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## Research Article

### QUALITATIVE ANALYSIS OF AEROMYCOFLORA OF INDOOR DAIRY CATTLE SHED

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#### ABSTRACT

There is an increasing concern about the exposure to fungal aerosols in occupational environments and associated respiratory allergic diseases and asthma. A large number of people work in cattle sheds around the world, pulmonary function impairments and higher frequency of respiratory symptoms have been reported in dairy farmers; however, it appears that adequate information on the fungal aerosols from the cattle sheds are largely lacking. The study of airborne cultivable fungal spores was performed in 5 different rural indoor cattle shed in Thane district of Maharashtra, India. The aeromycoflora of the cattle shed was investigated by gravity sampling method using selective medium for fungi. A total of morphologically different 15 fungal isolates were obtained. The study revealed the prevalence of higher frequency of Aspergilli, *Ustilago* spp., Penicilli, Alternaria, and Cladosporium. The result indicates the poor hygienic condition of indoor environment of selected dairy cattle sheds.

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#### INTRODUCTION

Bioaerosols are one of the most important contaminants in the dairy environment. Cattles and dairy workers are exposed to high concentrations of bacteria and fungi which results in incidence of allergic respiratory diseases. Fungal spores are small and buoyant thus having easy access to indoor environment of cattle shed. Even the animal feed is often contaminated by fungi and their conidia are also emitted into air. The air borne fungal spores are mostly responsible for causing allergic diseases in a significant proportion (Pavan and Manjunath, 2014).

The air quality inside the cattle shed depends on factors like type and age of a building, number of inhabitants (people or animals), the type of ventilation systems, and climatic conditions: temperature, humidity, dust concentration (Pavan, 2015). Improper working methods and hygienic conditions are the main causes of considerable air contamination (Dutkiewicz *et al.*, 1994). Air quality inside the shed also influences the health of people working with animals, whereas the spread of bioaerosol outside animal housing facilities results in local or even more extensive environmental pollution. It is now well recognized that exposure of the airways to microorganisms in occupational environment is associated with a wide range of

adverse health effects with major public health impact (Kakati, 2015). The freshly drawn milk also contains a certain number of microorganisms originating from the dairy air which leads to postsecretory contamination (Pavicic *et al.*, 2003).

In India, a little attention has been paid to the hazards posed from exposure to filamentous fungi in indoor cattle shed environment and also the flora from the skin surface of cattle and workers in cattle sheds. Hence, the present study was conducted in order to assess the mycoflora from cattle shed environment from Thane region of Mumbai, Maharashtra, India. Detailed information of fungal types in the cattle shed environment will be helpful in effective diagnosis and treatment of allergic ailments, thus reducing infections in indoor environment of cattle sheds.

#### MATERIALS AND METHODS

##### Study Site

The study was conducted in five different local cattle sheds from Thane regions, viz, Ulhasnagar, Ambarnath, Badlapur, Kalyan and Dombivli having the capacity of 50 buffaloes and more.

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**Sample Collection**

The sample was collected twice a day, morning and evening at monthly intervals from September 2017 to December 2018.

**Aeromycoflora of Cattle Shed**

Air samples were collected by gravitational method on Sabouraud glucose agar medium supplemented with 500mg/l chloramphenicol and ampicilin. The plates were incubated at room temperature for 48 hours (Goyer, 2001).

**Characterization of the Fungal Isolates**

The morphologically different fungal colonies were selected from the Sabouraud glucose agar plate. The selected fungi were stained in lactophenol cotton blue and identified microscopically with reference to standard texts (Navietal., 1999; Stevens 1974).

**RESULT AND DISCUSSION**

A total of 100 fungal isolates were isolated from the air of five different cattle sheds. Fig.1 indicates the type and percentage distribution of fungi isolated from the air of dairy cattle sheds. Fungi isolates were identified as *Alternaria* spp., *Aspergillus* spp., *Chaetomium* spp., *Cladosporium* spp., *Claviceps* spp., *Curvularia* spp., *Epicoccum* spp., *Fusarium* spp., *Mucor* spp., *Penicillium* spp., *Rhizopus* spp., *Trichoderma* spp., *Trichophyton* spp., *Ustilago* spp. and Yeast (*Candida* spp.).

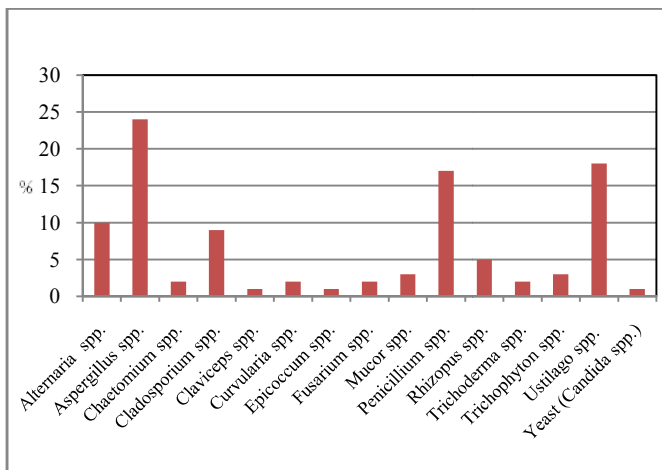


Fig 1 Types and percentage distribution of fungi isolated from air of five dairy cattle sheds

The most predominant fungi contributing to the total airflora of cattle shed were *Aspergillus* spp. (24%) followed by *Ustilago* spp. (18%), *Penicillium* spp. (17%), *Alternaria* spp. (10%) and *Cladosporium* spp. (9%) as shown in Fig. 2.

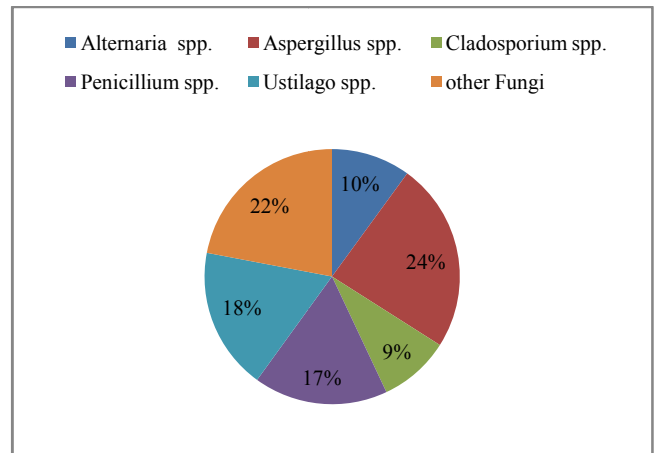


Fig 2 Percentage of five most predominant fungi isolated from air of cattle shed.

Similar findings have been recorded in air of cattle sheds by Elkattan,(2005); Abd-Elaliet al.,(2009); Sharma,(2010). On the contrary, the lower percentages of the fungal species have also been reported in cattle sheds of Egypt (Ahmed et al., 1984). The species of fungi found inside the cattle shed characterize the climatic conditions in these areas. The frequent isolation of the air borne fungi in the present study may be attributed due to factors like type of floors (concrete or muddy), number of animals, the type of ventilation systems, and climatic conditions: temperature, humidity, dust concentration etc. Many of these factors make the environment conducive for the growth of fungi (Chang et al., 2001). The present study highlights the hygienic condition of the cattle sheds. Most the isolated fungal species have been reported to produce allergic reactions and infections of the respiratory tract. *Aspergillus* spp., *Alternaria* spp., *Cladosporium* spp. and *Penicillium* spp. have been reported to pose the greatest respiratory risk (Verma,2011.,Kakati, 2015). The cattle shed air sampled in the morning showed the highest proportion of the genus *Aspergillus*, *Penicillium*, *Ustilago*, while air samples collected in the evening showed a higher proportion of the genus *Aspergillus*, *Cladosporium*, *Ustilago* and *Alternaria*. Respiratory infections are reported to cause damage in caretakers as well as livestock with prolonged exposure to the environment at high microorganism levels (PavanandManjunath2014).

**CONCLUSION**

The present mycological study provides a comprehensive picture of the important airborne allergenic fungal spores associated with the cattle sheds of Thane region. This research work revealed the considerably high level of air contamination in cattle shed environments. A result of this research work recommends that indoor air standards should also be created for dairy cattle shed work settings and animal accommodations in order to assure proper hygienic and epidemiological conditions and to prevent the emission of bioaerosols into atmospheric air. Finally our study suggest that exposure to high fungal levels can increase the risk of respiratory allergy as the environment of dairy cattle sheds contain number of fungal spore type which may cause allergic incidence in cattle shed workers and also pose a threat to passage of these allergens via milk to the consumers.

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