

A Preliminary survey on acarine fauna inhabiting different stored products in four districts of Malabar region, Kerala (India)

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Abstract: The present paper reports for the occurrence of mites on stored products in four districts of Malabar region in Kerala which includes 33 species under 14 genera 12 families and 3 orders viz, Trombidiformes (suborder Prostigmata), Mesostigmata and Sarcoptiformes (Cohort Astigmata). The Family Cheyletidae represented as the most dominating family while *Cheyletus malaccensis* was the most abundant species found in stored products. The representatives of Stigmaeidae and Cunaxidae families were also dominant. Among the stored product, from pepper maximum number of mite species were identified followed by boiled rice and raw rice. Coriander represented with six species of mites whereas wheat represented with five species. This study also reported 3 species namely *Lasioseius* sp.1, *Stigmaeus* sp1 and *Tydeus* sp.1 which appeared to be un described and among these one species *Lasioseius* sp.1 which is being reported here for the first time from India inhabiting stored products.

Keywords: Mite, Stored products, arthropoda, Malabar, Kerala.

I. INTRODUCTION

From the early stages of human civilization, people are aware of the importance of food materials to be stored and different methods of storing and preservation techniques have been practiced. The mites comprise a large group of Phylum Arthropoda and belong to subclass Acari under class Arachnida. These are microscopic in size, well distributed in all types of habitats throughout the world. The stored grain and stored products mites infest and damage cereals and other food stuffs as cheese, flour, seed, bulbs, tubers and dried fruits of all kinds. The mites cause direct and indirect damage to stored grains and their products by feeding on the grains and making those unsuitable for human consumption besides raising their moisture contents, generating sufficient heat for the growth of infectious bacteria and fungi. Apart from that, they also cause depletion of protein, amino acids, carbohydrate and vitamin contents of grains [1,2]. Over and above many of the mites which occur in stored product cause itching, inflammation, dermatitis, etc. to those persons who handle the grains. Though a good amount of work on mites occurring on stored products have been done during the last two decades, but most of those are from northern India like Punjab and Haryana and from Karnataka in southern India. As far as Kerala is concerned, the stored products mites have not been explored and therefore the available knowledge is meager. Keeping all these in view, The present research topic was chosen to explore during April 2015 to March 2016 both the damage causing and predatory mites from some selected stored products and the results thereof are presented in this paper. This work was carried out in collaboration between all authors. Author Sachin P James designed the study, wrote the protocol, performed the study and wrote the final draft of the manuscript, author M.K. Jaisath managed the

analyses, literature searches, author Salil K Gupta performed the statistical analysis and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

II. RELATED WORK

Since no earlier studies are available from the targeted area on stored product mites the present results could not be compared with those of the earlier ones.

III. MATERIALS AND METHODS

The samples of stored products like cereals (Rice both boiled and raw, Wheat), Spices (Coriander, Pepper), Medicinal plant parts (Jamun, Muthanga) etc. were collected from the different places comes under the jurisdiction of four Districts in the Malabar region as listed below and the names given in the parenthesis were the places from where the samples were collected.

1. Wayanad (Kalapatta & Manandavady)
2. Kannur (Talassery, Payyannur)
3. Kozhikode District (Calicut City & Payyoli),
4. Malappuram District (Kuttipuram, Ponnani & Malappuram)

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Stored products thus collected were taken in clean polyethylene bags with proper labelling and initially screened in the laboratory under a Magnus stereo zoom binocular microscope. These were subjected to heat desiccation method through modified Tullgren's

apparatus for extraction of mites in a receiver containing 70 % alcohol fitted with the stem of the funnel. The collected mites were sorted out in different groups and were mounted in Hoyer's medium for identification. The identification was done by consulting the updated literature and with the help of by the third author (S.K.Gupta). The identified mite species have been documented with their habitat, locality, relative abundance and importance if any.

IV. RESULT AND DISCUSSION

The materials collected from different stored products and identified list of mites have been provided in Table 1. Identified species of mites revealed the occurrence of total of 33 species of mites which belonged to 14 genera, and 12 families and 3 orders. The representative of the Prostigmata appeared to be most diverse because it included 18 species under six genera and four families, followed by Mesostigmata represented by ten species under six families under six genera and least diverse group was Astigmata represented by 5 species under 2 genera and 2 families (Table.1).

Among the mite species, those belonging to Ascidae under Mesostigmata and Cunaxidae, Stigmaeidae, aphignathidae and Cheyletidae under Prostigmata were of predatory in nature and mostly feeding upon the Acarid mites. The species under Uropodidae were fungal feeders and on the contrary the species belonging to Acaridae under Astigmata were the damage causing mites of the stored products.

It also appeared that the species which were found to be the most dominant belonged to *Cheyletus malaccensis*, *C.eruditus* and *C.fortis*, under Chelytidae. The representatives of Stigmaeidae and Cunaxidae families were also dominant. Among the stored product, pepper appeared to be inhabiting maximum number of mite species (9 species) followed by boiled rice and raw rice (8 and 7 species each respectively). Coriander represented with 6 species and in wheat five species were identified. Contrary to this jamun, inhabited two mite species and rest of the stored products had only one species.

Lasioseius sp.1, *Stigmaeus sp1* as well as *Tydeus sp.1* were appeared to be new to science and thus are under further study for confirmation of novelty. Among the mites, *Cheylectus malaccensis*, *Tyrophagus putrescentiae* and *Austroglycyphagus geniculatus* could be collected on as many as three types of stored products, while *C.eruditus* could be collected on two of stored products.

V. CONCLUSION AND FUTURE SCOPE

Since no earlier studies are available from the targeted area on stored product mites the present results could not be compared with those of the earlier ones [3, 4, 1, 5] who contributed on the stored

product mites of India and Gupta 2012 [2] who provided summarized information on this aspect. From the preliminary results obtained from the present study, enough indication is provided indicating that the stored products mites of Kerala are quite rich and more thorough investigation is needed to add further knowledge in this area of research.

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Table 1. List of mites different stred products

Order/Family/Species	Habitat	Locality	Relative abundance	Remarks
Trombidiformes				
Family: Cheyletidae				
<i>Cheyletus eruditus</i>	Rice (boiled), Jamun	Talassery, Calicut	5	Predatory in nature
<i>Cheyletus fortis</i>	Rice (raw)	Calicut	3	Predatory in nature
<i>Cheyletus malaccensis</i>	Rice (raw) Pepper, Jamun	Calicut, Kalapetta, Thalassery	7	Predatory in nature
<i>Cheyletus sp.1</i>	Pepper	Calicut	1	
<i>Cheyletus sp.2</i>	Wheat	Calicut	1	Predatory in nature
<i>Cheyletus sp.3</i>	Pepper	Malappuram	1	Predatory in nature
<i>Bothrocheyla sp.</i>	Pepper	Calicut	1	
Fam: Cunaxidae				
<i>Cunaxa evansi</i>	Rice (boiled)	Payyoli	1	Predatory in nature
<i>Cunaxa sp.1</i>	Coriander	Payyoli	1	Predatory in nature
<i>Cunaxa sp.2</i>	Pepper	Ponnani	1	Predatory in nature
Fam: Stigmaeidae				
<i>Agistemus sp.</i>	Rice raw	Calicut	1	
<i>Stigmaeus sp.1</i>	Rice boiled	Calicut	1	Appears to be undescribed
<i>Stigmaeus sp.2</i>	Rice boiled	Calicut	1	Predatory in nature
<i>Stigmaeus sp.3</i>	Rice raw	Payyoli	1	Predatory in nature
<i>Stigmaeus sp four</i>	Coriander	Kuttipuram	1	Predatory in nature
<i>Stigmaeus sp.5</i>	Coriander	Thalassery	1	Predatory in nature
Fam: Raphignathidae				
<i>Raphignathus sp.1</i>	Rice raw	Malappuram	1	
<i>Rahhignathus sp.2</i>	Pepper	Ponnani	1	
Mesostigmata				
Fam: Tydeidae				
<i>Tydeius sp.1</i>	Muthunga	Calicut	1	Appears to be undescribed
<i>Tydeius sp.2</i>	Wheat	Ponnani	1	
Fam: Ameroseiidae				
<i>Kleemania plumosus</i>	Rice raw	Payyoli	1	
<i>Kleemania sp.1</i>	Pepper	Talassery	1	
<i>Kleemania sp.2</i>	Pepper	Calicut	1	
Fam: Attisoeiidae				
<i>Lasioseius ometus</i>	Rice boiled	Calicut	1	
<i>Lasioseius sp.1</i>	Coriander	Calicut	1	Appears to be undescribed
Fam: Glycyphagidae				
<i>Autroglycephagus geniculatus</i>	Rice boiled, Coriander, Pepper	Calicut, Kalapetta, Payyoli	3	
Fam: Pyroglyphidae				
<i>Euroglyphus maynei</i>	Wheat	Ponnani	1	
Fam: Uropodidae				
<i>Uropoda sp.</i>	Rice boiled	Payyoli	1	Fungal Feeder
Sarcoptiformes				
Fam: Acaridae				
<i>Tyrophagus putrescentiae</i>	Rice boiled, Rice raw, Coriander	Calicut	3	
<i>Tyrophagus sp.1</i>	Dust	Calicut	1	
<i>Tyrophagus sp.2</i>	Wheat	Calicut	1	
Fam: Saprogllyphidae				
<i>Suidasiidae nesbitti</i>	Wheat	Malappuram	1	
<i>Suidasisidae sp.1</i>	Rice	Calicut	1	