



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2022; 10(3): 119-121

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Received: 16-02-2022

Accepted: 18-03-2022

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On a collection of mites and insects occurring on edible and wild mushrooms from Mini Sundarbans-Hasnabad areas of North 24 Parganas (West Bengal)

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DOI: <https://doi.org/10.22271/j.ento.2022.v10.i3b.8999>

Abstract

The present paper reports 28 species of mites under 3 orders, 14 families and 23 genera and 6 species of insects belonging to 6 families and 3 orders collected from some edible and wild mushrooms from Mini Sundarbans and adjoining areas of Taki-Hasnabad (Dist-North 24 Parganas). This includes both damage causing and predatory species of mites and insects. There are 3 species of mites not earlier known to occur on mushrooms in India. All the species are listed giving collection localities including GPS data and nature of association with mushroom.

Keywords: mushroom, mites, insects, mini Sundarbans (North 24 Parganas, West Bengal), diversity

Introduction

Mushrooms have received attention of man since ancient time as it has a big role to play in human life as food as well as for having medicinal values. Mushrooms provide rich source of proteins, carbohydrates, vitamins, minerals, etc. It is a good source of protein especially for those who are purely vegetarians. Mushrooms are of two types, edible and wild. Among the edible mushrooms, the important ones are *Agaricus bisporus* (button mushroom), *Volvariella volvacea* (paddy straw mushroom), *Pleurotus sajor caju* (oyster mushroom). In-addition, there are several other mushrooms which are wild ones and feeding of those may prove toxic to human beings. Mushrooms are attacked by a good number of mites and insects; some are damage causing, some are predators and the rest are of uncertain association. Some works related to exploration of mites and insects on mushrooms of India are: Mukherjee & Somchoudhury (1974) ^[8], Trivedi (1988) ^[13], Das *et al.* (1986-1993) ^[3-5], Aiswarya *et al.* (2018) ^[2], Mondal & Gupta (2019) ^[7], Parveen & Gupta (2019, 2020, 2020a, 2020b) ^[9, 10, 11, 12], Gupta & Mondal (2021) ^[6] brought out a compendium on mites and insects of mushroom in India along with their management. Acharya & Pradhan (2017) ^[1] provided an excellent contribution on wild mushrooms of West Bengal giving coloured photographs of mushrooms. Since Mini Sundarbans and adjoining areas of Taki and Hasnabad (Dist.- North 24 Parganas, West Bengal) are rich with both edible and wild mushrooms and as no attempt was made earlier to explore the mites and insects occurring on those, an attempt was made to explore the same from the aforesaid areas during September 2021- March 2022 and the present paper is based upon results of that study.

This paper Reports a total of 28 species of mites (including 3 species not earlier known to occur on mushroom in India) and 6 species of insects. The collection records and nature of association with mushroom have also been provided for each species.

Materials and Methods

The present study was conducted from September 2021- March 2022. Various areas of Mini Sundarbans and adjoining areas of Taki and Hasnabad (North 24 parganas) were surveyed 2-3 times per months and mushrooms were collected and brought to the laboratory in polythene bags, tightly closing its mouth by a rubber band. The mites and insects were extracted from the samples by adopting Heat Desiccation method in a Tullgren funnel and specimens were

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collected in a receiver containing 70% alcohol fitted with the stem to the funnel. The collected materials were sorted out under stereobinocular microscope and were identified by examining those under research microscope taking the help of the junior author of this paper.

The collection localities with their GPS data are as:- 1. Haripur (Lat.-22.580879° Long.-88.911818°), 2. Motijheel (Lat.-22.609048° Long.-88.943386°), 3. Mini Sundarbans (Saidpur) (Lat.-22.599805° Long.-88.941791°), 4. Katri (Lat.-22.594276° Long.-88.932204°), 5. Gachharati (Lat.-22.596881° Long.-88.931169°), 6. Hasnabad (Lat.-22.57479413° Long.-88.91247783°).

Results

The identification of the collected material of insects and mites revealed the occurrence of a total of 28 species of mites under 3 orders, 14 families, 23 genera. Out of these, 7 species under 4 families were damage causing mites, 16 species under 7 families were predatory mites, 3 species under 2 families were fungal associated mites and 5 species under 4 families were of uncertain association. This included 3 species, the occurrence of which on mushroom was earlier unknown from India. The insects belonged to 6 species under 6 families, 3 orders of which 5 were damage causing and 1 was a predator. All the species have been listed in Table-1 (for mites) and Table-2 (for insects); giving collection data and nature of association with mushrooms

Table 1: List of mites collected on different species of mushrooms in different localities of Mini Sundarbans and adjoining areas of Taki - Hasnabad (North 24 Parganas, West Bengal)

Sl. No.	Name of Mites	Name of Mushrooms	Locality	Date of Collection	Remarks
1.	Order I-Mesostigmata Family 1- Ascidae				
	Family 1- Ascidae				
	1. <i>Lasioseius krantzi</i> Chant	<i>Ganoderma</i> sp.	Haripur	13/03/22	It is known to be a good predatory mite.
	2. <i>Lasioseius matthyssei</i> Chant	<i>Pycnopus sanguineus</i>	Motijheel	25/09/21	Earlier unknown on mushroom in India, found to be predatory on acarid mites.
	3. <i>Lasioseius ometus</i> Chant	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	01/10/21	Predatory mite.
	4. <i>Lasioseius bispinosus</i> Evans	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	01/10/21	New record on mushroom from India, observed as predator on acarid mites.
	5. <i>Gamasellodes bicolor</i> Berlese	<i>Lentinus squarrosulus</i>	Katri	08/11/21	It is predatory mite found feeding on acarid mite.
	6. <i>Cheiroseius belaptoides</i> Berlese	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	18/10/22	Predatory on insect larvae.
	7. <i>Arctoseius</i> sp.	<i>Pycnopus sanguineus</i>	Haripur	04/12/21	It is a predatory mite.
	8. <i>Asca biswasi</i> Bhattacharyya	<i>Pycnopus sanguineus</i>	Motijheel	25/09/21	It is a predatory mite.
	9. <i>Asca</i> sp.	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	18/10/22	It is a predatory mite. It is likely to be a new species as it does not tally with any of the known species of this genus.
	10. <i>Asca garmani</i> Hurlbutt	<i>Ganoderma</i> sp.	Haripur	13/03/22	It is a predatory mite.
	Family 2- Blattisociidae 11. <i>Blattisocius keegani</i> Fox	<i>Phellinus rimosus</i>	Haripur	08/02/22	Predatory on acarid mite.
	Family 3- Parasitidae 12. <i>Parasitus consanguineus</i> Oudemans and Voigts	<i>Pycnopus sanguineus</i>	Motijheel	25/09/21	A predatory mite, found abundantly.
	Family 4-Phytoseiidae 13. <i>Typhlodromus</i> sp.	<i>Phellinus rimosus</i>	Haripur	08/02/22	This species is an interesting one and is close to <i>Typhlodromus gopali</i> Gupta but differs in relative length of idiosomal setae. Probably it is a new species and it is a predatory species.
	Family 5-Macrochelidae 14. <i>Macrocheles glaber</i> Müller	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	01/10/21	Predatory on dipteran maggot.
	Family 6- Uropodidae 15. <i>Leiodynychus krameri</i> Canestrini	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	01/10/21	Nature of association is uncertain.
	16. <i>Fuscuropoda marginata</i> Koch	<i>Chlorophyllum hortense</i>	Haripur	30/09/21	Found in plenty, it is a scavenger mite. It also fed on mushroom hyphae.
	17. <i>Trematura jacksonia</i> Hughes	<i>Pycnopus sanguineus</i>	Haripur	01/01/22	Nature of association is uncertain.
2.	Order II- Prostigmata Family 7- Cunaxidae				
	Family 7- Cunaxidae 18. <i>Dactyloscirus bengalensis</i> Gupta	<i>Pycnopus sanguineus</i>	Motijheel	25/09/21	Predatory on dipteran larvae.
	Family 8-Raphignathidae 19. <i>Raphignathus</i> sp.	<i>Copelandia cyanescens</i>	Gachharati	20/09/21	Its association with mushroom is unknown.
	Family 9-Stigmaeidae 20. <i>Agistemus macrommatatus</i> Gonzalez-Rodriguez	<i>Chlorophyllum hortense</i>	Haripur	30/09/21	Predatory mite, occurrence in mushroom earlier unknown from India.
	Family 10-Tydeidae	<i>Lentinus</i>	Katri	06/11/21	Nature of association is uncertain.

	21. <i>Orthotydeus</i> sp.	<i>squarrosulus</i>			
	Family 11- Caligonellidae	<i>Macrocybe crassa</i>	Gachharati	27/09/21	Nature of association is uncertain.
	22. <i>Neognathus</i> sp.				
	Family 12- Tarsonemidae	<i>Ganoderma</i> sp.	Haripur	13/03/22	Affected mushroom become reddish.
	23. <i>Tarsonemus confusus</i> Ewing				
	Family 13- Pygmephoridae	<i>Phellinus rimosus</i>	Haripur	10/02/22	It attacked on mushroom and fed on fruit body.
	24. <i>Pygmephorus fletchmanni</i> Wicht				
3.	Order III- Astigmata Family 14- Acaridae				
	Family 14- Acaridae	<i>Volvariella volvacea</i>	Mini Sundarbans (Saidpur)	06/09/21	Abundantly found in mushroom, damaged mushroom.
	25. <i>Acarus siro</i> Linnaeus				
	26. <i>Tyrophagus putrescentiae</i> Schrank	<i>Pleurotus sajor caju</i>	Haripur	10/09/21	Affected mushroom become brownish.
	27. <i>Rhizoglyphus echinopus</i> Fumouze and Robin	<i>Agaricus bisporus</i>	Hasnabad	13/12/21	Damaged mushroom by attacking mycelial mats.
	28. <i>Caloglyphus berlesei</i> Michael	<i>Pleurotus sajor caju</i>	Haripur	10/09/21	Occurred on mushroom; fed mycelia turned blackish.

Table 2: List of insects collected on different species of mushrooms in different localities of Mini Sundarbans and adjoining areas of Taki - Hasnabad (North 24 Parganas, West Bengal)

Sl. No.	Name of Insects	Name of Mushrooms	Locality	Date of Collection	Remarks
1.	Order I- Diptera Family 1- Phoridae	<i>Pycnoporus sanguineus</i>	Motijheel	25/09/21	Larvae fed on mycelia in the compost.
	1. <i>Megaselia scalaris</i> Loew				
	Family 2- Sciaridae	<i>Pycnoporus sanguineus</i>	Motijheel	25/09/21	Larvae fed on mycelia, damage compost. This is likely to be <i>longimentula</i> .
	2. <i>Bradysia</i> sp. near <i>longimentula</i> Sasakawa				
	Family 3- Cecidomyiidae	<i>Pycnoporus sanguineus</i>	Motijheel	25/09/21	Larvae sucked contents from mycelium hyphae.
	3. <i>Heteropeza</i> sp.				
2.	Order II- Collembola Family 4- Isotomidae	<i>Pycnoporus sanguineus</i>	Haripur	02/03/22	Abundantly available, damaged fruit bodies.
	4. <i>Isotoma</i> sp.				
	Family 5- Entomobryidae	<i>Ganoderma</i> sp.	Haripur	31/01/22	Occasionally encountered. It is close to <i>cyaneus</i> and further examination is on to confirm identity.
	5. <i>Lepidocyrtus</i> sp. near <i>cyaneus</i> Tullberg				
3.	Order III- Hymenoptera	<i>Coriolopsis occidentalis</i>	Mini Sundarbans (Saidpur)	01/10/21	Predator on dipteran larvae.
	Family 6- Formicidae				
	6. <i>Camponotus vicinus</i> Mayr				

Acknowledgements

Sincere thanks are due to Swami Sarvalokananda Maharaj, the Secretary, Ramakrishna Mission, Narendrapur for providing infrastructure facilities, to Dr. Sumana Saha, Head of the Post Graduate Dept. of Zoology, Barasat Government College, for constant encouragement and extending necessary facilities for carrying out the work. Sincere thanks are also alike to Mr. Srijit Pakira and Mr. Sagar Roy who helped in collection of mushrooms from the forests.

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