

## RESEARCH ARTICLE

## INTRAMURAL DUST MITES FROM POULTRY AND FLOUR MILL IN PUNE, INDIA

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### ABSTRACT

The Biodiversity of mites in dust of poultry and flour mill was investigated.. The mites were picked up from intramural dust ecosystem that is poultry farm and flour mill. Analysis of air was also done using Tilak Air Sampler. The dust from poultry farm was collected and scanned. The mite *Dermatophagoides pteronyssinus* were found more in number of the entire mite found in poultry, followed by *Urodia spistecta*, and *Dermanyssus gallinae* which is actual chicken mite. The observation revealed mite fauna exhibiting seasonal fluctuations. The mites were found in highest percentage in rainy season, moderate during winter season and least during summer season. *Acarus siro* mite was observed in the study of flour mill dust.

**Keywords :** Biodiversity, Mites, Prevalence

### INTRODUCTION

Mites are arachnids, cosmopolitan in distribution, and are characterized by the presence of four pairs of legs. They are small, microscopic and are parasitizing majority of animals specially birds and mammals. Mites are free living and are useful in biologic recycling process as scavengers or as saprophagous or parasitic mites (Spieksma F. Th. M- 1997). Mites are the main material found in intramural dust. Dust is fine dry powder and it consists of particles. Dust in home, offices and other home environment contain small amount of plant pollen, human and animal hairs, textile fibers, paper fibers, human skin cells and many others materials which may be found in local environment.

Dust mites found in poultry dusts are allergens causing allergy in sensitive individuals. Some of them

have also been found to cause diseases in poultry birds and poultry workers. They create ecological imbalance in nature. It also results into aero bio pollution problems. Some of them are very tiny and lighter in weight, therefore are suspended in breeze, and forms exclusive part of Aerobiology. Dust mites prefer dark and humid climate. Poultry dust is mixture of bird feed. The rearing bed consists of wood shavings, shreds, straws, gravels, bird droppings, feather and dander (dead skin). The poultry birds affects on the growth of the birds and laying of the eggs. The increasing incidence of a number of diseases in poultry has been associated with ingestion of contaminated feed with biologically active compound. Poultry house provides an environment to dust mites. Exploration about biodiversity of poultry mites is carried out from September 2010 to August 2012.

### MATERIAL AND METHODS

The site selected is the poultry farm and flour mill in Pune. The poultry dust was collected from corner, under the feeder, sides of wall and central part of the poultry house. The surface layer was removed, which is the poultry litter. It is coarse and consists of bigger

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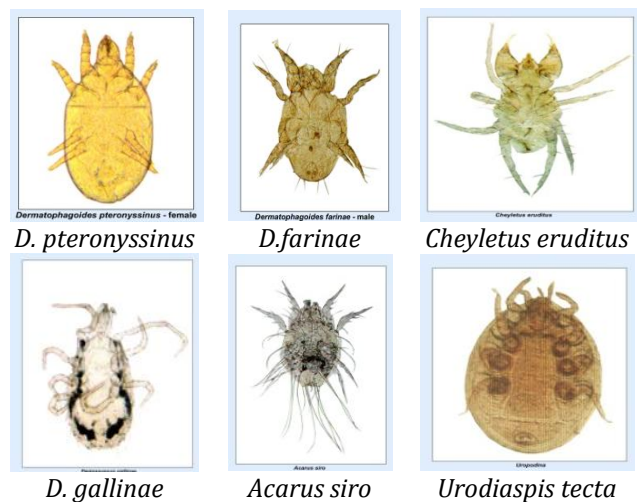
size gravel, saw dust, groundnut hulls, chopped straws and paddy husks. The immediate lower layer below surface is fine which was collected manually. It was then packed in sterilized bag of paper. The time of collection of dust is 4:00 p.m. It was then sieved through 300micronmeter mesh size sieve into Petri dish of 5 cm diameter. It was uniformly spread in thin layer. The Petri plates were then mounted under dissecting microscope with 10X magnification. They were then picked up with the help of needle of 0.2mm, 0.5 mm depending on the size of mite. The tip of needles was moistened with 40% lactic acid, as on touch they stick to moist needle. It was then placed in cavity blocks containing lactic acid for 24 hours. Lactic acid is used as clearing agent and it also paralyzes the mites. It dissolves and clears the sclerotization of the mites, and makes it transparent.

Another site for the collection of flour dust was from flour mill. It is the place where whole grains like wheat, jowar, bajri, and cereals are ground. The flour dust was collected from the side of walls, corners and near the flap of mill. It was collected with the help of brush and collected in paper bags.

Quantification of mites is undertaken so as to find out the number of each species out of total mites present in the dust at given time. The quantification of mites was done every month. It is done by floatation technique. The dust was weighed to 1 gram. It was then centrifuged in 100% kerosene at 2000 rpm for 10 minutes. Supernatant was filtered through filter paper. To the sediment of above, kerosene and carbon tetrachloride in 3:5 ratios is added. It was again centrifuged at 2000 rpm for 10 minutes. It was filtered through the same filter paper. To the above sediment kerosene and CCl<sub>4</sub> was added in 1:3 ratio and filtered through same filter paper. In the last step, in the sediment, pure CCl<sub>4</sub> was added and centrifuged at 2000 rpm for 10 minutes. The filter paper is spread on Petri plate and observed under the microscope and total mites were counted. The mites kept in cavity blocks were then picked up and placed on slide with ventral side up. A drop of freshly melted glycerin jelly was put on the mite and immediately cover slip was mounted over it. It is then pressed slightly. Excess of jelly is removed.

## OBSERVATION:

Mites are placed in phylum Arthropoda in class Arachnida. The mites found belong to order Astigmata, Prostigmata, Mesostigmata. Total 379 specimens were screened to find out the percentage contribution of each species of mite. The mites found in the investigation were *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Cheyletus eruditus*, *Dermanyssus gallinae* and *Urodiaspis tecta*. Scanning of dust from the flour mill was also undertaken and only one species of mite *Acarus siro* was found.



| Species                               | % Contribution |
|---------------------------------------|----------------|
| <i>Dermatophagoides pteronyssinus</i> | 30.34          |
| <i>Dermatophagoides farinae</i>       | 15.30          |
| <i>Cheyletus eruditus</i>             | 17.94          |
| <i>Dermanyssus gallinae</i>           | 7.65           |
| <i>Urodiaspis tecta</i>               | 28.75          |

| Name of mite          | Season | % Prevalence of mites |
|-----------------------|--------|-----------------------|
| <i>D.ptronyssinus</i> | rainy  | 73.04                 |
|                       | winter | 24.34                 |
|                       | summer | 2.60                  |
| <i>D.farinae</i>      | rainy  | 75.86                 |
|                       | winter | 22.41                 |
|                       | summer | 1.72                  |
| <i>C.eruditus</i>     | rainy  | 98.52                 |
|                       | winter | 0                     |
|                       | summer | 2.94                  |
| <i>D.gallinae</i>     | rainy  | 93.10                 |
|                       | winter | 6.89                  |
|                       | summer | 0                     |
| <i>U.tecta</i>        | rainy  | 94.95                 |
|                       | winter | 5.50                  |
|                       | summer | 0                     |



### Seasonal fluctuation of population of mites in poultry

Systematic study was undertaken to study the seasonal variation in the population of mites of poultry September 2010 to August 2012. The prevalence in percentage contribution of mites found in poultry dust is calculated. Out of all mites, *Dermatophagoides pteronyssinus*, *Cheyletus eruditus* were not found in winter season. *D. gallinae* which is actual chicken mite was found in less number in winter season as compared to *D. pteronyssinus* and *D. farinae*. Highest % contribution of all dust mites is recorded during rainy season that is July, August, September and October. These are congenial environmental conditions, when the temperature is 25°C and humidity between 75% and 85%. There is progressive increase in number of mites per gram of poultry dust from July to September. Our findings revealed that low temperature, low RH, cold condition and rainless days act as adverse condition for the incidence and growth of mites. In such condition the population of mite in the dust of poultry is significantly decreased from November to May that is comprising winter and summer months. The dry period of summer months makes it hard for the survival of mites.

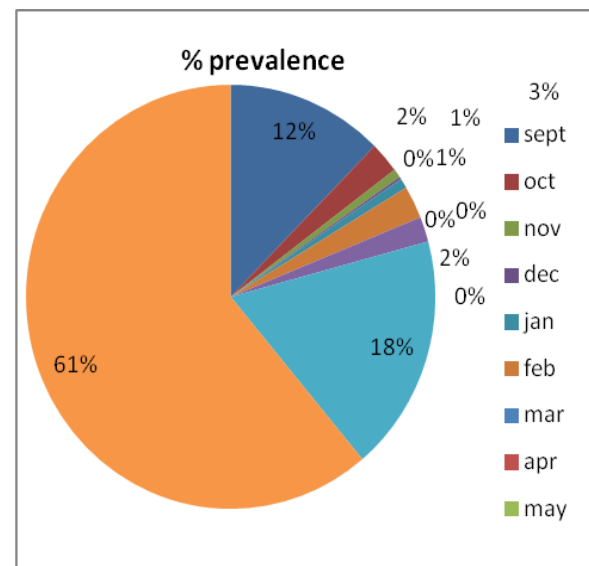
#### Prevalence of Poultry Dust Mites

September 2010 to August 2012 Number of mites/gm dust

| Months | 2008-09 | 2009-10 | Total | % prevalence |
|--------|---------|---------|-------|--------------|
| Sept   | 45      | 85      | 130   | 12.41        |
| Oct    | 13      | 12      | 25    | 2.38         |
| Nov    | 3       | 4       | 7     | 0.66         |
| Dec    | 1       | 1       | 2     | 0.19         |
| Jan    | 4       | 4       | 8     | 0.76         |
| Feb    | 14      | 12      | 26    | 2.48         |
| Mar    | 0       | 0       | 0     | 0            |
| Apr    | 0       | 0       | 0     | 0            |
| May    | 0       | 0       | 0     | 0            |
| Jun    | 10      | 10      | 20    | 1.91         |
| Jul    | 100     | 89      | 189   | 18.05        |
| Aug    | 241     | 399     | 640   | 61.12        |
|        | 128     | 132     | 1047  |              |

### RESULT AND DISCUSSION

The study demonstrates that poultry dust mites occur in humid environmental condition. It is known that prevalence is greater in humid geographic areas than the dry areas. Seasonal variation in population of mites is generally consistent with those reported by studies in Bangalore, India. There was gradual increase in the population of mite during the months of rainy season, when the RH and temperature was optimum for the survival of mite fauna.



Very little work has been done on poultry mites and house dust mites in Pune region. In this we performed identification and presence of different types of mites in the poultry farm. During these studies *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Cheyletus eruditus*, *Dermanyssus gallinae* and *Urodiaspis tecta* mite species were reported in different concentration, of which *Dermatophagoides pteronyssinus* were reported highest in all season. Moderate temperature, high relative humidity provided most congenial environment for maximum percentage contribution of mites in poultry dust. RH affects the population of mites. The observation is also reported by Spieksma (1997). Whereas low temperature and high temperature were found to be unfavorable for the survival of mites as is revealed in cold dry winter months and hot summers of April and May. It is in agreement with those of Tilak and Jogdand (2009).



In the present study *Dermanyssus* was also found, which is the actual chicken mite. Hughes (1976) has found its distribution cosmopolitan. Work on *Cheyletus eruditus* has also been done by Choudhary and Mukherjee (1971) and have recorded it as a common predatory mite. Further investigations would include exploring more biodiversity of mites in intramural ecosystem, allergen load of mites in dust samples and clinical investigations.

#### Acknowledgements:

The authors wish to express thanks to Principal of Prof. R. More College, Department of Zoology, for permitting to carry out research. We thank UGC for financial assistance. We are indebted to Dr. S. B. Jogdand for his immense help.

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**Cite this article as:** Bansod Vaishali M, Borde Sunita N and Lahot Sapna (2013) Intramural dust mites from poultry and flour Mill in Pune, India, *Int. J. of Life Sciences*, Special Issue A (1): XX- XX.

