

Incidence of Airborne Fungal Spores at Raipur with Special Reference to Railway Station

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Abstract: *Aeromycoflora of Railway station was studied with the help of petriplate method in the year July 2007 to June 2008. During investigation period total 67 fungal species belongs to 39 genera were observed. Environmental factor play an important role for the distribution of fungal spores. Out of total maximum number of fungi were isolated from Anamorphic group moderate for Ascomycotina, Zygomycotina and minimum for Basidiomycotina and Mycelia sterila. Maximum frequency of aeromycoflora shown by Aspergillus niger and maximum percentage contribution shown by Cladosporium oxysporium.*

Keywords: Railway station, incidence, fungal spores, Aeromycoflora, Percentage frequency

1. Introduction

Life on earth is possible only due to the cover of air surrounding the planet. Air has its benefits as it provide necessary oxygen for the survival of live on earth. Aerobiology is a branch of biology that studies organic particles, such as bacteria, fungal spores, very small insects, pollen which are passively transported by the air (Spieksma, 1991) [1]. Aerobiology is concerned with the activities in the global atmosphere. This multidisciplinary science also deals with bio particles found in environments. Air is a carrier of microorganisms which are present in our environment. The aerobiological monitoring of mold spores is of great importance because of their possible effects on the population's health, as they are responsible for different diseases particularly those affecting respiratory system. The ultimate goal of aerobiology is to understand the floor of biota in the atmosphere in order to help ensure human health and well-being through managing the many diverse population and environments on earth. This involves increasing our scientific understanding of aerobiological process to the point where we can accurately and precisely for cast the movement of important aerobiota. One of the important aspects of aerobiology is that it provides accurate information regarding the quality of air of an area. Like many places railway station is such place which has large amount of activity round the clock. Such hectic activity in an

area makes the place vulnerable for large amount of microorganisms to move around in air due to human and other activities. Therefore to avoid any medical calamity in a railway station aerobiological study of such place is must. Major problem causing organism in any outdoor or indoor place is basically fungi therefore fungal aerobiological study of railway station should be first concern.

2. Materials and Methods

In the present study for analysis of the Aeromycoflora, railway station of Raipur were selected in the year July 2007 to June 2008. For survey of Aeromycoflora, ten sterilized Petriplates containing PDA media were exposed 5 to 10 min. at Railway station of Raipur. These exposed Petri plates brought in to the laboratory and incubated at $26 \pm 1^{\circ}\text{C}$. At the end of incubation period fungal colonies are counted, isolated and identified with the help of available literatures and finally identified by the authentic authority. For ecological studies at the end of the incubation period of Aeromycoflora, during the survey period percentage frequency and percentage contribution of fungal flora is calculated (Jadhav and Tiwari, 1994) [2] with the help of the following formula:

$$\text{Percentage frequency} = \frac{\text{Number of observation in which a species appeared}}{\text{Total number of observations}} \times 100$$

$$\text{Percentage contribution} = \frac{\text{Total number of colonies of a species in all observations taken together}}{\text{Total number of colonies of all species}} \times 100$$

3. Result and Discussion

3.1 Seasonal variation

Seasonal variation is a component of a time series which is defined as the repetitive and predictable movement around the trend line in one year or less. It is detected by measuring the quantity of interest for small time intervals, such as days, weeks, months or quarters. Seasonal variation play important role in distribution of fungal species of a

particular area. Fungal species affected by weather conditions like temperature, relative humidity and rainfall. Weather of Raipur city is characterized by three seasons *i.e.* rainy season, winter season and summer season. During investigation period 67 fungal species (1605 fungal colonies) belongs to 39 genera were observed. Out of them, 05 fungal species (42 fungal colonies) belongs to 05 genera from Zygomycotina, 02 fungal species (06 colonies) belongs to 02 genera from Basidiomycotina, 07 fungal species (101 fungal colonies) belongs to 07 fungal genera from Ascomycotina, 51 fungal species (1384 fungal colonies)

belongs to 24 genera from Anamorphic fungi and 02 fungal species (72 fungal colonies) belongs to 01 genus from *Mycelia sterilia* were recorded (**Table-1**).

During this investigation period maximum fungal species 56 species were recorded during winter season due to favorable temperature (21.67⁰C) and humidity (56.93%) and moderate 38 fungal species recorded in rainy season due to temperature (26.97⁰C) and humidity (78.84%) and minimum fungal species 27 species observed in summer season due to unfavorable temperature (37.78⁰C) and humidity (44.69%). (**Fig.1**). These results are in agreement with Jadhav (1996), Sharma (2001). Kunjam (2007) [3] also reported maximum of 65 fungal species during winter season moderate of 52 in rainy season and minimum of 38 in summer season out of total 71 fungal species. Das and Bhattacharya (2007) [4] also reported maximum fungal species during winter season while minimum fungal species recorded in summer season. Lall (2008) [5] also observed maximum fungi in winter, moderate in rainy season while minimum in summer season.

Mycobial ecology

Mycobial ecology is the study of interrelationships between microorganisms and their living and nonliving environments. In the present study percentage frequency and percentage contribution of Aeromycoflora observed during July 2007 to June 2008. It was also observed that maximum frequency of the aeromycoflora shown by *Aspergillus flavus*, *A. niger* (100.00%), *Mycelia sterilia* white (83.33%), *Penicillium oxalicum* (75.00%), *Aspergillus fumigatus* (66.66%), *Altenaria alternata*, *Aspergillus parasiticus*, *Fusarium pallidoroseum* (58.33%), while minimum frequency shown by *Cunninghamella echinulata* (8.33%), *Alysidium resinae* (8.33%), *Phialophora fastigata* (8.33%), *Ascotricha chartarum* (8.33%), *Eupenicillium sheartii* (8.33%), *Myrothecium verrucaria* (8.33%), *Acremonium fusidioides*, *A. roseum*, *Aspergillus clavatus*, *A. stellatus*, *A. tamarii*, *Basidiospora alba*, *Curvularia lunata* var. *aeria*, *Fusarium moniliformae*, *Helminthosporium* sp., *Penicillium italicum*, *P. sclerotiorum*, *Pithomyces chartarum*, *Stachybotrys elegans*, *Trichoderma viridae*, *Trichothecium roseum* and *Trichuris spiralis* (8.33%) (**Table-1**). These results agreement with Jadhav and Tiwari (1994). Tavora *et al.* (2003), Green *et al.* (2006), Singh (2006), Kunjam (2007), Ozkara *et al.* (2007), Lall (2008) [7] also reported that *Aspergillus niger* was most frequent fungi.

Table 1: Showing fungal distribution of Aeromycoflora during July 2007 - June 2008

| S. N. | Name of the Fungal Species | Rainy season | | | | | Winter season | | | | | Summer season | | | | | Grand Total No. of Fungal Colonies | Percentage frequency | Percentage contribution |
|-------|----------------------------------|--------------|------|------|------|-------|---------------|------|------|------|-------|---------------|-------|-----|------|-------|------------------------------------|----------------------|-------------------------|
| | | July | Aug. | Sep. | Oct. | Total | Nov. | Dec. | Jan. | Feb. | Total | Mar. | April | May | June | Total | | | |
| A | ZYGOMYCOTINA | | | | | | | | | | | | | | | | | | |
| 1 | <i>Choanephora cucurbitarum</i> | - | 1 | 4 | 1 | 6 | - | - | - | - | - | - | - | - | - | - | 6 | 25 | 0.37 |
| 2 | <i>Cunninghamella echinulata</i> | - | - | - | - | - | 3 | - | - | - | 3 | - | - | - | - | - | 3 | 8.33 | 0.18 |
| 3 | <i>Mucor racemosus</i> | 1 | - | 2 | - | 3 | - | - | 1 | - | 1 | - | - | 1 | - | 1 | 5 | 33.3 | 0.31 |
| 4 | <i>Rhizopus stolonifer</i> | 1 | 1 | 1 | - | 3 | 1 | - | - | 9 | 10 | 4 | - | - | 5 | 9 | 22 | 50 | 1.37 |
| 5 | <i>Syncephalastrum racemosum</i> | - | 1 | - | - | 1 | 4 | - | 1 | - | 5 | - | - | - | - | - | 6 | 25 | 0.37 |
| | Total Number of Fungal Colonies | 2 | 3 | 7 | 1 | 13 | 8 | - | 2 | 9 | 19 | 4 | - | 1 | 5 | 10 | 42 | - | 2.61 |
| | Total Number of Fungal Species | 2 | 3 | 3 | 1 | 4 | 3 | - | 2 | 1 | 4 | 1 | - | 1 | 1 | 2 | 5 | - | 7.46 |
| | Total Number of Fungal Genera | 2 | 3 | 3 | 1 | 4 | 3 | - | 2 | 1 | 4 | 1 | - | 1 | 1 | 2 | 5 | - | 12.8 |
| B | BASIDIOMYCOTINA | | | | | | | | | | | | | | | | | | |
| 6 | <i>Alysidium resinae</i> | - | - | - | - | - | 3 | - | - | - | 3 | - | - | - | - | - | 3 | 8.33 | 0.18 |
| 7 | <i>Phialophora fastigata</i> | - | - | - | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 8.33 | 0.18 |
| | Total Number of Fungal Colonies | - | - | - | 3 | 3 | 3 | - | - | - | 3 | - | - | - | - | - | 6 | - | 0.37 |
| | Total Number of Fungal Species | - | - | - | 1 | 1 | 1 | - | - | - | 1 | - | - | - | - | - | 2 | - | 2.98 |
| | Total Number of Fungal Genera | - | - | - | 1 | 1 | 1 | - | - | - | 1 | - | - | - | - | - | 2 | - | 5.12 |
| C | ASCOMYCOTINA | | | | | | | | | | | | | | | | | | |
| 8 | <i>Ascotricha chartarum</i> | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 8.33 | 0.06 |

Showing fungal distribution of Aeromycoflora during July 2007 - June 2008

| S. N. | Name of the Fungal Species | Rainy season | | | | | Winter season | | | | | Summer season | | | | | Grand Total No. of Fungal Colonies | Percentage frequency | Percentage contribution |
|--------------------|---------------------------------|--------------|------|------|------|-------|---------------|------|------|------|-------|---------------|-------|-----|------|-------|------------------------------------|----------------------|-------------------------|
| | | July | Aug. | Sep. | Oct. | Total | Nov. | Dec. | Jan. | Feb. | Total | Mar. | April | May | June | Total | | | |
| 9 | <i>Byssochalamus niveus</i> | - | - | - | - | - | - | - | 2 | - | 2 | - | - | 2 | 4 | 6 | 8 | 25 | 0.49 |
| 10 | <i>Chaetomium globosum</i> | - | - | - | - | - | 5 | 3 | - | - | 8 | - | - | - | - | - | 8 | 16.7 | 0.49 |
| 11 | <i>Eupenicillium sheartii</i> | - | - | - | - | - | - | 2 | - | 2 | - | - | - | - | - | - | 2 | 8.33 | 0.12 |
| 12 | <i>Khuskia oryzae</i> | - | - | - | 7 | 7 | 13 | 24 | 24 | 7 | 68 | - | - | - | - | - | 75 | 41.7 | 4.67 |
| 13 | <i>Myrothecium verrucaria</i> | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | - | 1 | 8.33 | 0.06 |
| 14 | <i>Thielavia terricola</i> | 4 | 1 | 1 | - | 6 | - | - | - | - | - | - | - | - | - | - | 6 | 25 | 0.37 |
| | Total Number of Fungal Colonies | 4 | 1 | 2 | 7 | 14 | 18 | 30 | 26 | 7 | 81 | - | - | 2 | 4 | 6 | 101 | - | 6.29 |
| | Total Number of Fungal Species | 1 | 1 | 2 | 1 | 3 | 2 | 4 | 2 | 1 | 5 | - | - | 1 | 1 | 1 | 7 | - | 10.4 |
| | Total Number of Fungal Genera | 1 | 1 | 2 | 1 | 3 | 2 | 4 | 2 | 1 | 5 | - | - | 1 | 1 | 1 | 7 | - | 17.9 |
| D ANAMORPHIC FUNGI | | | | | | | | | | | | | | | | | | | |
| 15 | <i>Acremonium fusidioides</i> | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | 1 | 8.33 | 0.06 |
| 16 | <i>A. kilience</i> | 2 | 1 | - | - | 3 | - | 1 | - | - | 1 | - | - | - | - | - | 4 | 25 | 0.24 |
| 17 | <i>A. roseum</i> | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | - | - | 2 | 8.33 | 0.12 |
| 18 | <i>Altenaria alternata</i> | 1 | - | 1 | 8 | 10 | 4 | - | - | 12 | 16 | 7 | 5 | - | - | 12 | 38 | 58.3 | 2.36 |
| 19 | <i>A. citri</i> | - | - | - | 2 | 2 | - | - | 9 | 6 | 15 | 8 | - | - | 3 | 11 | 28 | 41.7 | 1.74 |
| 20 | <i>A. raphani</i> | - | - | - | - | - | - | 3 | 8 | 9 | 20 | 7 | 3 | - | - | 10 | 30 | 41.7 | 1.86 |
| 21 | <i>Aspergillus carneus</i> | 1 | - | - | 1 | 2 | - | - | - | 1 | 1 | - | - | - | - | - | 3 | 25 | 0.18 |
| 22 | <i>A. clavatus</i> | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | 1 | 8.33 | 0.06 |
| 23 | <i>A. flavus</i> | 2 | 1 | 5 | 7 | 15 | 11 | 1 | 5 | 4 | 21 | 17 | 8 | 8 | 11 | 44 | 80 | 100 | 4.98 |
| 24 | <i>A. fumigatus</i> | - | 1 | 1 | 7 | 9 | - | 2 | - | 1 | 3 | 2 | 2 | - | - | 4 | 16 | 66.7 | 0.99 |
| 25 | <i>A. nidulans</i> | 1 | - | - | 1 | 2 | - | - | - | 1 | 1 | - | 1 | 19 | 8 | 28 | 31 | 50 | 1.93 |

Showing fungal distribution of Aeromycoflora during July 2007 - June 2008

| S. N. | Name of the Fungal Species | Rainy season | | | | | Winter season | | | | | Summer season | | | | | Grand Total No. of Fungal Colonies | Percentage frequency | Percentage contribution |
|-------|------------------------------------|--------------|------|------|------|-------|---------------|------|------|------|-------|---------------|-------|-----|------|-------|------------------------------------|----------------------|-------------------------|
| | | July | Aug. | Sep. | Oct. | Total | Nov. | Dec. | Jan. | Feb. | Total | Mar. | April | May | June | Total | | | |
| 26 | <i>A. niger</i> | 4 | 6 | 13 | 21 | 44 | 18 | 9 | 10 | 8 | 45 | 30 | 19 | 44 | 22 | 115 | 204 | 100 | 12.7 |
| 27 | <i>A. ochraceus</i> | - | - | 1 | - | 1 | - | - | - | 11 | 11 | - | - | - | - | - | 12 | 16.7 | 0.74 |
| 28 | <i>A. parasiticus</i> | 1 | 5 | - | 4 | 10 | - | 1 | 2 | 1 | 4 | 1 | - | - | - | 1 | 15 | 58.3 | 0.93 |
| 29 | <i>A. stellatus</i> | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | 1 | 8.33 | 0.06 |
| 30 | <i>A. tamaritii</i> | - | - | - | - | - | 5 | - | - | - | 5 | - | - | - | - | - | 5 | 8.33 | 0.31 |
| 31 | <i>A. terreus</i> | - | - | - | 2 | 2 | 1 | - | - | - | 1 | 4 | - | 13 | 6 | 23 | 26 | 41.7 | 1.61 |
| 32 | <i>A. versicolor</i> | 3 | 6 | 3 | 3 | 15 | - | - | - | 7 | 7 | 2 | - | - | - | 2 | 24 | 50 | 1.4 |
| 33 | <i>Basidiospora alba</i> | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | - | - | 2 | 8.33 | 0.12 |
| 34 | <i>Botryoidiplodia theobromae</i> | - | - | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 16.7 | 0.12 |
| 35 | <i>Cladosporium cladosporiodes</i> | 13 | - | - | 3 | 16 | - | - | 2 | 45 | 47 | - | - | - | - | - | 63 | 33.3 | 3.9 |
| 36 | <i>C. oxysporium</i> | - | - | - | - | - | 147 | 111 | 98 | 64 | 420 | 14 | - | - | - | 14 | 434 | 41.7 | 27 |
| 37 | <i>C. sphaerospermum</i> | - | - | - | - | - | - | 3 | 10 | 37 | 50 | - | - | - | - | - | 50 | 25 | 3.11 |

| | | | | | | | | | | | | | | | | | | | |
|----|--|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|------|------|------|
| 38 | <i>Curvularia lunata</i> var. <i>aeria</i> | - | - | - | 4 | 4 | - | - | - | - | - | - | - | - | - | 4 | 8.33 | 0.24 | |
| 39 | <i>C. pallescense</i> | - | - | - | - | - | 3 | 5 | - | 8 | - | - | - | - | - | 8 | 16.7 | 0.49 | |
| 40 | <i>Diplococcium</i> sp. | - | - | - | 6 | 6 | 4 | - | 1 | 5 | 10 | 3 | - | - | - | 3 | 19 | 41.7 | 1.18 |
| 41 | <i>Drechslera rostrata</i> | - | - | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | 2 | 16.7 | 0.12 | |
| 42 | <i>D. specifer</i> | 1 | 2 | - | - | 3 | - | 3 | - | - | 3 | - | - | - | 6 | 6 | 12 | 33.3 | 0.74 |
| 43 | <i>Fusarium chlamyosporum</i> | - | - | - | 2 | 2 | - | - | 2 | - | 2 | 3 | - | - | - | 3 | 7 | 25 | 0.43 |
| 44 | <i>F. moniliformae</i> | - | - | - | - | - | 6 | - | - | - | 6 | - | - | - | - | 6 | 8.33 | 0.37 | |
| 45 | <i>F. pallidoroseum</i> | - | - | - | 7 | 7 | 2 | 3 | 5 | 4 | 14 | 4 | 3 | - | - | 7 | 28 | 58.3 | 1.74 |
| 46 | <i>Gilmaniella humicola</i> | - | - | - | - | - | - | 2 | 3 | 2 | 7 | - | - | - | - | 7 | 25 | 0.43 | |

Showing fungal distribution of Aeromycoflora during July 2007 - June 2008

| S. N. | Name of the Fungal Species | Rainy season | | | | | Winter season | | | | | Summer season | | | | | Grand total | Percentage frequency | Percentage contribution |
|-------|----------------------------------|--------------|------|------|------|-------|---------------|------|------|------|-------|---------------|-------|-----|------|-------|-------------|----------------------|-------------------------|
| | | July | Aug. | Sep. | Oct. | Total | Nov. | Dec. | Jan. | Feb. | Total | Mar. | April | May | June | Total | | | |
| 47 | <i>Helminthosporium</i> sp. | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 8.33 | 0.06 |
| 48 | <i>Monilia</i> sp. | - | - | - | - | - | - | - | - | - | - | 4 | - | - | 16 | 20 | 20 | 16.7 | 1.24 |
| 49 | <i>Paecilomyces variotii</i> | 1 | - | - | 2 | 3 | - | 2 | - | - | 2 | - | - | - | - | 5 | 25 | 0.31 | |
| 50 | <i>Penicillium chrysogenum</i> | 1 | - | - | - | 1 | 7 | - | 4 | 24 | 35 | 12 | 8 | - | - | 20 | 56 | 50 | 3.48 |
| 51 | <i>P. citrinum</i> | 1 | - | - | - | 1 | - | - | 2 | 3 | 5 | - | - | - | - | 6 | 25 | 0.37 | |
| 52 | <i>P. italicum</i> | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | 1 | 8.33 | 0.06 | |
| 53 | <i>P. oxalicum</i> | 5 | 5 | 2 | 13 | 25 | - | 1 | 2 | 8 | 11 | 9 | 12 | - | - | 21 | 57 | 75 | 3.55 |
| 54 | <i>P. sclerotiorum</i> | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | - | 1 | 8.33 | 0.06 | |
| 55 | <i>Pestalotiopsis glandicola</i> | - | - | - | - | - | - | 3 | 1 | - | 4 | - | - | - | - | 4 | 16.7 | 0.24 | |
| 56 | <i>Phoma exigua</i> | - | - | - | - | - | - | 2 | 3 | - | 5 | - | - | - | 2 | 2 | 7 | 25 | 0.43 |
| 57 | <i>P. herbarum</i> | - | - | - | 17 | 17 | 11 | - | 1 | 1 | 13 | - | - | 1 | 2 | 3 | 33 | 41.7 | 2.05 |
| 58 | <i>P. leveillei</i> | - | - | - | 1 | 1 | - | - | 2 | - | 2 | 1 | - | - | - | 1 | 4 | 25 | 0.24 |
| 59 | <i>Pithomyces chartarum</i> | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | 1 | 8.33 | 0.06 | |
| 60 | <i>Stachybotrys elegans</i> | - | - | - | - | - | - | 4 | - | - | 4 | - | - | - | - | 4 | 8.33 | 0.24 | |
| 61 | <i>Spilodocheium veroniae</i> | - | - | - | - | - | - | - | 2 | 2 | 4 | - | - | - | - | 4 | 16.7 | 0.24 | |
| 62 | <i>Stemphillium</i> sp. | - | - | - | - | - | 4 | 7 | - | - | 11 | - | - | - | - | 11 | 16.7 | 0.68 | |
| 63 | <i>Trichoderma viridae</i> | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | - | 2 | 8.33 | 0.12 | |
| 64 | <i>Trichothecium roseum</i> | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | 1 | 8.33 | 0.06 | |
| 65 | <i>Trichurus spiralis</i> | - | - | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | 8.33 | 0.06 | |
| | Total Number of Fungal Colonies | 37 | 27 | 29 | 114 | 207 | 223 | 168 | 179 | 256 | 826 | 129 | 61 | 85 | 76 | 351 | 1384 | - | 86.2 |
| | Total Number of Fungal Species | 14 | 8 | 10 | 22 | 28 | 15 | 22 | 23 | 22 | 44 | 18 | 9 | 5 | 10 | 22 | 51 | - | 76.1 |
| | Total Number of Fungal Genera | 7 | 4 | 6 | 11 | 14 | 9 | 16 | 12 | 9 | 20 | 9 | 4 | 2 | 6 | 10 | 24 | - | 61.5 |

Showing fungal distribution of Aeromycoflora during July 2007 - June 2008

| S. N. | Name of the Fungal Species | Rainy season | | | | | Winter season | | | | | Summer season | | | | | Grand Total | Percentage frequency | Percentage contribution |
|-------|----------------------------|--------------|------|------|------|-------|---------------|------|------|------|-------|---------------|-------|-----|------|-------|------------------------|----------------------|-------------------------|
| | | July | Aug. | Sep. | Oct. | Total | Nov. | Dec. | Jan. | Feb. | Total | Mar. | April | May | June | Total | No. of Fungal Colonies | | |

| | July | Aug. | Sep. | Oct. | Total | Nov. | Dec. | Jan. | Feb. | Total | Mar. | April | May | June | Total | | | |
|---------------------------------------|------|------|------|------|-------|------|------|------|------|-------|------|-------|-----|------|-------|------|------|------|
| E MYCELIA STERILA | | | | | | | | | | | | | | | | | | |
| 66 Mycelia sterila (white) | 18 | 4 | 5 | - | 27 | 3 | 4 | 4 | 5 | 16 | 3 | 4 | - | 10 | 17 | 60 | 83.3 | 3.73 |
| 67 Mycelia sterila (black) | - | 1 | 2 | 3 | 6 | 2 | - | 1 | - | 3 | 3 | - | - | - | 3 | 12 | 50 | 0.74 |
| Total Number of Fungal Colonies | 18 | 5 | 7 | 3 | 33 | 5 | 4 | 5 | 5 | 19 | 6 | 4 | - | 10 | 20 | 72 | - | 4.48 |
| Total Number of Fungal Species | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | - | 1 | 2 | 2 | - | 2.98 |
| Total Number of Fungal Genera | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 1 | 1 | 1 | - | 2.56 |
| Grand Total Number of Fungal Colonies | 61 | 36 | 45 | 128 | 270 | 257 | 202 | 212 | 277 | 948 | 139 | 65 | 88 | 95 | 387 | 1605 | - | - |
| Grand Total Number of Fungal Species | 18 | 14 | 17 | 26 | 38 | 23 | 27 | 29 | 25 | 56 | 21 | 10 | 7 | 13 | 27 | 67 | - | - |
| Grand Total Number of Fungal Genera | 11 | 9 | 12 | 15 | 23 | 16 | 21 | 17 | 12 | 31 | 11 | 5 | 4 | 9 | 14 | 39 | - | - |

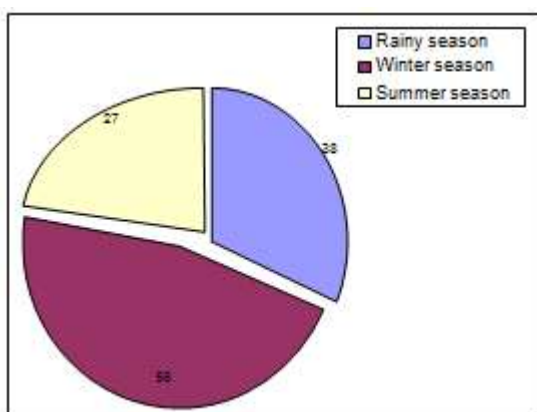


Figure 1: Showing season wise fungal species distribution of Aeromycoflora during July 2007 to June 2008

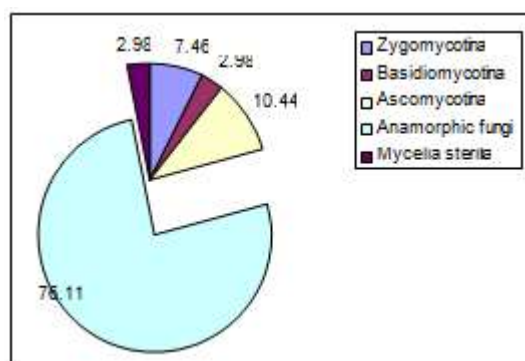


Figure 2: Showing groupwise percentage contribution of fungal species of Aeromycoflora during July 2007 to June 2008

Out of total Aeromycoflora percentage contribution of each fungal group were recorded i.e. Zygomycotina (7.46%), Basidiomycotina (2.98%), Ascomycotina (10.44%), Anamorphic fungi (76.11%) and Mycelia sterilia (2.98%) (Table-2). It was also observed that Anamorphic fungi have maximum contribution of the total fungal flora. (Fig-2). This study is in agreement with Jadhav (1996) and Kunjam (2007).

Table 2: Showing groupwise percentage contribution of fungal species of Aeromycoflora during July 2007 to June 2008

| S.N. | Name of fungal groups | Percentage contribution |
|------|-----------------------|-------------------------|
| 1. | Zygomycotina | 7.46 |
| 2. | Basidiomycotina | 2.98 |
| 3. | Ascomycotina | 10.44 |
| 4. | Anamorphic fungi | 76.11 |
| 5. | Mycelia sterilia | 2.98 |

The member of Anamorphic fungi being the most dominant contributed throughout the seasons. Similar result found Singh (2006), Saluja (2005), Lall (2008), Jadhav and Kunjam (2009) on aeromycoflora of a tribal area of Chhattisgarh.

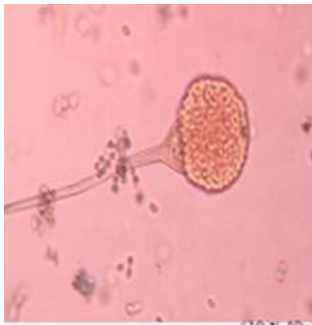
It is also observed that maximum percentage contribution were recorded that *Cladosporium oxysporium* (27.00%) followed by *Aspergillus niger* (12.70%), *A. flavus* (4.98%) and *Khuskia oryzae* (4.67%), similarly the minimum percentage contribution (0.06%) recorded for *Ascotricha chartarum*, *Myrothecium verrucaria*, *Acremonium fusidioides*, *Aspergillus clavatus*, *Helminthosporium sp.*, *Penicillium italicum*, *P. sclerotiorum*, *Pithomyces chartarum*, *Trichothecium roseum* and *Trichurus spiralis* (Table-1) similar results observed. This results agreement with Sabariego *et al.* (2007), Aira *et al.* (2007), Ozkara *et al.* (2007) also observed *Cladosporium* spores probably occur more abundantly worldwide than any other spore type and are the dominant outdoor spores in many areas, especially in hot climate.

4. Conclusion

Railway station is a place where different type of human being comes everyday. The air of Railway station consist microorganisms which are harmful for human being. Microorganisms enter in environment through air current and contaminated the atmosphere, therefore it is necessary to survey the aeromycoflora of Railway station of Raipur. Different type of fungal spores found in the air of Railway station during investigation period.

5. Scope for Future work

- 1) Further studies on the occurrence of aeromycoflora in railway station air could bring about better understanding of their possible role in occupational related health hazards.
- 2) Characterization of fungal spores responsible for the induction of seasonal allergy so on that basis we can dignose the disease.



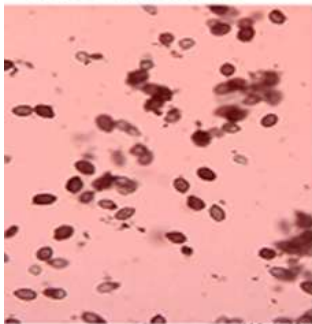
Mucor racemosus

(10 X 40x)



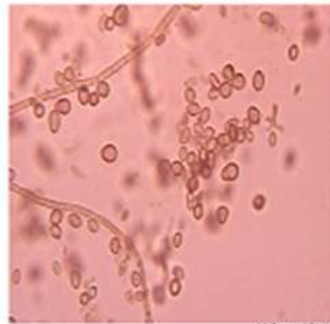
Rhizopus stolonifer

(10 X 10x)



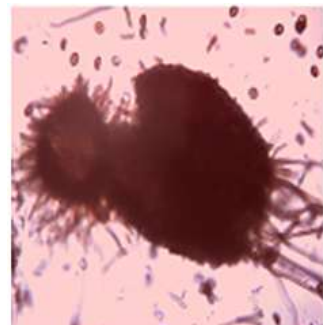
Alysiium resiniae

(10 X 40x)



Phialophora fastigata

(10 X 40x)



Chaetomium globosum

(10 X 40x)



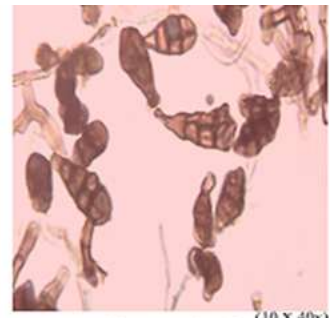
Khuskia oryzae

(10 X 40x)



Alternaria alternata

(10 X 40x)



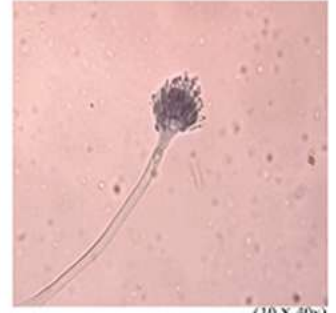
Alternaria citri

(10 X 40x)



Alternaria raphani

(10 X 40x)



Aspergillus carneus

(10 X 40x)



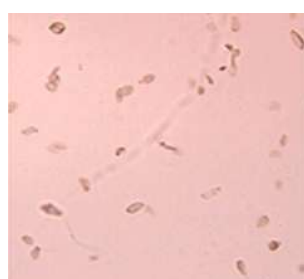
Aspergillus clavatus

(10 X 40x)



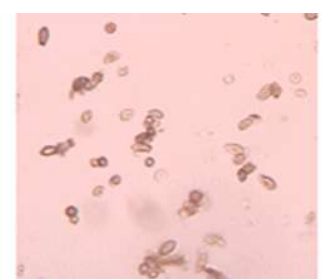
Aspergillus flavus

(10 X 40x)



Cladosporium oxysporium

(10 X 40x)



Cladosporium sphaerospermum

(10 X 40x)



Curvularia lunata var. area

(10 X 40x)



Curvularia pallescens

(10 X 40x)

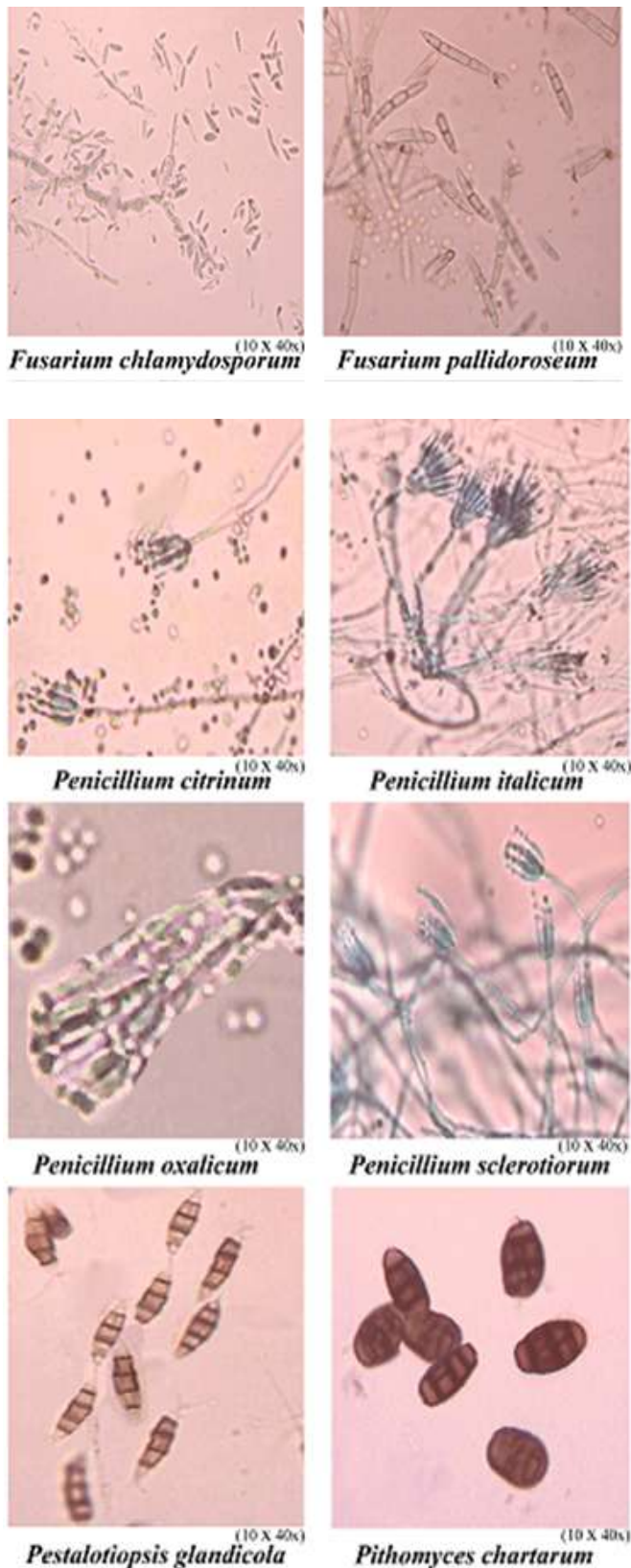


Figure 3: Photograph of fungal species found in the Railway station area

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