



A Study on Mites Infesting Stored Products Including Stored Mushroom from South 24 Parganas and Nadia Districts of West Bengal with Their Importance

Biotechnology

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ABSTRACT

The present study reports the occurrence of mites collected from stored grain and mushroom from South 24 Parganas and Nadia districts of West Bengal. This includes 30 species, 22 genera, 12 families, of which 22 species, 15 genera, 10 families were recorded on various stored products like Cereals, Pulses, Farinaceous products, Dry fruits, Dry fish, Processed food materials and Oil seeds and 20 species, 18 genera, 9 families were recorded on Oyster mushroom. This paper lists the mite species on 2 habitats (i.e., stored products and mushroom) giving their localities, relative abundance etc.

KEYWORDS:

Mite, Stored Products, Stored Mushroom, Nadia, South 24 Parganas, West Bengal

INTRODUCTION:-

Mites form important communities in any stored product ecosystem and are of manifold importance not only due to feeding of stored grains and making those unsuitable for human and animal consumption as well as grains become unsuitable for germination. Besides, they increase humidity of storage which invite fungal infections causing further deterioration of stored grains inflicting further economic loss. As per one available information, the post-harvest loss were estimated to be 10.63% (Singh *et al.* 2007). In addition to stored grains, mites also attack stored mushroom and mushroom beds and affect the quality and quantity. Thus mushroom production also gets severely reduced. In addition, those persons who handle stored products with uncovered hands also get bitten by mites causing itching, inflammation, dermatitis (Mukherjee *et al.* 2010 and Gupta, 2012).

Besides direct damage, they also cause depletion of protein, amino acids, carbohydrate, vitamins of both stored products/mushroom (Nangia, 1986; Gupta, 2012) which, in turn, are responsible for substantial economic loss to stored grains and mushrooms. Though mites from stored products/mushroom have been well explored and documented from abroad and some parts of India (mostly North & South India) but practically very little has been done from West Bengal as well as Eastern India in general. Considering the importance of this aspect and keeping in view the gap of knowledge, the present research topic was chosen and the results thereof are presented in this paper.

MATERIAL AND METHODS:-

Various stored product samples like Cereals (Wheat, Rice, *Sooji*, Pasted rice, Popped rice), Pulses (*Musur*, *Mung*, *Channa*, *Motor*), Dry fish, Dry Fruits (*Kaju*, Resin, Date Palm), Farinaceous products (Cake, Biscuit), Processed Food products (*Chanachur*), Bulbs (Turmeric), Spices (Cumin, Coriander, Chilli, Cardamom, Black pepper), Mushroom etc. were collected from various places of South 24 Parganas and Nadia districts of West Bengal. For mushroom collection, mushroom cultivation unit of Ramakrishna Mission Ashrama, Narendrapur, Kolkata, was the venue. The samples of above mentioned stored products were collected at fortnightly interval from different places of the above mentioned areas and were brought to the laboratory in a zipper bag. Mites were extracted through Tullgren apparatus. In many a cases, the mites were isolated by examining the samples directly under Stereo-Binocular Microscope and were mounted in Hoyer's medium.

Identification of the mites were done by the Junior author (SKG). While processing the samples, the nature of damage done by the mites was also recorded. All the identified species of mites were listed in a classificatory manner.

RESULTS AND DISCUSSION:-

The results of the surveys conducted during January 2017-April 2017 for stored product and mushroom- infested mites and their

identification revealed the occurrence of a total of 30 species of mites which belonged to 22 genera, 12 families and 4 orders. The abundance of species varied in different habitats like mushroom, cereals (Wheat, Rice, *Sooji*, Pasted rice, Popped rice), Pulses (*Musur*, *Mung*, *Channa*, *Motor*), Farinaceous products (Cake, Biscuit), Dry fruit (*Kaju*, Resin, Date Palm), Spices (Cumin, Turmeric, Coriander, Chilli, Cardamom, Black pepper), Oil seed (Sesame), Processed food (*Chanachur*). Among the total mites, which could be collected, 5 species under 5 genera and 2 families were Mushroom feeders, 6 species under 4 genera and 2 families were Grain feeders, 10 species under 9 genera and 5 families were Predators and 10 species under 7 genera and 5 families were Fungal feeders.

Regarding Relative abundance of mites on different habitats, it appeared that mushroom inhabited the maximum number of mites as evident from the fact that a total of 796 mite specimens could be collected from there. This was followed by 200 mite specimens from wheat habitat and the number of specimens collected from different other habitats were 90 in *musur*, 29 in cumin dust, 28 in *sooji*, 18 each in popped rice and cake, 6 in rice dust, 49 in cumin seeds, 19 in pasted rice, 23 in turmeric dust, 41 in *kaju*, 12 in resin, 31 in *channa*, 9 in sesame, 10 in coriander, 7 in rice dust, 12 in bakery biscuits, 21 in chilli dust, 9 in *motor*, 10 in cardamom and 16 in *mung*. From this it could be inferred that mushroom was the best habitat for mites as compared to all those habitats which were taken up for investigation in the present study.

So far as the damage done by mites on different stored products and mushroom is concerned it was found that, Wheat was found to be damaged heavily by *Tyrophagus putrescentiae*, *Acarus sp.*, *Glycyphagus sp.*, *Lepidoglyphus destructor*, *Histioglyphus feroniarum*, *Tarsonemus sp.*, *Cheyletus sp.*, *Laelaps sp.*, *Fuscuropoda marginata*, *Schelorbates sp.* among all other stored products. The next in order was *musur* grains which were also found infested by *Tyrophagus putrescentiae*, *Glycyphagus sp.*, *Bloomia tropicalis*, *Histioglyphus sapromyzaarum*, *Tarsonemus sp.* observed during January 2017-April 2017. The stored products like Cake, rice dust, pasted rice, turmeric dust, *chanachur*, sesame, rice grain, bakery biscuit, chilli dust, *motor*, *mung* had shown the minimum species diversity, represented by a single species only.

In case of mushroom, the maximum number of species which could be encountered was *Urodynychus sp.* which was observed in all the samples examined in the present study. This was in fact a fungal feeding mite and did no noticeable damage on the mushroom. The most damage causing mite found in mushroom was *Tyrophagus putrescentiae* and *Rhyzoglyphus echinopus* which were severely damaging the mushroom beds making those unsuitable for mushroom growth. A good number of predatory mites like *Paratydeus sp.*, *Parasitus consanguinus*, *Laelaps sp.*, *Asca sp.*, *Pergamasus crassipus*, *Hypoaspis miles*, *Androlaelaps casalis*, were recorded on mushroom

bed and they were effectively feeding upon acarid mites and nematodes.

The stored pulse grains had a total of 7 species of mites belonging to 6 genera and 5 families. Out of those the species like *Tyrophagus putrescentiae*, *Tyrophagus longior*, *Glycyphagus domesticus* which damage the grains often seriously making those unsuitable for either human consumption or for seed purpose. One predatory mite like *Cheyletus malaccensis* was the dominating predator which was seen effectively feeding upon acarid mites. It fed not only all stages of the mite but also was seen feeding upon immature stages of coleopteran pests.

As regards spices, the most affected spice was cumin (both seeds and dust) which were attacked by *Tyrophagus putrescentiae*, *Glycyphagus domesticus* and *Rhizoglyphus sp.* making those totally unsuitable for use. The other spices like cardamom were found infested by *Caloglyphus hughesi*, *Tyrollichus casei*, *Klemania plumigera* and the occurrence of coriander by *Tyrophagus putrescentiae*, *Glycyphagus domesticus*. The occurrence of these species on the above mentioned spices were not recorded earlier. Hence, the record of these species as made here is for the first time in India.

As regards farinaceous products the infestation of mite was more severe on bakery biscuit where *Tyrophagus putrescentiae* was found dominating making the biscuits dusty.

The cereals like rice grains, rice powder, *sooji*, pasted rice, popped rice

were examined for occurrence of mites and it was found that *sooji* was infested with *Tyrophagus sp.*, *Tarsonemus sp.* and *Glycyphagus domesticus*. Other cereal products were found infested with only 1 or 2 species of mites namely *Tyrophagus putrescentiae* and *Glycyphagus domesticus*.

All the identified mites were listed in Table: 1 and that is self explanatory.

Girish *et al.* (1971) reported *Acarospis docta* from stored grain but the said species could not be collected in the present study.

Ghai (1976) listed 29 species infesting stored product from India but in the present study 50% of these could not be recorded from this part of the country.

Mathur and Mathur (1983) reported 13 species from Haryana but the species reported in the present study on resin, dried cardamom, black pepper are reported here for the first time from India.

Das *et al.* (1987) reported mushroom mites *Rhizoglyphus echinopus*, *Hypoaspis miles* which also could be collected in the present study.

Gupta and Chatterjee (2004) reported 36 species on wheat and rice but their report did not include the mite species on various types of stored product as has been done here and therefore the presented information will add to our knowledge on mites occurring on stored product and mushroom.

Table 1: List of Mites collected from Stored product and Mushroom from South 24 Parganas and Nadia districts of West Bengal during January 2017- April 2017

Sl. No	Order/Family/Genus	Stored Product	Locality	Mushroom	Locality	Relative abundance
Order I: ASTIGMATA						
Family. 1. Acaridae						
1	<i>Rhizoglyphus echinopus</i>	Cumin dust	Nadia	Oyster	S. 24 pgs.	1
2	<i>Acarus siro</i>	Wheat	Nadia	-	-	2
3	<i>Acarus farris</i>	Wheat	Nadia	Oyster	S. 24 pgs.	3
4	<i>Acarus gracilis</i>	Wheat	S. 24 pgs.	-	-	3
5	<i>Caloglyphus hughesi</i>	Cardamom, Black pepper	Nadia	-	-	4
6	<i>Tyrophagus longior</i>	Sooji, Musur	Nadia	-	-	4
7	<i>Tyrophagus putrescentiae</i>	Wheat, Sooji, Rice dust, Popped rice, Pasted rice, Rice grain, Musur, Channa, Motor, Cumin seed & dust, Turmeric dust, Coriander, Chilli dust, Cake, Biscuit, Kaju, Resin, Chanachur, Sesame	Nadia , S. 24 pgs.	Oyster	S. 24 pgs.	1
8	<i>Tyrollichus casei</i>	Cardamom, Black pepper	Nadia	-	-	4
Family. 2. Glycyphagidae						
9	<i>Glycyphagus domesticus</i>	Wheat, Sooji, Popped rice, Musur, Mung, Cumin seeds, Coriander, Kaju, Kismis	Nadia	Oyster	s. 24 pgs.	2
10	<i>Glycyphagus destructor</i>	Wheat	S. 24 pgs.	-	-	3
11	<i>Bloomia freemani</i>	-	-	Oyster	S. 24 pgs.	3
12	<i>Bloomia tropicalis</i>	Musur	Nadia	-	-	4
13	<i>Lepidoglyphus destructor</i>	Wheat	S. 24 pgs.	Oyster	S. 24 pgs.	3
Family. 3. Histiomidae						
14	<i>Histiostoma feroniarum</i>	Wheat	S. 24 pgs.	Oyster	S. 24 pgs.	3
15	<i>Histiostoma sapromyzae</i>	Musur	Nadia	Oyster	S. 24 pgs.	2
Order II: PROSTIGMATA						
Family. 4. Tarsonemidae						
16	<i>Tarsonemus sp.</i>	Wheat, Sooji, Musur	S. 24 pgs.	Oyster	S. 24 pgs.	3
Family. 5. Tydeidae						
17	<i>Paratydeus sp.</i>	-	-	Oyster	S. 24 pgs.	4
Family. 6. Cheyletidae						
18	<i>Cheyletus malaccensis</i>	Wheat	S. 24 pgs.	-	-	4
19	<i>Cheyletus eruditus</i>	Wheat	S. 24 pgs.	-	-	3
Order. III. MESOSTIGMATA						
Family. 7. Ameroseiidae						
21	<i>Klemania plumigera</i>	Cardamom	Nadia	-	-	4
Family. 8. Ascidae						
22	<i>Asca sp.</i>	-	-	Oyster	S. 24 pgs.	3
Family. 9. Laelapidae						
23	<i>Laelaps sp.</i>	Wheat	S. 24 pgs.	Oyster	S. 24 pgs.	3
24	<i>Hypoaspis miles</i>	-	-	Oyster	S.24 pgs.	3
25	<i>Androlaelaps casalis</i>	-	-	Oyster	S.24 pgs.	4
Family. 10. Parasitidae						
26	<i>Parasitus consanguinus</i>	Channa	S.24 pgs.	Oyster	S.24 pgs.	3
27	<i>Pergamasus crassipus</i>	-	-	Oyster	S.24 pgs.	3

Family. 11. Uropodidae						
28	<i>Urodynychus sp.</i>	-	Oyster	S.24 pgs.	1	
29	<i>Fuscopoda marginata</i>	Wheat	Nadia	Oyster	S.24 pgs.	3
Order. IV. CRYPTOSTIGMATA						
Family. 12. Scheloribatidae						
30	<i>Schelorbates sp.</i>	Wheat	Nadia	-	-	4

*1= Very much abundant, 2=Moderately abundant, 3=Less abundant, 4=Rarely found

ACKNOWLEDGEMENTS

The authors are thankful to the Secretary, Ramakrishna Mission Ashrama, Narendrapur, for providing the necessary facilities for the study. Thanks are also due to the Dean and Co-ordinator of the IRDM Faculty Centre, Ramakrishna Mission Vivekananda University for various help and suggestions in carrying out this work.

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