Diversity of Mites occurring on tropical fruit trees in South 24 Parganas District of West Bengal with their economic importance

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Introduction

The South 24 Parganas district of West Bengal is very rich with cultivation of a good number of tropical fruit trees and from there supplies of fruits are made to the rest of the state. The fruit trees commonly available there are mango, litchi, guava, sapota, banana, fig, date palm, wood apple, jackfruit, citrus, coconut, papaya, black berry, wax apple, etc. These trees are attacked by a number of mites, some of which are phytophagous and some are predatory in nature. So far, no concerted efforts were made to survey and document those.

The present study was undertaken to fulfil that gap and the results thereof are presented in this paper. Earlier to this study some stray occurrence of mites have been reported in various works and all those have been included in Gupta (2012).

Material and methods

Survey and documentation: Different collection sites in South 24 Parganas district which were selected were Narendrapur, Baruipur, Canning, Diamond Harbour, Lakshmikantapur, Jharkhali, Gosaba, Namkhana, etc. The period of collection was from August, 2017 to March, 2018 and frequency of collection was at monthly interval.

Collection method:This was done by directly examining the leaves in the field with 20X lens and collecting the mites with a fine brush, moistened with ethyl alcohol. Besides, the infested leaves were also brought to the laboratories, examined those under stereobinocular microscope and collecting those mites.

Preservation and mounting: Preservation was done in 70% alcohol and mounting was done in Hoyer's medium.

The identification was done taking the help of up-dated literature.

Results and Discussion

The identification of collected mite specimens revealed the occurrence of a total of 29 species belonging to 21 genera, 10 families and 3 orders (Table 1). Among these, there were 14 species under 11 genera and 4 families which belonged to the phytophagous group while there were another 12 species under 6 genera and 3 families which were predatory in nature. Apart from these, there were 3 species under 3 genera and 3 families which were fungivorous and occurred on leaves having fungal infection.

Phytophagous group

Among the phytophagous mites, the species which were most dominant and injurious were *Eotetranychus hirsti* on fig, *Eutetranychus orientalis, Schizotetranychus hindustanicus* and *Brevipalpus californicus*, all on citrus while *Tetranychus urticae* and *Aceria litchii*, both on litchi. Out of these dominating species, *Aceria litchii* caused formation of brownish erineum on the undersurface of litchi leaves. The infestation of *Schizotetranychus hindustanicus* produced brownish patches on leaf lamina followed by drying and defoliation. The Tenupalpid mite, *Raoiella indica* on date palm and *Brevipalpus californicus* on citrus produced reddish and brownish patches, respectively on leaves. All the others though occurred but caused no noticeable damage on their respective host plants.

Predatory group

Among the predatory mites, the most dominant species were *Cunaxa setirostris* associated with *Brevipalpus californicus* on guava, *Amblyseius largoensis* on date palm feeding upon *Raoiella indica, Amblyseius guajavae* on guava feeding upon *Brevipalpus californicus* on citrus and *Euseius ovalis* on banana feeding upon *Oligonychus indicus*. Out of these predatory mites, *Amblyseius largoensis, Euseius ovalis, Cunaxa setirostris* appeared to be promising predators.

Fungiferous group

As regards fungiferous mites, 3 species could be collected of which 2 belonged to Oribatida and 1 belonged to Acaridae. Both the species of Oribatids were found on mango and the Acarid mite was collected from wax apple. All these 3 species were found in association with the mould grown on the undersurface of leaves but had no major economic importance.

Table 1. List of mite species collected from tropical fruit trees in South 24 Parganas district of West Bengal, during September, 2017 to June, 2018.

Order/ Family	Species	Host/ Habitat	Locality	Relative abundance	Remarks
		PHYTOPHAGOUS GROUP			
Order: Trombidiformes					
Sub-order: Prostigmata					
Family: Tetranychidae					
1.	*Eotetranychus indicus* Gupta & Gupta	Fig	Narendrapur	3	Occasionally encountered, no damage done.
2.	*Eotetranychus hirsti* Pritchard & Baker	Fig	Narendrapur	1	Produced transparent spots on the undersurface of leaves.
3.	*Eutetranychus orientalis* (Klein)	Citrus	Baruipur	1	Occurred on upper surface, covered the entire leaf with web where the dust particles adhered, the leaf turned brownish, gradually defoliated.
4.	*Oligonychus mangiferus* (Rahman & Sapra)	Litchi, mango	Narendrapur	1	Occur on upper surface, produced first yellowish then brownish spots.
5.	*Oligonychus indicus* (Hirst)	Banana	Baruipur	3	Colonized on undersurface of leaves, produced white spots.
6.	*Schizotertanychus hindustanicus* (Hirst)	Citrus	Canning	1	Yellowish and brownish scattered spots appear all along the leaf lamina, gradually weathered.
7.	*Tetranychus urticae* Koch	Litchi	Narendrapur	1	Occasionally encountered.
8.	*Panonychus citri* (McGregor)	Citrus, papaya	Jharkhali	1	Occurred on both the surface of leaves, along veins, produced brownish patches.
Family: Tenuipalpidae					
9.	*Brevipalpus californicus* (Banks)	Citrus, guava	Namkhana	1	Occurred on undersurface, mostly near mid-vein, produced brownish patches.
10.	*Raoiella indica* Hirst	Date palm	Namkhana	1	Colonized on the undersurface of leaves, produced reddish patches.
Family: Tarsonemidae					
11.	*Polyphagotarsonemus latus* (Banks)	Citrus	Canning	1	Occurred on undersurface, produced yellowish spots.
12.	*Tarsonomus* sp.	Wood apple	Gosaba	3	Occasionally encountered, no damage.
Family: Eriophyidae					
13.	*Aceria ficus* (Cotte)	Fig	Diamond Harbour	3	On undersurface of leaves, produced yellowish patches.

14.	*Aceria litchi* (Keifer)	Litchi	Canning	1	Occurred on undersurface of leaves, produced chocolatey brown erineum, such leaves gradually twisted and dried.
		PREDATORY GROUP			
Family: Cunaxidae					
15.	*Cunaxa setirostris* (Hermann)	Guava	Diamond Harbour	1	Occurred on undersurface of leaves in the corners of the veins, feeding upon *Brevipalpus californicus* on citrus.
16.	*Dactyloscirus* sp.	Coco-nut, Black berry	Gosaba	3	Occasionally occurred.
Order: Mesostigmata					
Family: Stigmaeidae					
17.	*Agistemus industani* Gonzalez-Rodriguez	Papaya	Lakshmi kantapur	3	Occasionally occurred.
18.	*Agistemus* sp.	Wood apple	Jharkhali	3	Occasionally occurred.
Family: Phytoseiidae					
19.	*Amblyseius largoensis*	Date palm	Narendrapur	1	Rich population, fed upon *Raoiella indica.*
20.	*Amblyseius aerialis* (Muma)	Banana	Canning	3	Occasionally occurred.
21.	*Amblyseius mcmurtryi* Muma	Mango	Lakshmi kantapur	2	Occasionally occurred.
22.	*Amblyseius guajavae* (Gupta)	Guava	Gosaba	1	Occurred regularly, feeding upon *Brevipalpus californicus.*
23.	*Euseius ovalis* (Evans)	Jackfruit	Baruipur	2	Occurred regularly, feeding upon *Oligonychus indicus.*
24.	*Euseius alstoniae* Gupta	Banana	Jharkhali	2	Occasionally occurred.
25.	*Euseius bambusae* (Ghai & Menon)	Guava	Baruipur	2	Occasionally occurred.
26.	*Paraphytoseius orientalis* (Narayanan & Kaur)	Fig	Lakshmi kantapur	1	Occurred in good number, feeding not observed.
		FUNGIVOROUS GROUP			
Sub-order: Oribatida					
Family: Xylobatidae					
27.	*Xylobates seminudus* Hammer	Mango	Diamond Harbour	3	Associated with mould.

Family: Scheloribatidae					
28.	*Scheloribates* sp.	Mango	Gosaba	3	Associated with mould.
Family: Acaridae					
29.	*Tyrophagus putrescentiae* (Schrank)	Wax apple	Jharkhali	2	Accidentally occurred, importance unknown.

Relative abundance index:- 1= Highly abundant; 2= Medium abundant; 3=Least abundant.

Conclusion

This paper reports the occurrence of 29 species under 20 genera, 10 families belonging to 4 orders, of those 14 species under 11 genera and 4 families were phytophagous, 12 species under 6 genera and 3 families were predatory and 3 species under 3 genera and 3 families were fungivorous mites occurring on 14 types of tropical fruit trees in South 24 Parganas district of West Bengal. Their relative abundance, economic importance, host/habitat records and localities have also been included. The important pests and predatory mites have also been highlighted.

Reference

Gupta, S. K., 2012. *Handbook. Injurious and beneficial mites infesting agri-horticultural crops in India and their management*. Nature Books India, New Delhi: 362 pp.

The Death of Death

Dying will be 'optional' within just 27 years and the ageing process will be 'reversible', according to two genetic engineers during the presentation of their new book in Barcelona. José Luis Cordeiro, born in Venezuela to Spanish parents, and Cambridge (UK) mathematician David Wood, founders of the operating system 'Symbian', have just published *The Death of Death* and say immortality is a real and scientific possibility that could come much earlier than originally thought.

Humans will only die in accidents, never of natural causes or illness, by around the year 2045, say Cordeiro and Wood, who say it is 'crucial' that old age starts to be classified as an 'illness' so that publicly-funded research into its 'cure' can extend. Nanotechnology is key, among other new genetic manipulation techniques, the engineers said during the presentation at Barcelona's Equestrian Circle. The process will involve turning 'bad' genes into healthy ones, eliminating dead cells from the body, repairing damaged cells, treatments with stem cells and 'printing' vital organs in 3D.

Cordeiro, who is based at the Massachusetts Institute of Technology (MIT) in the USA, says he has 'chosen not to die' and that in 30 years' time, he will be 'younger than he is today'.

Ageing is the result of DNA 'tails', known as 'telomeres', in chromosomes – of which every cell except red blood and sex cells has 23 pairs – becoming shorter, and reversing ageing involves lengthening the telomeres. Telomeres become damaged and shortened with the passage of time, a process that speeds up in the event of toxins entering the body – smoking, alcohol and air pollution are among elements that reduce the length of telomeres, thus accelerating ageing.

Cordeiro and Wood believe that within 10 years, illnesses such as cancer will be curable, and that major international corporations such as Google will be 'entering the field of medicine' because they are 'beginning to realise that curing ageing is possible'. Microsoft has reportedly already announced the setting up of a cryopreservation centre in which a scientist is researching the possibility of cancer being completely curable within a decade. The engineers explain that, although 'people generally do not know about it', it was discovered in 1951 how cancer cells are immortal: when Henrietta Lacks died from cervical cancer, surgeons removed the tumour and kept it – and it is still 'alive' today.

Immortality will not necessarily mean the planet becomes overcrowded, the scientists say: there is still plenty of room for more people on Earth, and these days, people do not have anywhere near as many children as they did in past decades and centuries; plus, 'it will be possible to live in space by then'. "Japan and the Koreas, if they continue with their current trend of hardly having any children, will become extinct – within two centuries, there'll be no Japanese or Korean people on the planet," Cordeiro says.

"I want Spain to have a place in the world of these technologies and show that we're not mad, it's just that people still don't know about them," Wood concluded. *The Death of Death* will eventually be published in four languages at first – Spanish, English, Portuguese and Korean – and all proceeds from its sales will be ploughed back into the authors' research.