



Occurrence, prevalence and species composition of *Rhizoglyphus robini* Claparede, 1869 (Acari: Astigmata: Acaridae) from some stored food products in Punjab (India)

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ABSTRACT

The aim of present research was to study an occurrence, prevalence and abundance review of *Rhizoglyphus robini* that have been recorded from March 2014 to February 2017 in Punjab. Out of 12 stored food products were examined but *Rhizoglyphus robini* were found in dalia and rice only. A total of 1220 (37.65 %) samples out of 3240 samples, were mite positive. Effect of temperature and relative humidity on mite population were studied.

KEY WORDS

Prevalence, Mites, *Rhizoglyphus robini*, Stored food products

INTRODUCTION

Mites are major pests of stored grain and many studies have dealt with their ecology and economic importance in grain stores (Hughes, 1976). Stored food mites are worldwide in distribution and include several species of mites. Although a number of studies have considered the occurrence of grain mites in outdoor habitats (Griffiths, 1960), the acarine fauna associated with the stored food products has not been systematically studied. A study of the acarine populations in 12 stored food products was carried out in Punjab, India from March 2014 to February 2017. Storage food mites are a particular quality problem of grains, stored food products. Infestations taint the grain making it unpalatable to livestock (Wilkin and Thind, 1984). Storage mites also cause occupational health problems to workers in the grain and milling industry e.g. farmer's lung, rhinitis, dermatitis, etc. (Cuthbert *et al.*, 1979).

Rhizoglyphus robini has been collected from wheat flour mills and stored grains (Griffiths *et al.*, 1976), house dust (Amoli and Cunningham, 1977). This mite was mostly found in wheat storage and flour mills and poultry feed. Gill (2014) reported it from grain stores and flour mills of Punjab. Das *et al.* (2016) reported *Rhizoglyphus robini* from

stored products, bird nests, house dust, roof gardens and cattle sheds of South Bengal. Kaur and Dhingra (2018) reported *Rhizoglyphus robini* from warehouses and other grain storage facilities of Punjab. Dehar *et al.* (2019) reported *Rhizoglyphus robini* from flour mills of Kashmir.

Identification features :

Oval mite, gnathosoma well developed, chelicerae toothed with conspicuous denticles, idiosoma broader, oval in appearance, vertical external, Ve, seta inconspicuous, dorsal seta, d_1 , almost half as long as d_4 , supra coxal seta spine like without showing lateral pectinations, Sci, seta minute, idiosomal seta shorter than the length of idiosoma, legs short, well developed, tarsi short, omega 1 and 2 and e short, lying at the base of tarsus.

MATERIALS AND METHODS

During the present study, stored food and their products samples from different fields/localities, homes, grocery shops and stores, from the 10 districts of Punjab were collected. Total of 3240 samples were collected. The samples were brought to laboratory in ziplocked polythene bags for further study. With "Modified Berlese Funnel" storage mites were extracted (Macfadyen, 1953, 1955, 1961). The mites were kept in

70% alcohol. For further identification mites were mounted in Hoyer's Medium (Fain *et al.*, 1990).

RESULTS AND DISCUSSION

During the present investigation, *Rhizoglyphus robini* has been observed in the samples of Dalia and Rice. 15 out of 3240 total samples examined were infested with

Rhizoglyphus robini that form 0.46% of total and 1.22% of mite infested samples. A total of 162 specimens of this mite were obtained which is 1.09% of the total mite population (14812 specimens). Its presence in the samples of Dalia is the new report of commodity infested with *Rhizoglyphus robini* in India.

Table 1: Seasonal distribution of food samples infested with *Rhizoglyphus robini*

Name of mite species	Food type found infested with mite	No. of samples found infested (No./%)	Seasonal distribution of mite infested		
			Summer	Rainy	Winter
<i>Rhizoglyphus robini</i>	Dalia	6 (40)	2	3	1
	Rice	9 (60)	3	5	1
Total (No/%)	2	15 (100)	5 (33.33)	8 (53.34)	2 (3.33)

The seasonal distribution of the number of food samples infested with this mite showed that 5 (33.33%) infested food samples with this mites *Rhizoglyphus robini* were obtained during the summer seasons, 8 (53.34%) during rainy seasons and 2 (13.33%) during winter seasons (Table 1).

Table 2: Yearly distribution of food samples infested with *Rhizoglyphus robini*

Name of mite species	Food type found infested with mite	No. of samples found infested	Yearly distribution of infested samples		
			2014-15	2015-16	2016-17
<i>Rhizoglyphus robini</i>	Dalia	6	2	2	2
	Rice	9	6	0	3
Total (No/%)	2	15	8 (53.34)	2 (3.33)	5 (33.33)

The yearly distribution of number of food samples infested with this mite showed that 8 (53.34%) infested food samples with this mite (*Rhizoglyphus robini*) were obtained during period from March 2014 to February 2015, 2 (13.33%) from March 2015 to February 2016 and 5 (33.33%) from March 2016 to February 2017 (Table 2).

Table 3: Seasonal distribution of specimens of *Rhizoglyphus robini*

Name of mite species	Food type found infested with mite	No. of specimens found (No./%)	Seasonal distribution of mite specimens		
			Summer	Rainy	Winter
<i>Rhizoglyphus robini</i>	Dalia	49 (30.25)	16	27	6
	Rice	113 (69.75)	33	75	5
Total (No/%)	2	162 (100)	49 (30.25)	102 (62.96)	11 (6.79)

A total of 162 specimens of this mite were obtained which is 1.09% of the total mite population (Table 102). Out of these 162 specimens of *Rhizoglyphus robini*, 49 (30.25%) specimens were obtained during the summer seasons, 102 (62.96%) specimens were obtained during the rainy seasons and 11 (6.79%) specimens were obtained during the winter seasons (Table 3).

Table 4: Yearly distribution of specimens of *Rhizoglyphus robini*

Name of mite species	Food type found infested with mite	No. of specimens found	Yearly distribution of mite specimens		
			2014-15	2015-16	2016-17
<i>Rhizoglyphus robini</i>	Dalia	49	13	16	20
	Rice	113	73	0	40
Total (No/%)	2	162 (100)	86 (53.09)	16 (9.88)	60 (37.04)

Out of these 162 specimens of species *Rhizoglyphus robini*, 86 (53.09%) specimens were obtained during period from March 2014 to February 2015, 16 (9.88%) from March 2015 to February 2016 and 60 (37.04%) from March 2016 to February 2017 (Table 4).

Table 5: Showing the seasonal based independent environmental factor values and frequency (%) of occurrence and abundance dependent factors of *Acarus immobilis*

Independent factor	Value taken	Season-wise factor value		
		Summer (CCL1)	Rainy (CCL2)	Winter (CCL3)
Environmental abiotic factors				
Temperature (°C)	Monthly Mean	28.36	29.34	15.60
R.H. (%)	Monthly Mean	52.36	73.67	75.49
Dependent factor				
<i>Rhizoglyphus robini</i>	Occurrence frequency (%)	33.33	53.34	3.33
<i>Rhizoglyphus robini</i>	Abundance frequency (%)	30.25	62.96	6.79

The above table indicates that dependant factors like temperature and relative humidity showed seasonal based difference in their mean values. Similarly, seasonal based difference in infestation and abundance was prominent. It appears that temperature has positive correlation with mite population whereas individually role of relative humidity role is unclear. It appears that high temperature and relative humidity together have synergistic and positive effect on mite population but low temperature and high relative humidity have negative effect.

CONCLUSION

The main objective of the present research was to explore mite fauna, their relative occurrence and abundance in 12 stored food products in Punjab. The scope of this study made it clear that how different factors like temperature and humidity in stored food products affect the mite population growth. It was also clear that different mite species relatively vary in their intrinsic rate of population growths. This work can be used in building better knowledge for future

Acarologists regarding mite control mechanisms in our stored foods.

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