

A REPORT ON SEASONAL ABUNDANCE OF MITE FAUNA INFESTING STORED FOOD PRODUCTS OF DISTRICT PATIALA (PUNJAB)

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Abstract: *Mites are reported from all the habitats around the globe. Mites are important pest of agricultural and stored food products. A great number of stored grains, dried fruits, various farinaceous products and stored food are often attacked by various types of mites. A study was under taken to know the mites associated with stored food products from Patiala district from Aril 2017 to March 2018. The samples were collected in three seasons i.e. summer, Rainy and winter. 60 % (36samples) of the samples contained mites and 14 mite taxa were identified, belonging to 7 families in 3 orders.*

Keywords: *Stored food products, Mites, Acaridae and Allergy.*

1. INTRODUCTION

Mites belong to Phylum Arthropoda, class Arachnida and subclass acari. They are free-living, parasitic, predatory, terrestrial, aquatic, arboreal or ridiculous and found in many diverse environments known to man. These tiny creatures infest wide range of commodities. Mites invade, infest and play important role in agricultural and stored food products pest all around the globe. The mite infestation can reduce quantitative loss by feeding and also qualitative loss by raising their moisture contents their secretions that produce musky odor (Sinha,1958¹). Often infestation to stored food products, decreases the germination of stored grains and cereals (Solomon, 1946²;Cusack et al,1976³). Decaying products are the main factors for storage mite habitation.

Some mites specially from family Acaridae and Glycyphagidae cause sickness in animals and man by carrying, externally and internally, fungal species that produce mycotoxins and by causing dust allergy, dermatitis and intestinal disorders .The farmers and the workers handling the stored food products reported occupational allergy and health problems (Arlian, 1991⁴; Cuthbert et al, 1979⁵; Hughes, 1976⁶). The relationship between storage-mite sensitivity and allergic symptoms such as asthma, rhinitis, and conjunctivitis was first studied among a group of farmers in Scotland. Allergens produced by stored mites cause respiratory disease and atopic dermatitis of farmers (Hage-Hamsten and Johansson,1992⁷; Colloff 1998⁸). Mites are also harmful for bakers and some of occupational categories (Dutkiewicz et. al. 1988⁹; Hage and Johansson, 1992⁷; Tee, 1994¹⁰).

Abiotic factors influence stored grain pest populations, i.e., climate , humidity and temperature . Generally, physical conditions of the environment influence the level of infestation, namely humidity, light and temperature . Mite growth is greatly affected by a combination of physical and biological factors interacting in a complex manner (Sinha and Wallace 1973¹¹). Seasonal and cyclic regulators, such as seasonal temperature and density dependant factors (crowding, migration, cannibalism etc.) also affect the regulation of mite numbers (Sinha and Wallace 1973¹¹). Apart from relative humidity, temperature is one of the main factors governing the abundance of mite populations (Sinha ,1968¹²).

To control the stored food mites, it is necessary to know the different types of mites infesting the food products. Therefore the present study has been undertaken to explore mite fauna associated with important stored food products of Patiala district.

2. MATERIALS AND METHODS

During the present study, stored food grain and their products samples from different localities from the Patiala district of Punjab were collected. From April 2017 to March 2018 research was carried out. Total of 60 samples were collected from different food store and grocery shops. The samples were brought to laboratory in zip locked polythene bags for further study. A complete record of date, time, temperature, moisture, type of field and locality was also maintained. Sampling was done in summer, rainy and winter season. In lab, with "Modified Berlese Funnel" storage mites were extracted (Macfadyen, 1953¹³, 1955¹⁴, 1961¹⁵). The mites were kept in 70% alcohol. For further identification mites were mounted in Hoyer's Medium.

3. RESULTS AND DISCUSSION

Result of the present research identified 14 species from 7 families, 3 orders from stored food products of District Patiala Punjab. In the present study, out of 14 species of stored food products of dist Patiala, 9 sp. belong to Order Astigamta, 1 from Order Mesostigamta, 4 from Order Prostigamta. Out of the 60 samples collected, 36 (60%) samples contained mites. The Astigamta mite were found dominant of the total sample examined (Table I). The species composition and abundance of total mite fauna found in infested samples of stored food are listed in Table 2 as *Glycyphagus destructor* 19.61%, *Acarus siro* 15.73%, *Tyrophagus putrescentiae* 14.8%, *Aleuroglyphus ovatus* 6.9%, *Dermatophagoides pteronyssinus* 6.9%, *Acarus farris* 6.6%, *Blomia freeman* 4.71%, *Cheyletus eruditus* 4.71%, *Cheyletus malaccensis* 4.25%, *Suidasia nesbitti* 3.9%, *Caloglyphus berlesei* 3.56%, *Cheyletus aversor* 3.72%, *Tarsonemus sp* 2.41%, *Androlaelaps sp* 2.2%.

Out of 60 stored food samples 37 samples were infested with mites. A total of 1907 mite specimen were isolated during one year of study. These samples were collected in three climatic classes/ seasons i.e. CCL1 –summer season (April to June), CCL2-rainy season (July to Sept.), CCL3-winter season (Oct. to March). Out of 1907 mite specimen 604 (31.68%) were found in summer season, in rainy season 974 (51.07%) and in winter season 329 (17.25%) were reported. Mite infestation was high in rainy season followed by summer and winter season. Mites are sensitive to temp and humidity. The optimum temp. is 25°C and optimum relative humidity ranges from 60% to 80% (Feng et al, 2009¹⁶).

Mites belong to Acaridae family were the most prevalent family in all collected samples. These mites commonly called storage mites. *Glycyphagus destructor*, *Tyrophagus sp.* and *Acarus Siro* were the dominant species. The concentration occurrence of mite fauna in samples may vary from place to place because of different environment conditions. The survey emphasizes the importance of mites in stored food products, further studies are highly desirable.

4. CONCLUSION

36 (60%) stored food products contain mites. 14 species belonging to 7 families and 3 orders are reported in this research. Among the three orders Astigmata was dominant followed by Prostigmata and Mesostigmata. Acaridae family mites were found all year around, the mite number depends upon environmental factors such as temp. and humidity. These samples were collected in three climatic seasons i.e. summer season (April to June), rainy season (July to Sept.), -winter season (Oct. to March). Total 1907 mite specimen were isolated, 974 (51.07%) from rainy, 604 (31.68%) specimen from summer and 329 (17.25%). *Glycyphagus destructor* 19.61%, *Acarus siro* 15.73%, *Tyrophagus putrescentiae* 14.8%, these 3 mite species were most prevalent and traditionally these are called storage product mites.

Table 1: The systematic list of identified species of mites is given below:

Order	Astigmata Canestrini 1891
Family	Acaridae Ewing and Nesbitt 1942
Genus	<i>Acarus siro</i>
Genus	<i>Acarus farris</i>
Genus	<i>Aleuroglyphus ovatus</i>
Genus	<i>Caloglyphus berlesei</i>
Genus	<i>Tyrophagus putrescentiae</i>
Family	Glycyphagidae Berlese 1887
Genus	<i>Blomia freemani</i>
Genus	<i>Glycyphagus destructor</i>
Family	Pyroglyphidae Cunliffe 1958

Genus	<i>Dermatophagoides pteronyssinus</i>
Family	Saproglyphidae Zachvatkin 1941
Genus	<i>Suidasia nesbiti</i>
Order	Mesostigmata G. Canestrini 1891
Family	Laelaptidae Berlese 1892
Genus	<i>Androlaelaps sp</i>
Family	Cheyletidae Leach 1815
Genus	<i>Cheyletus aversor</i>
Genus	<i>Cheyletus malaccensis</i>
Genus	<i>Cheyletus eruditus</i>
Order	Prostigmata Kramer 1877
Family	Tarsonemidae Kramer 1877
Genus	<i>Tarsonemus sp</i>

Table 2: Showing the seasonal abundance of different mite species in infested stored food products

TAXA	SUMMER SEASON-CCL1	SUMMER SEASON-CCL2	SUMMER SEASON-CCL3	TOTAL MITES	% MITE
<i>Acarus siro</i>	101	152	47	300	15.73%
<i>Acarus farris</i>	38	65	23	126	6.6%
<i>Aleuroglyphus ovatus</i>	42	71	19	132	6.9%
<i>Caloglyphus berlesei</i>	22	32	14	68	3.56%
<i>Tyrophagus putrescentiae</i>	104	124	54	282	14.8%
<i>Blomia freemani</i>	31	40	19	90	4.71%
<i>Glycyphagus destructor</i>	108	212	54	374	19.61%
<i>Dermatophagoides pteronyssinus</i>	45	66	21	132	6.9%
<i>Suidasia nesbiti</i>	19	43	12	74	3.9%
<i>Androlaelaps sp</i>	12	21	9	42	2.20%
<i>Cheyletus eruditus</i>	24	47	19	90	4.71%
<i>Cheyletus malaccensis</i>	21	42	17	80	4.25%
<i>Cheyletus aversor</i>	19	38	14	71	3.72%
<i>Tarsonemus sp</i>	18	21	7	46	2.41%

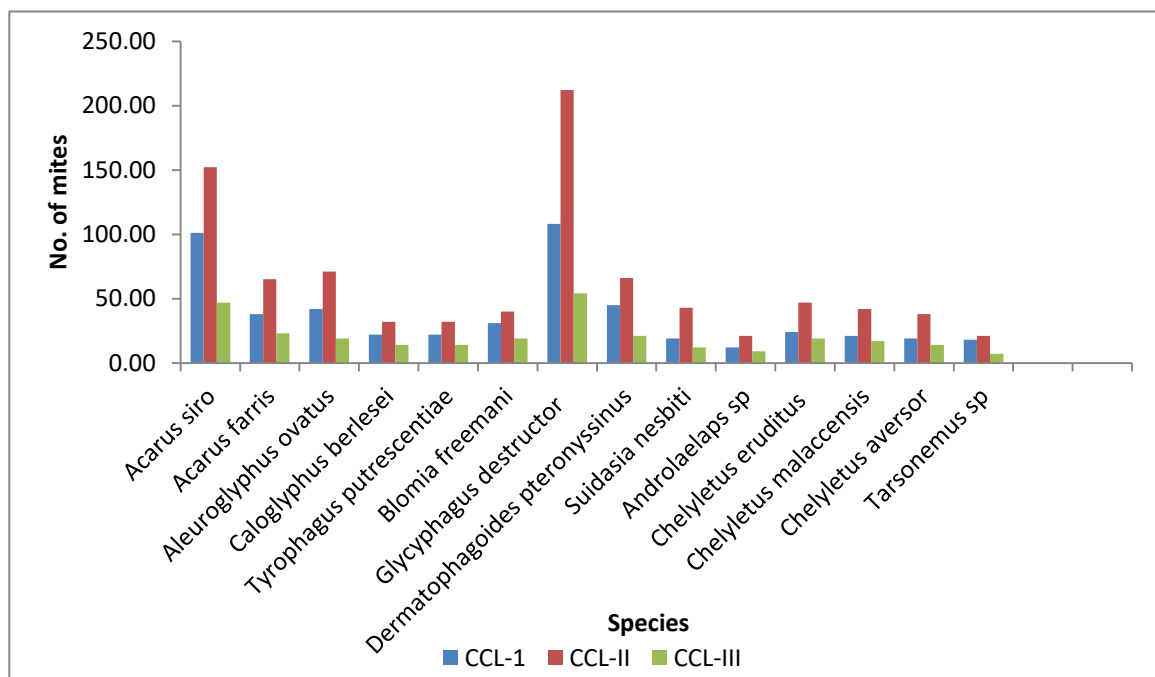


Fig 1: Showing %age prevalence of mite species during Summer (CCL I), Rainy (CCL II) and Winter season (CCL III).

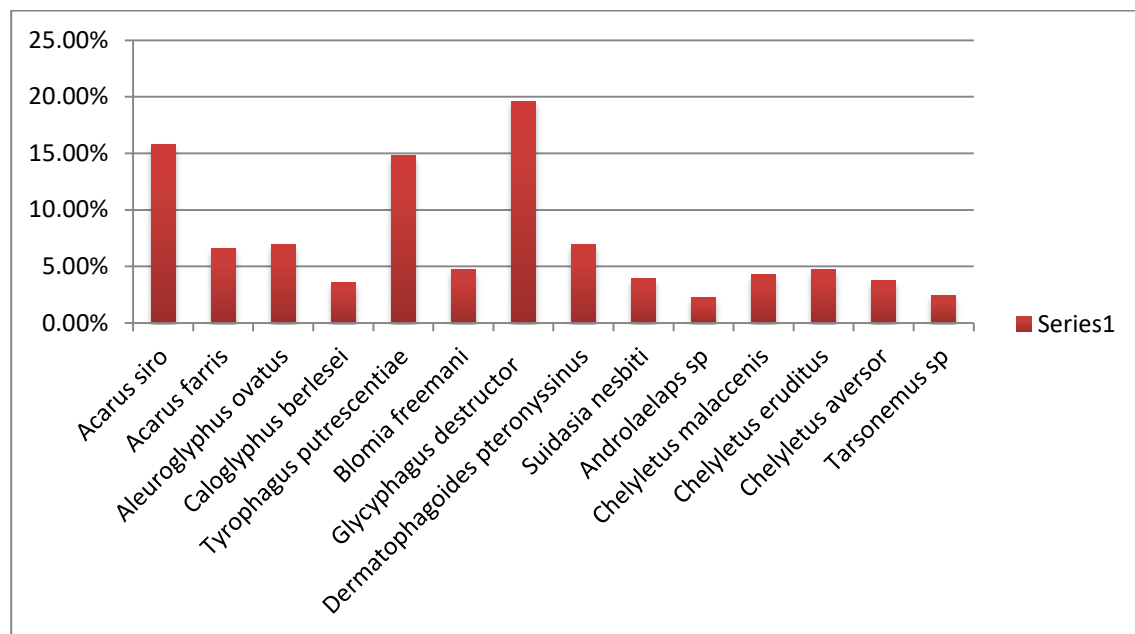
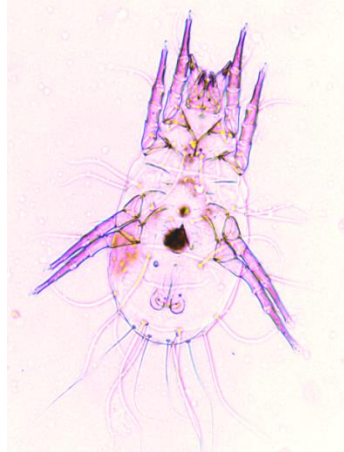


Fig 2: Showing % age prevalence of mite species to total number of mites isolated

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Some Identified Mite Species from Stored Food Products:



Tyrophagus putrescentiae



Suidasia nesbitti



Chelyletus malaccensis



Androlaelaps sp.