International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Biodiversity of Grain and Dust Mites from Baramati Tehsil, District Pune, Ms, India

Sameer Jadhav[1] Sanika Kakade[2] Shreya Charate[3]

[1,2,3]Department of Zoology, Tuljaram Chaturchand College, Braramati, District-Pune, MS, India.

ABSTRACT:
The research was carried out to find biodiversity of grain and dust mites from some regions of Baramati tehsil of the state Maharashtra, India. Studying mites is important because they play vital role in quality of grains and seeds. We found 06 species of grain and 07 species of dust mites representing three orders viz., Astigmata, Mesostigmata, Prostigmata belongs to families Dermanysidae, Cheyletidae, Acaridae, Pyroglyphidae.

Keywords: Research, Vital, Important, Quality

INTRODUCTION:

Mites belong to the phylum Arthropoda, class Arachnida, and subclass Acari. Most mite species infesting stored food belong to order Astigmata. Stored grain mites are pests that cause economic damage worldwide. (Hughes, 1976 & Thind, 2005). Grain mites damages grain kernels, weight loss, and decreased grain quality (Hill, 2002). Additionally, they can contaminate grain with their eggs, feces, and body parts, potentially posing health risks to humans and animals (Lorini, 2018).

These mites directly cause grain spoilage. Some stored grain mites play a role in decomposition, breaking down organic impact is context dependent, influenced by environmental factors. (Wallace & Mahon 2003).

House dust mites measure 0.2 - 0.3 mm. House dust mites are one of the most important and first suspected allergen in the house dust that has medical importance (Colloff, 2009).

Ecological parameter shows positive impact on population dynamics of grain mites.

MATERIAL AND METHODS:

Study of mites was carried out from September 2024 to March 2025 in some regions of Baramati. Samples were collected in clean small plastic bags and they are also labelled with location, date, temperature, humidity and rainfall. Mites were separated by using a simple pickup method (Jogdand, 1988). For the separation of large particles and other material from grain and dust were separated by sieving through a special brass sieve.

Preparation of glycerin jelly: Boil 300ml of distilled water in the beaker and add 350ml glycerin to it, and add 50g of gelatin powder, in portion with continous stirring by clean glass rod, without allowing the clumping. After the considerable boling, add 1 gm of phenol and cool it for room temperature to solidify and become almost transparent.

Isolation of mites: The mites were isolated by using the needle moistened with 4% lactic acid.

Clearing and Mounting: Isolated mites were kept in 4% lactic acid for 2 to 3 days for frequent examination, to ensure that the specimens are not damaged by over clearing. After clearing the mites, mount the specimens and keep them on ventral side, facing upon the clean glass slide and any desired position without damage. At centre add the single drop of melted glycerin jelly. Press the slides on filter paper to remove excess glycerine jelly to make the slide clear. Preserve as permanent slides for the further studies in the slide storage box.

Morphometric analysis: For the measurement of mites using Image J software.

Ecological parameters: Rainfall was taken from Maharain website.

Identification: Mites were identified by using pictorial keys given by Hughes 1976.

RESULT AND DISCUSSION:

Month	**Total number of mites**	**Temperature** °C	**Humidity** %	**Rainfall**
September	46	26°C	49 %	59.09 mm
October	89	28°C	44 %	90.05 mm
November	13	22°C	64 %	0.8 mm
December	0	23.05°C	67.85 %	0.04 mm
January	0	23°C	45.05 %	0 mm
February	0	26.05°C	49 %	0 mm
March	0	30°C	45 %	0 mm

Table 1 : 4. Month wise meteorological parameters.

Order	**Family**	**Species**	**Habitat**
Astigmata (Astigmata Canestrini, 1891)	Acaridae (Ewing and Nesbitt, 1942)	*Acarus siro* (Acarus siro L, 1758)	House Dust
		Tyrophagus sp. 1 (Tyropghagus Oudemans, 1924)	House Dust
		Tyrophagus sp. 2 (Tyrophagus Oudemans, 1924)	House Dust
		Tyrophagus sp. 3 (Tyropghagus Oudemans, 1924)	House Dust
	Pyroglyphidae (Pyroglyphidae Cunliffe, 1958)	*Dermatophagoides sp.* 1 (Dermatophagoides farina Huges, 1961)	House Dust

		Dermatophagoides sp. 2 (Dermatophagoides farina Huges, 1961)	House Dust
		Dermatophagoides pteronyssinus (Trouessart, 1897)	House Dust

Table 2 : List of dust mites along with their habitats and taxonomic position.

Order	**Family**	**Species**	**Habitat**
Mesostigmata	Dermanyssidae	*Dermanyssus gallinae* (De Geer, 1778)	Wheat
Prostigmata	Cheyletidae	*Cheyletus malaccenisis* (Oudemans,1903)	Rice
		Cheyletus erudite (Schrank,1877)	Rice
Astigmata	Acaridae	*Tyrophagus putrescentiae* (Schrank, 1781)	Moong
	Pyroglyphidae	*Dermatophagoides pteronyssinus* (Trouessart,1897)	Wheat

Table 3 : List of grain mites along with their habitats and taxonomic position.

Species	**Length**	**Width**	**Leg I**	**Leg II**	**Leg III**	**Leg IV**	**Chelicera**	**Pedipalp**
Male : *C malaccensis*	683.539	269.904	670.484	465.539	434.181	449.529	293.904	222.002
Female : *C malaccensis*	934.118	465.446	489.183	424.721	394.088	506.306	299.908	134.826
T putrescentiae	800.302	417.484	532.643	435.574	415.448	583.414	319.595	219.244
D gallinae	818.912	441.073	385.135	318.057	246.830	556.683	223.886	180.427
D pteronyssinus	669.706	402.492	258.645	216.021	247.132	265.089	162.388	136.137
Chyeletus erudits	622.223	337.457	333.054	262.718	350.179	383.179	247.323	173.118
Acarus siro	252.071	217.412	146.007	158.773	138.423	128.860	91.831	80.88
Tyrophagus sp.1	326.063	238.212	211.729	662.260	146.110	170.816	115.879	100.11
Tyrophagus sp.2	240.786	156.978	280.223	205.407	207.868	188.809	107.079	98.22
Tyrophagus sp.3	308.110	243.019	212.323	177.508	235.648	236.239	87.052	80.00
Dernatophagoides sp.1	613.652	384.047	425.376	369.439	331.388	495.327	147.733	110.26

Dermatophagoides sp.2	534.135	280.030	462.944	335.598	324.014	456.247	107.079	95.69
Dermatophagoides pteronyssinus	387.525	254.558	196.977	254.778	226.345	133.207	96.167	75.28

Table 4 : Body length and width (in micrometer) of reported mites

PHOTO PLATE 1-GRAIN MITES

Male : *Chyeletus malaccensis*

Female : Chyeletus malaccensis

Dermatophagoides pteronyssinus

Tryophagus putrescentiae

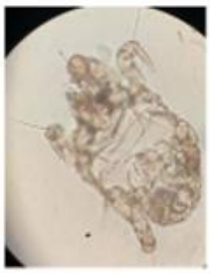
Dermanyssus gallinae

Cheyletus erudits

PHOTO PLATE 1-DUST MITES

Acarus siro

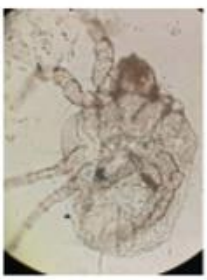
Tyrophagus sp.



Tyrophagus sp.

Tyrophagus sp.

Dermatophagoides sp.



Dermatophagoides sp.

Dermatophagoides pteronyssinus

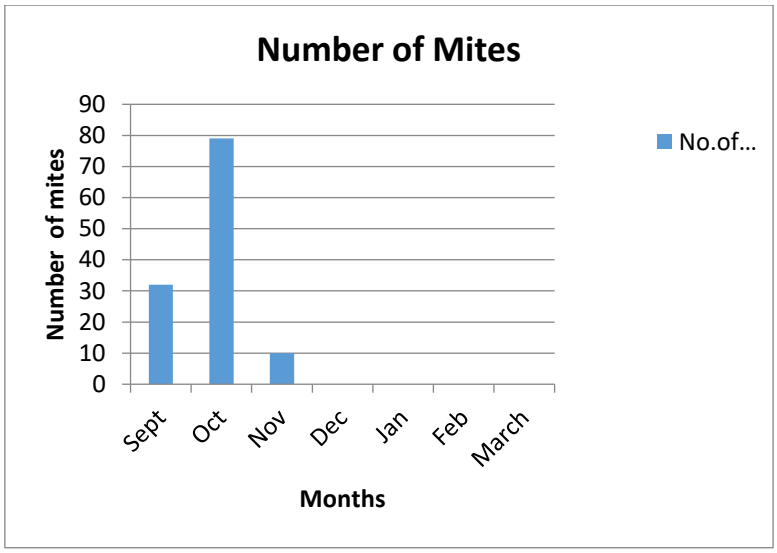


Fig 1: The given graph shows number of grain mites.

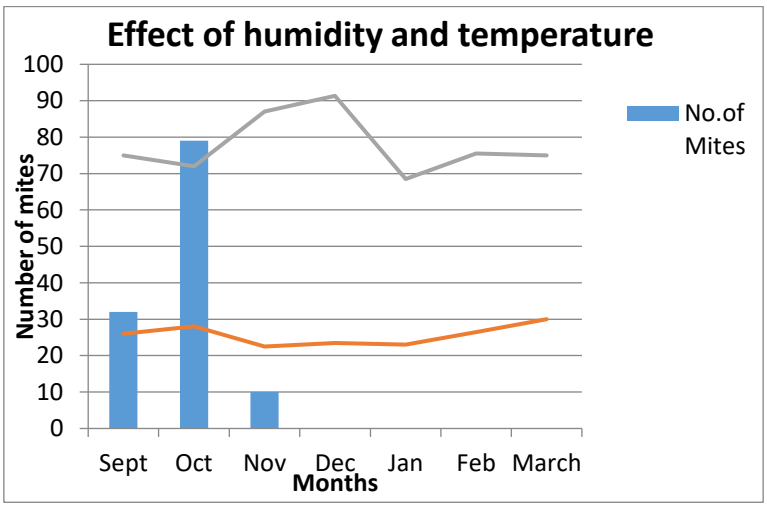


Fig 2: The given graph shows effect of humidity and temperature on grain mites

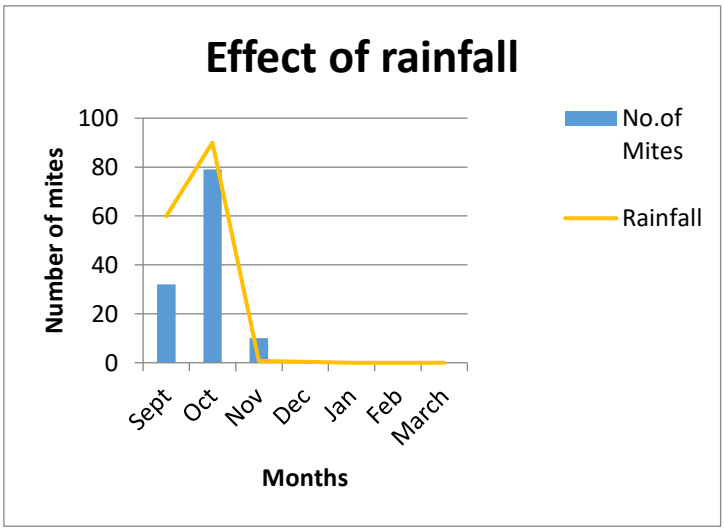


Fig 3 :The given graph shows effect of rainfall on grain mites.

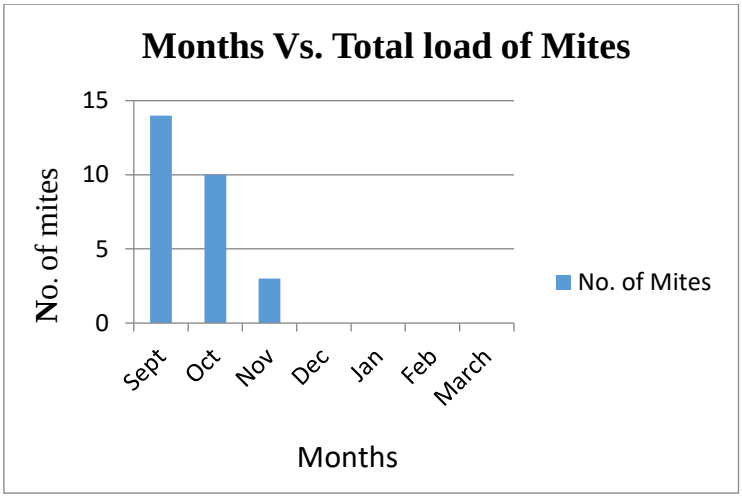


Fig 1 :The given graph shows number of dust mites.

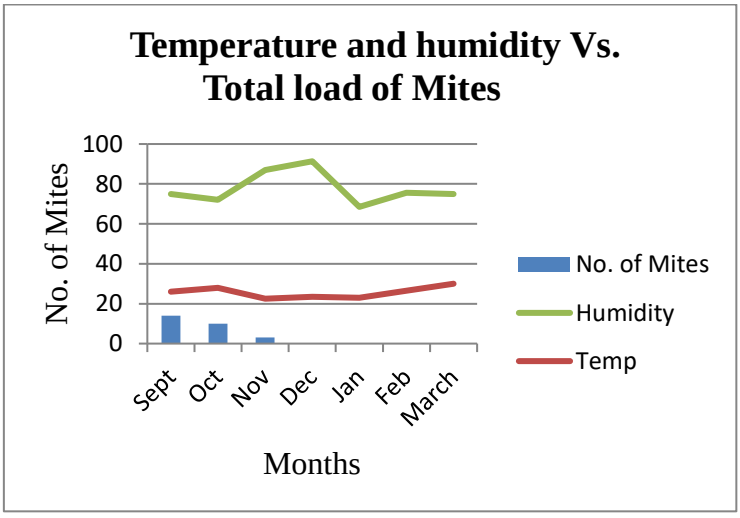


Fig 2 : The given graph shows effect of humidity and temperature on dust mites.

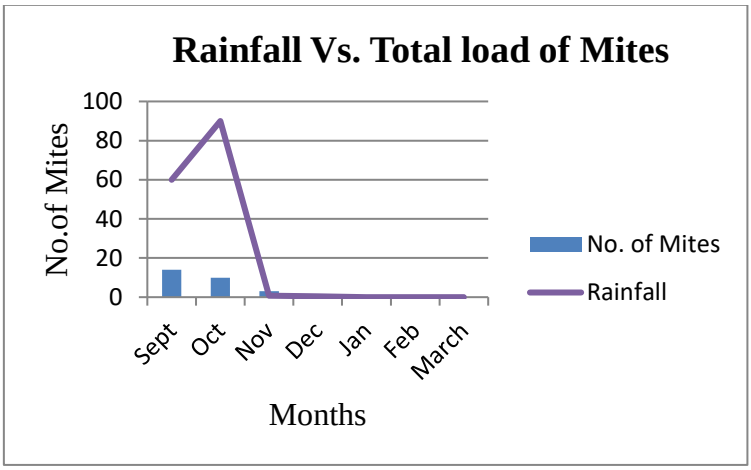


Fig 3 :The given graph shows effect of rainfall on dust mites.

Temperature has slight impact on total load of mites, i.e. as temperature increase mites number is also increase. Humidity has significant impact on total load of mites, i.e. as humidity increase number of mites also increases. Rainfall also has significant impact on mites load, i.e. as rainfall increase mites number also increase.

CONCLUSSION

The research study was to find grain mites biodiversity from some regions of Baramati of the state Maharashtra, India .A total 05 species of grain mites (Acari) were recorded under 5 genera and 4 families Dermanysidae, Cheyletidae , Acaridae, Pyroglyphidae belonging to 03 orders Astigmata, Mesostigmata, Prostigmata were recorded from different regions of Baramati within the state of Maharashtra. Out of 05 species 02 species isolated from Wheat, 01 species from Moong, 02 from Rice. 7 species of house dust mites namely *Acarus siro*, *Tyrophagus sp.,2,3, Dernatophagoides sp1,2*, *Dermatophagoides pteronyssinus* House dust mites inhabiting mite representing 1order Astigmata, 2 families such as Acaridae and Pyroglyphidae. This study reveals rich acari fauna within short period of time.

REFERENCE

1. Allergy. Journal of Medical Entomology, 6(3), 295-299.
2. Arlian, L. G., & Morgan, M. S. (2003). Biology, ecology, and prevalence of dust mites. Immunology and Allergy Clinics, 23(3), 443-468.
3. Bansod, V. M. INTRAMURAL DUST MITES: BIODIVERSITY AND ITS QUANTITATIVE ANALYSIS.
4. Barton, R. H. (2009). *Sacred rhythms: Arranging our lives for spiritual transformation*. Intervarsity press.
5. Blainey, A. D., Topping, M. D., Ollier, S., & Davies, R. J. (1989). Allergic respiratory disease in grain workers: the role of storage mites. *Journal of allergy and clinical immunology*, *84*(3), 296-303.
6. Blythe, M. E. (1976). Some aspects of the ecological study of the house dust mites. British Journal of Diseases of the Chest, 70, 3-31.
7. Collins, D. A. (2012). A review on the factors affecting mite growth in stored grain commodities. Experimental and applied acarology, 56, 191-208.
8. Colloff, M. J. (2009). Methods in house dust mite ecology and biology. In Dust Mites (pp. 255-271). Dordrecht: Springer Netherlands.
9. Cunnington, A. M. (1976). Effect of physical conditions on the development and increase of some important storage mites. *Annals of applied biology*.
10. Damle, K. L., Gupta, S., & Sharma, M. (2016). Biodiversity and population dynamics of dust mites. Journal of Agriculture and Veterinary Science, 9(9), 94-98.
11. Dey, D., Saha, G. K., & Podder, S. (2019). A review of house dust mite allergy in India. Experimental and Applied Acarology, 78, 1-14.
12. Dhaliwal, A. K. (2022). Role of Abiotic Factors on House Dust Mite Population: Control and Allergen Avoidance-A Review Article. Journal of Scientific Research, 66(4).
13. Dhaliwal, A. K., & Gill, N. K. (2020). Allergenic co-inhabitants of House Dust. Journal of Scientific Research, 64(2), 66-74.

14. Gad, M. E. G., Metwally, A. M., & Bream, A. S. M. (2020). Some Astigmated, Prostigmated and Cryptostigmated Mites Inhabiting some Stored Products at El-Sharqia Governorate, Egypt. Journal of Plant Protection and Pathology, 11(4), 215-219.
15. Gad, M. E. S., Metwally, A. S. M., & Bream, A. S. (2020). Some Mesostigmated Mites Associated with Food Stuff. Egyptian Academic Journal of Biological Sciences. A, Entomology, 13(2), 189-194.
16. Genç, D. Dental folikül kaynaklı mezenkimal kök hücrelerin (DF-MKH) ev tozuna duyarlı astım hastalarından elde edilen naive t lenfositlerin in vitro TH1 ve TH2 farklılaşması üzerine etkisi.
17. Gøtzsche, P. C., & Johansen, H. K. (2008). House dust mite control measures for asthma. Cochrane Database of Systematic Reviews, (2).
18. Griffiths, D. A., Hodson, A. C., & Christensen, C. M. (1959). Grain storage fungi associated with mites. *Journal of Economic Entomology*, *52*(3), 514-518.
19. Haq, M. A., & Ramani, N. (2010). 'Preliminary survey of House Dust Mites at Calicut (Kerla)''. Acarology, 23, 223-226.
20. Hill, D. S. (2002). *Pests of stored foodstuffs and their control*. Springer Science & Business Media.
21. Hubert, J., & Mourek, J. (2002). The feeding interactions of astigmatid mites (Acari: Astigmata) and microfungi in stored grain habitats (Mini-Review). Lisbon, Portugal 3–5 September, 2001, 25, 45.
22. Hughes, A. M. (1961). The mites of stored food.
23. Jogdand, D. R. S. B. (2016). Ecofriendly environmental dynamics of House Dust Mites and their role in manifestation of allergy, diagnosis and therapy. International Journal Mendel, 33, 1-2.
24. Klain, A., Senatore, A. A., Licari, A., Galletta, F., Bettini, I., Tomei, L., & Indolfi, C. (2024). The prevention of house dust mite allergies in pediatric asthma. Children, 11(4), 469.
25. Larson, D. G., Mitchell, W. F., & Wharton, G. W. (1969). Preliminary studies on Dermatophagoides farinae Hughes, 1961 (Acari) and house dust. Modak, A., Saha, G. K., Tandon, N., & Gupta, S. K. (2004). Faunal diversity and habitat preference of house dust mites in West Bengal in relation to nasobronchial allergic disorders. Records of the Zoological Survey of India, 137-146.
26. Lin, G., Tanguay, A., Guertin, C., Todorova, S., & Brodeur, J. (2017). A new method for loading predatory mites with entomopathogenic fungi for biological control of their prey. *Biological Control*, *115*, 105-111.
27. Lorini, I. (2018). Stored grain pests and their management. CABI.
28. Macfadyen, S., Moradi-Vajargah, M., Umina, P., Hoffmann, A., Nash, M., Holloway, J.,& Barton, M. (2019). Identifying critical research gaps that limit control options for invertebrate pests in Australian grain production systems. *Austral Entomology*, *58*(1), 9-26.
29. Malik, A., Gulati, R., Duhan, K., & Poonia, A. (2018). Tyrophagus putrescentiae (Schrank)(Acari: Acaridae) as a pest of grains: a review. *Journal of Entomology and Zoology Studies*, *6*(2), 2543-2550.
30. Mondal, P., Dey, D., Sarkar, T., Laha, A., Moitra, S., Bhattacharyya, S.,& Podder, S. (2019). Evaluation of sensitivity toward storage mites and house dust mites among nasobronchial allergic patients of Kolkata, India. Journal of medical entomology, 56(2), 347-352.
31. OConnor, B. M. (1982). Evolutionary ecology of astigmatid mites. Annual Review of Entomology, 27(1), 385-409.
32. Pawar, S., Jogdand, S., Jadhav, M., & Deokar, T. (2016). Effect of environment on seasonal dynamics of rat house mites at Pune. International Journal of Entomology Research, 1(4), 26-32.

33. Podder, S., Biswas, H., & Saha, G. (2021). A faunistic survey of house dust mites of Kolkata, West Bengal, India. Acarological Studies, 3(1), 22-31.
34. Sarwar, M. (2020). House Dust Mites: Ecology, Biology, Prevalence, Epidemiology. Parasitology and Microbiology Research, 271.
35. Saw, M. K., Bharati, S. K., & Sinha, S. K. (2018). Faunal diversity of house dust mite in grocery shops in coal mining area of Dhanbad, India. Journal of Experimental Zoology India, 21(2).
36. Saw, M. K., Bharati, S. K., & Sinha, S. K. (2025, March). House Dust Mite Diversity and Abundance in the Human Dwellings of the Coal Mining Area of Dhanbad, India. In Proceedings of the Zoological Society (pp. 1-5). Springer India.
37. Shaaya, E., & Kostjukovsky, M. (1998). Efficacy of phyto-oils as contact insecticides and fumigants for the control of stored-product insects. In *Insecticides with Novel Modes of Action: Mechanisms and Application* (pp. 171-187). Berlin, Heidelberg: Springer Berlin Heidelberg.
38. Sinha, R. N. (1979). Role of Acarina in the stored grain ecosystem. Recent advances in acarology, 1, 263-272.
39. Spieksma, F. T. M. (1967). The house-dust mite Dermatophagoides pteronyssinus (Trouessart, 1897), producer of the house-dust allergen (Acari: Psoroptidae).
40. Spieksma, F. T. M. (1997). Domestic mites from an acarologic perspective. Allergy, 52(4), 360-368.
41. Tandon, N., Chatterjee, H., Gupta, S. K., & Hati, A. K. (1989). Some observations on house dust mites in relation to naso-bronchial asthma in Calcutta, India. Progress in Acarology, 1, 163-168.
42. Wallace, D. R., & Mahon, R. J. (2003). Stored product mites and their control. Journal of Stored Products Research.
43. White, N. D. (1995). Insects, mites and insecticides in stored-grain ecosystems. Stored grain ecosystems, 123-168.
44. Yahia, S. H., & Metwally, A. S. (2019). Effect of some housing criteria and seasonal variations on indoor prevalence and distribution of dust mite populations in Sharkia Governorate, Egypt. Life Sci J, 16(7), 59-68.