'55.20"E |
| | | *Polyalthia longifolia, Termenialla cadappa,* | Vikash Vidyalaya, Rachi, | 23° 26'28.0"N/ 85°25'52.80"E |
| | | Forest plant, *Tectona grandis Mangifera indica* | Dhanbad | 23° 47'44.35"N/ 86°25'49.38"E |
| *Euseius* sp1. | *P. latus, Tetranychus urticae* | *Duranta repens, Rosa sinensis, Citrus* sp *Arecaceae* sp *Artocarpus heterophyllus, Antirrhinum majus* Forest Plant *Punica granatum Rosa sinensis, Ziziphus mauritiana* Ghatu | Vikash Vidyalaya, Rachi Krishi Paryatan Kendra, Hazaribagh Dhanbad National Wild life Sanctuary | 23° 26'28.0"N/ 85°25'52.80"E 24° 0'43.272"N/ 85°23'13.3836"E 23° 47'44.35"N/ 86°25'49.38"E 24° 0'59.18"N/ 85°24'47.47"E |
| *Typhlodromus* (*Anthoseius*) sp1. | *P. latus T. urticae* | Forest Plant *Mangifera indica Rosa sinensis Punica granatum* | Krishi Paryatan Kendra, Hazaribagh Dhanbad | 24° 0'43.27"N/ 85°23'13.38"E 23° 47'44.35"N/ 86°25'49.38"E |
| *Typhlodromips syzygii* (Gupta) | *P. latus, T. urticae* | *Rosa sinensis Ziziphus mauritiana* | Dhanbad, National Wild life Sanctuary | 23° 47'44.35"N/ 86°25'49.38"E 24° 0'59.18"N/ 85°24'47.47"E |
| *Amblyseius largoensis* (Muma) | *Polypgagotarsonemus latus* (Bank) | *Ziziphus mauritiana* | National Wild life Sanctuary | 24° 0'59.18"N/ 85°24'47.47"E |
| *Scapulaseius asiaticus* (Evans) | *P. latus, T. urticae* | *Ghetu* | National Wild life Sanctuary | 24° 0'59.18"N/ 85°24'47.47"E |
| Predatory mite order Prostigmata | | | | |
| Family: Stigmaeidae *Agistemus* sp. | *P. latus*, Brevipalpus sp. White fly, Mealy | *Dolichos bean Rosa sinensis* | Ramghar Vikash Vidyalaya, | 23° 36'03.10"N/ 85°30'55.20"E |

| | | | | |
|---|---|---|---|---|
| | bug | | Rachi | 23° 26'28.0"N/ 85°25'52.80"E |
| Family: Tydeidae Genus: *Tydeus* sp. | *T. macfarlanei, P. latus, A. mangiferae, T. urticae, Brevipalpus* sp | *Polyanlthia longifolia, Rosa sinensis* | Vikash Vidyalaya, Rachi, Dhanbad | 23° 26'28.0"N/ 85°25'52.80"E 23° 47'44.35"N/ 86°25'49.38"E |
| amily: Bdellidae Genus: *Bdelloides* sp. | *P. latus, Brevipalpus* sp. White fly | *Rosa sinensis* | Krishi Paryatan Kendra, Hazaribagh | 24° 0'43.27"N/ 85°23'13.38"E |
| Family: Ascidae *Lasioseius parberlesei* Bhattacharya | *S. spinki, T. urticae, P. latus, Mealy bug* | *Rosa sinensis* | Dhanbad | 23° 47'44.35"N/ 86°25'49.38"E |
| Family: Cunaxidae *Cunaxoides* sp. | *T. urticae, P. latus, B.phoenicis.* | *Rosa sinensis* | Dhanbad | 23° 47'44.35"N/ 86°25'49.38"E |

Continue…...

| **Order: Prostigmata, Family: Tetranychidae** | **Host habitat** | **Distribution in Jharkhand** | **Geographical location** |
|---|---|---|---|
| *Tetranychus urticae* (Koch) | *Citrullus vulgaris, Mangifera indica Rosa sinensis* Unknown forest plant *Dolichos bean* | Rachi Road tea garden, National Wild life Sanctuary, Dhanbad Ramghar | 23° 21'7.14"N/ 85°22'27.20"E 24° 0'59.18"N/ 85°24'47.47"E 23° 47'44.35"N/ 86°25'49.38"E 23° 36'03.10"N/ 85°30'55.20"E |
| *Eutetranychus orientalis* (Klein) | *Psidium guajava Allium sativum Bauhinia acuminate, Polyalthia longifolia,* Unknown forest plant, Citrus plant | Rachi Road tea garden Ramghar Krishi Paryatan Kendra, Hazaribagh. Vikash Vidyalaya, Rachi. Dhanbad | 23° 21'7.14"N/ 85°22'27.20"E, 23° 36'03.10"N/ 85°30'55.20"E, 24° 0'43.27"N/ 85°23'13.38"E 23° 26'28.0"N/ 85°25'52.80"E 23° 47'44.35"N/ 86°25'49.38"E |
| *Oligonychus* sp. | Ghetu, *Arecaceae* sp. | Vikash Vidyalaya, Rachi. Krishi Paryatan Kendra, Hazaribagh | 23° 26'28.0"N/ 85°25'52.80"E, 24° 0'43.27"N/ 85°23'13.38"E |
| *Brevipalpus phoenicis* (Geijskes) | Mahua, Jackfruit | Krishi Paryatan Kendra, Hazaribagh | 24° 0'43.27"N/ 85°23'13.38"E |
| *Polyphagotarsonemus latus* (Bank) | Chilli | Ramghar | 23° 36'03.10"N/ 85°30'55.20"E |

## 4. Conclusion

The present investigation shows that both the phytophagous and predatory mite fauna is associated with the agro-horticultural crops of Jharkhand. The potential of some predatory mites namely *Euseius alstoniae* (Gupta, 1975), *Euseius* sp1, *Typhlodromus* (*Anthoseius*) sp1, *Typhlodromips syzygii* (Gupta, 1975), *Amblyseius largoensis* (Muma, 1955) and *Scapulaseius asiaticus* (Evans, 1953) belonging to the family Phytoseiid were found as a natural enemies of phytophagous mite pests. The other important predatory mites belong to the family Stigmaeidae, Tydeidae, Bdellidae and Ascidae were also observed in exerting natural suppression of harmful plant feeding mite pests in Jharkhand.

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