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Sourav Maity
Post Graduate, Department of
Zoology, Vidyasagar College,
Salt Lake Campus, CL Block,
Kolkata, West Bengal, India

Sagata Mondal
Post Graduate, Department of
Zoology, Vidyasagar College,
Salt Lake Campus, CL Block,
Kolkata, West Bengal, India

Corresponding Author:
Sagata Mondal
Post Graduate, Department of
Zoology, Vidyasagar College,
Salt Lake Campus, CL Block,
Kolkata, West Bengal, India

Diversity of mite fauna associated with some fruit trees in Paschim Medinipur district of West Bengal, India with their economic importance

Sourav Maity and Sagata Mondal

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Abstract

A study was conducted in June to November, 2022 to explore the mite fauna from some fruit trees in different parts of Paschim Medinipur District of West Bengal. A total of 23 species of mites belonging to 14 genera and 08 families under 02 orders were observed. Out of these, 12 species belonging to phytophagous group and 11 species belonging to predatory mites occurring on 14 different fruit crops of Paschim Medinipur district of West Bengal. All the mite species are listed along with their collection localities, period of occurrence, relative abundance, and economic importance. The species like *Eutetranychus orientalis*; *Oligonychus oryzae*; *Panonychus citri*; *Polyphagotarsonemus latus*; *Aceria litchi*; *Phyllocoptruta oleivora* were abundantly encountered and were of importance as pests causes serious damage to their respective host plants. Likewise, predatory mites like *Amblyseius largoensis*; *Amblyseius paraaerialis*; *Euseius alstoniae*; *Euseius ovalis* were of predatory importance.

Keywords: Phytophagous mites, predatory mites, fruit trees, Paschim Medinipur, West Bengal

Introduction

The district Paschim Medinipur in West Bengal is very famous for growing important fruits tree like litchi, guava, mango, banana, jackfruit, sapota, wax apple, citrus along with several others. Like other agricultural crops, these fruit plants are also attacked by several mites. The phytophagous mites which attack the horticultural crops are known to inflict damage causing loss to the extent of 5-70% and in some cases, the loss may be far reaching leading to total crop failure. Several works on mite associated with fruit plants were recorded from different parts of India and West Bengal (Gupta, Dhooria and Sidhu, 1971; worked on In 1980, Gupta observed on Litchi leaf curl disease. Gupta (1991) ^[6, 11] also studied on the mites of agricultural importance in India. Jagadish, Nagaraj and Nangia, in 1995 ^[14] reported predatory mite fauna of fruit crops around Bangalore. Chatterjee and Gupta in 1995 ^[3], surveyed on occurring of mites and documented their pest status. (Chakraborty (2010); Gupta, 2012; Basu and Gupta, 2016; Karmakar, Bhattacharya and Gupta, 2016; Kundu, Debnath and Gupta, 2017; Karmakar, 2018; Chatterjee and Gupta, 2019) ^[2, 9, 1, 17, 15, 4,], but no such work was previously documented from the Paschim Medinipur District, West Bengal. To fulfil these lacunae the present study was undertaken during June, 2022 to November, 2022.

Materials and Methods

During the present study seven different collection sites were selected in Paschim Medinipur Districts viz., Radhaballavpur, Srikrishnapur, Jenkapur, Mohanpur, Belda, Dantan, Menkapur. and studied on 14 different fruits plants viz., Mango, Papaya, Jackfruit, Banana, Litchi, Wax apple, Coconut, Citrus, Bael, Sapota, Guava, Ber, Fig, Black Berry that were observed for the occurrence of mites. The collection was done during June to November, 2022 and field was visited twice a month. Leaves were examined in the field itself under a 20x hand lens and mites were collected with a fine brush moistened with alcohol and preserved in 70% alcohol and were brought to laboratory where they were identified upto species level.

Result and Discussion

The identification of collected mites revealed the occurrence of a total of 23 species of mite belonging to 14 genera and 08 families under 02 orders were observed.

All the identified species have been listed in Table-1. The mite fauna included 12 phytophagous species (belongs to 08 genus under 04 family, 01 order) and 11 predatory species (belongs to 06 genus under 04 family, 01 order). Among the phytophagous mites species *Oligonychus mangiferus*, *Panonychus citri*, and *Brevipalpus phoenicis* were abundantly encountered and were of importance as pests. Likewise, predatory mites like *Euseius alstoniae* and *Amblyseius largoensis* were of predatory importance. The result of the present study was also found to be similar with the previous works viz., Chatterjee and Gupta (1995) [4]; Chakraborty (2010) [2]; Gupta (2012) [9]; Basu and Gupta (2016) [1]; Karmakar, Bhattacharya and Gupta (2016) [16]; Mitra, Acharya and Ghosh (2017) [18]; Kundu, Debnath and Gupta (2017) [17]; Karmakar (2018) [15]; Chatterjee and Gupta (2019) [4]. The present study also recorded *Eutetranychus orientalis*; *Oligonychus oryzae*; *Panonuchus citri*; *Polyphagotarsonemus latus*; *Aceria litchi*;

Phyllocoptruta oleivora to be most serious pest species, while the mites *Amblyseius largoensis*; *Amblyseius paraaerialis*; *Euseius alstoniae*; *Euseius ovalis* proves to be most promising predatory mite species feeding upon different Tetranychid mites. These result was also according to the findings of Gupta (2012) [9]; Karmakar, Bhattacharya and Gupta (2016); Mitra, Acharya and Ghosh (2017) [18]; Mitra, Acharya and Ghosh (2017) [18]; Kundu, Debnath and Gupta (2017) [17]; Karmakar (2018) [15]; Chatterjee and Gupta (2019) [4]. The result of such a short duration study revealing a good number of mites give enough evidence that these regions are indeed rich which these types of plants (examined 14 plant species) and that contributed for richness of mite species also. Hence, it is quite obvious that more study if conducted in future will bring into light many more species and some of which might be very interesting also.

Table 1: List of mites (phytophagous and predatory) from different fruit plants in Paschim Medinipur District of West Bengal during June to November, 2022.

Sr No.	Mite species recorded	Host plants	Date of collection	Site of occurrence	Relative Abundance	Economic importance
A. Phytophagous group						
Order-I: Trombidiformes; Sub order- Prostigmata; Family-1: Tetranychidae						
1.	<i>Eutetranychus carieae</i> Nassar & Ghai	<i>Artocarpus heterophyllus</i> Lam. <i>Carica papaya</i> L.	07/06/2022 02/09/2022	Radhaballavpur	2	Occasionally recorded.
2.	<i>Eutetranychus orientalis</i> (Klein)	<i>Citrus maxima</i> Merr. <i>Ziziphus mauritiana</i> Lam.	28/11/2022 30/07/2022	Srikrishnapur	2	This mite occurred on under surface of leaf producing brownish patches.
3.	<i>Eutetranychus histri</i> Pritchard & Baker	<i>Ficus carica</i> L.	03/11/2022 04/07/2022	Jenkapur, Srikrishnapur	2	Stray occurrence of this mite was found on under surface of leaf but due to poor population no damage was caused to host. This mite is common on fig tree, causing chlorosis.
4.	<i>Oligonychus indicus</i> (Hirst)	<i>Cocos nucifera</i> L.	07/06/2022 06/10/2022	Mohanpur	2	This mite colonized scattardly on under surface of bananaleaves. The feeding produced whitish patches. Colonies were covered with thin webs.
5.	<i>Oligonychus mangiferus</i> (Rahman & Sapra)	<i>Mangifera indica</i> L. <i>Litchi chinensis</i> Sonn. <i>Syzygium cumini</i> (L.) <i>Syzygium samarangense</i> Merr.&L.M. Perry	07/06/2022 12/08/2022 28/09/2022	Belda, Srikrishnapur. Dantan.	1	High population of all stages was seen on upper surface of leaves. The infested leaves turned brown.
6.	<i>Oligonychus oryzae</i> (Hirst)	<i>Musa acuminata</i> Colla	29/06/2022 03/11/2022	Dantan, Belda	2	Leaves develop whitish patches at the point of feeding, later such leaves wither.
7.	<i>Panonuchus citri</i> (McGregor)	<i>Carica papaya</i> L. <i>Citrus maxima</i> Merr.	04/07/2022 12/08/2022 29/10/2022 03/11/2022	Menkapur, Radhaballavpur, Belda, Mohanpur	1	A heavy population of this mite was seen on under surface of papaya leaves especially in association with the petiolar attachment with leaf lamina. Mealy bug was also found in association with this mite. The infested leaves turned brownish and withered.
8.	<i>Tetranychus fijiensis</i> Hirst	<i>Cocos nucifera</i> L.	30/07/2022 06/10/2022	Belda, Mohanpur.	2	Occasionally recorded, leaves turned brownish.
Family-2: Tenuipalpidae						
9.	<i>Brevipalpus phoenicis</i> (Geijskes)	<i>Citrus maxima</i> Merr. <i>Psidium guajava</i> L.	07/06/2022 26/08/2022 06/10/2022	Belda, Srikrishnapur.	1	This is a widely distributed phytophagous species that produce brownish spots on host.
Family-3: Tarsonemidae						
10.	<i>Polyphagotarsonemus latus</i> (Banks)	<i>Aegle marmelos</i> (L.) Corrêa	30/07/2022 29/10/2022	Radhaballavpur, Mohanpur	2	Leaves become curled and wrinkled. Later such leaves wither.
Family-4: Eriophyidae						

11.	<i>Aceria litchi</i> (Keifer)	<i>Litchi chinensis</i> Sonn.	04/07/2022 06/10/2022	Belda, Dantan.	2	This mite formed heavy population on undersurface of leaves, more near the midribs, produced chocolatey brown erineum.
12.	<i>Phyllocoptruta oleivora</i> (Ashmead)	<i>Citrus maxima</i> Merr.	26/08/2022	Dantan, Srikrishnapur.	3	The citrus rust mite is a serious pest of citrus. It infects twigs, leaves and fruits of all citrus species.
B. Predatory GROUP; Family-5: Anystidae						
13.	<i>Walzia Indiana</i> Smith-Meyer & Ueckermann	<i>Morus alba</i> L.	07/06/2022 06/10/2022	Radhaballavpur, Srikrishnapur.	3	Actively feeding.
Family-6: Cunaxidae						
14.	<i>Cunaxa setirostris</i> (Hermann)	<i>Artocarpus heterophyllus</i> Lam.	29/06/2022	Menkapur	3	Very common and effective predator of spider mites.
Family-7: Stigmaeidae						
15.	<i>Agistemus edulis</i> Gupta	<i>Carica papaya</i> L.	12/08/2022	Belda,	3	This species, although close to <i>Agistemus edulis</i> but the measurements of dorsal idiosomal setae do not tally with those of <i>Agistemus edulis</i> .
16.	<i>Agistemus hystrix</i> Gupta	<i>Carica papaya</i> L.	29/06/2022 12/08/2022	Dantan, Belda	2	Occasionally recorded.
Order-II: Mesostigmata; FAMILY-8: Phytoseiidae						
17.	<i>Amblyseius largoensis</i> (Muma)	<i>Musa acuminata</i> Colla <i>Carica papaya</i> L.	30/07/2022 02/09/2022 28/11/2022	Mohanpur, Srikrishnapur.	1	Very common and good predator on eggs of <i>Panonychus citri</i> , <i>Eutetranychus orientalis</i> . This species is very potential bio-controlling agent against phytophagous group.
18.	<i>Amblyseius paraaerialis</i> Muma	<i>Litchi chinensis</i> Sonn.	04/07/2022 29/10/2022	Radhaballavpur	2	Good predator on eggs of <i>Brevipalpus phoenicis</i> .
19.	<i>Euseius alstoniae</i> (Gupta)	<i>Litchi chinensis</i> Sonn. <i>Psidium guajava</i> L. <i>Manilkara zapota</i> (L.)	07/06/2022 29/06/2022 02/09/2022	Mohanpur, Srikrishnapur, Menkapur.	1	Found feeding upon eggs and nymph of <i>Brevipalpus sp.</i>
20.	<i>Euseius coccineae</i> (Gupta)	<i>Carica papaya</i> L.	12/08/2022 03/11/2022	Mohanpur, Belda.	3	They are often used as biological control agent for some mite pests.
21.	<i>Euseius ovalis</i> (Evans)	<i>Artocarpus heterophyllus</i> Lam. <i>Litchi chinensis</i> Sonn.	28/09/2022 29/10/2022	Dantan.	2	Good predator of all stages of <i>Oligonychus tylos</i> .
22.	<i>Euseius rhododendronis</i> (Gupta)	<i>Musa acuminata</i> Colla	28/09/2022	Mohanpur.	3	Rare occurrence.
23.	<i>Neoseiulus indicus</i> (Narayan & Kaur)	<i>Mangifera indica</i> L.	30/07/2022	Dantan.	3	Casual occurrence.

Where, Relative Abundance index: 1= abundantly occurrence, 2= occasional occurrence, 3= casual occurrence

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