**FINAL REPORT OF MINOR RESEARCH PROJECT**

**UNIVERSITY GRANTS COMMISSION**

**BAHADUR SHAH JAFAR MARG**

**NEW DELHI-110002**

**ON THE TOPIC**

# AEROBIOLOGICAL ANALYSIS OF INTRAMURAL ENVIRONMENT IN DEORI DIST: GONDIA

**UGC APPROVAL NO: 47-085/2012 (WRO)**

**SUBMITTED BY**

**DR. KALPANA P. GHOSHAL**

**MANOHARBHAI PATEL COLLEGE OF ARTS, COMMERCE, DEORI, GONDIA (M.S) 441901**

**Annexure - III**

**UNIVERSITY GRANTS COMMISION**

**BAHUDUR SHAH ZAFAR MARG**

**NEW DELHI- 110002**

**Annual/ Final Report of the work done on the Minor Research Project.**
**(Report to be submitted within 6 weeks after completion of each year)**

1. Project report No. 1st / 2nd / 3rd / Final : **Final Report**
2. UGC Reference No : **47-085/12 (WRO)**
3. Period of report : **From 01/4/2013 to 25/03/2015**
4. Title of research project : "**Aerobiological Analysis of Intramural Environment in Deori District- Gondia"**.

**5.** (a) Name of the Principal Investigator : **DrKalpana P. Ghoshal**

(b) Department and University/ College where work has progressed : **Department of Botany, M.B. Patel College of Arts and Commerce, Deori Dist: Gondia**

6. Effective date of starting of the project : **25-02-2013**

7. Grant approved and expenditure incurred during the period of the report:

(a) Total amount approved Rs :**1,35,000/- (One Lakh thirty five thousand only)**

(b) Total expenditure Rs :1**,35,000/- (One Lakh thirty five thousand only)**

( c) Report of the work done: (Please attach a separate sheet)

i. Brief objective of the project: On separate sheet

ii. Work done so far and result achieved and publication, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication: **One paper accepted in International Journal of Life Science**.

iii. Has the progress been according to original plan of work and towards achieving the objective. If not, state reasons: Yes

iv. Please indicates the difficulties, if any, experienced in implementing the project:**NIL**

v. If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the commission on a separate sheet:**Project Completed**

vi. If the project has been completed, please enclose a summary of the findings of the study. Two bound copies of the final report of work done may also be sent to the Commission: YES

vii. Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as (a) Manpower trained (b) Ph.D awarded (c) Publication of result (d) other impact, if any:

**Signature of Principal Investigator** **Registrar/Principal**

**Signature of the Co-investigator**

**Annexure - IV**

**UNIVERSITY GRANTS COMMISION**

**BAHUDUR SHAH ZAFAR MARG**

**NEW DELHI- 110002**

**UTILIZATION CERTIFICATE**

1. Certified that the grant of Rs **1, 35,000/- (One Lakh thirty five thousand Rupees only)** received from the University Grants Commission under the scheme of support for **Minor Research Project** entitled **"Aerobiological Analysis of Intramural Environment in Deori. District-Gondia"**. Vide UGC letter No. F. **47-085/2012 (WRO)** dated **23-02-2013** has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

**Signature of Principal Investigator** **Registrar/Principal** **Stautory auditor**

**Signature of the Co-investigator**

**Annexure - V**

**UNIVERSITY GRANTS COMMISION**

**BAHUDUR SHAH ZAFAR MARG**

**NEW DELHI- 110002**

**STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT**

1. Name of the Principal Investigator : **DrKalpana P. Ghoshal**

**2.** Department of University/ College : **Department of Botany, M.B Patel College of Arts and Commerce , Deori**

3. UGC approval No. and Date : **47-085/2012 (WRO) and 23-02-2013**

4. Title of the Research Project :**"Aerobiological Analysis of Intramural Environment in Deori District- Gondia".**

5. Effective date of starting the project :**25/02/2013**

6. A. Period of Expenditure :**From 25/02/2013 to 25/02/2015**

B. Details of Expenditure:

| Sr.No | Item | Amount Approved Rs. | Expenditure Incurred Rs. |
|---|---|---|---|
| **1** | Books And Journals | 10,000/- | 10,050/- |
| **2** | Equipment (Please enclose the quotation) | 75,000/- | 76,371/- |
| **3** | Contigency | 20,000/- | 20,010/- |
| **4** | Field Work/Travel (Give details in the proforma at Annexure-VI) | 10,000/- | 10,200/- |
| **5** | Hiring Services | Nil | Nil |
| **6** | Chemicals & Glassware | 20,000/- | 20,210/- |
| **7** | Overhead | Nil | Nil |
| **8** | Any other items (please specify) | Nil | Nil |
| | Total | 1,35,000/- | 1,36,941/- |

Sanctioned grant- 1,35,000/-
Grant Received- 1,10,000/-
Loan from PI- 25,000/-
Contribution-1941/-

C. Staff

Date of appointment : **Nil**

| Sr.No | Expenditure Incurred | From to | Amount Approved(Rs) | Expenditure Incurred(Rs) |
|---|---|---|---|---|
| 1 | Honorarium to PI (Retired Teachers) Rs. 12,000/- P.M | | | |
| 2 | Post-Doctoral Fellow Fellowship @ Rs. 12,000/- P.M | | | |
| 3 | Project Associate Salary @ Rs. 10,000/- P.M | | | |
| 4 | Project Fellow Salary @ Rs. 8000/- P.M | | | |

1. It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the Commission.

2. It as a result of checks or audit objective, some irregularly is noticed, later date, action will be taken to refund, adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of **Rs 1, 35,000/- (One Lakh Thirty five thousand Rupees only)** received from the University Grants Commission under the scheme of support for Minor Research Project **"Aerobiological Analysis of Intramural Environment in Deori District- Gondia"**vide UGC letter No. F. **47-085/2012 (WRO)** dated **23-02-2013** has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

**Signature of Principal Investigator** **Registrar/Principal**

**Signature of the Co-investigator**

**Annexure - VI**

**UNIVERSITY GRANTS COMMISION**

**BAHUDUR SHAH ZAFAR MARG**

**NEW DELHI- 110002**

**STATEMENT OF EXPENDITURE INCURRED ON FIELD WORK**

Name of the Principal Investigator: DrKalpana P. Ghoshal

| Name of the Place visited | Duration of the Visit | | Mode of Journey | Expenditure Incurred (Rs) |
|---|---|---|---|---|
| | From | To | | |
| Deori to Gondia (Khamari, Jabartola, Tirora, Ratnara) and back to Deori | April 2013 to April 2014<br>Two visits to each Rice mills | | By Taxi | 4700/- |
| Gondia to Deori, Deori to Hirdamali, Tirora and back | April 2014 to Feb 2015<br>Two visits every 6 months | | By Taxi | 5500/- |

Certified that the above expenditure is in accordance with the UGC norms for Minor Research Projects

**Signature of Principal Investigator** **Registrar/Principal**

**Signature of the Co-investigator**

**Annexure - VIII**

**UNIVERSITY GRANTS COMMISION**

**BAHUDUR SHAH ZAFAR MARG**

**NEW DELHI- 110002**

**PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL REPORT OF THE WORK DONE ON THE PROJECT**

1. Name and address of the Principal investigator : Dr.Kalpana P. Ghoshal, Department of Botany, M.B. Patel College of Arts and Commerce, Deori

2. Name and address of the institution :M.B. Patel College of Arts and Commerce, Deori

3. UGCapproval No. and Date : 47-085/2012 (WRO) and 23-02-2013
4. Date of Implementation : 01-04-2013
5. Tenure of the Project : 2 years
6. Total grant allocated : 1,35,000/- (One Lakh thirty five thousand rupees only)
7. Total grant received : 1,10,000/- (One Lakh ten thousand rupees only)
8. Final expenditure : 1,35,000/- (One Lakh thirty five thousand rupees only)
9. Title of the project :Aerobiological Analysis of Intramural Environment in Deori District- Gondia.

**10.** Objectives of the project**:Attach on separate sheet**

11. Whether objectives were achieved (give details): Yes
12. Achievements from the project:Attached Separately
13. Summary of the findings (in 500 words): Gives in separate sheet.
14. Contribution of the society (give details): Nil
15. Whether any Ph.D. enrolled/produced out of the project: Nil
16. No. of publications out of the project (please attach re-prints): Nil

Signature of Principal Investigator Registrar/Principal

Signature of the Co-investigator

**UNIVERSITY GRANTS COMMISSION (WRO) PUNE**

Name of the scheme: **Minor Research Project**

**ACCESSION CERTIFICATE FOR**

It is certified that the grant of **Rs. 10,000/-** (Rupees: **Ten thousand rupees only**) sanctioned to Dr.**Kalpana P. Ghoshal** by the University Grants Commission vide its sanction letter No. **47-085/2012 (WRO)**dated **23-02-2013** has been utilized for the purchase of Books & Journals and the same have been accessioned and noted in the Accession Register from Accession No. **UGC- 2672 to 2681** being maintained by the college. The last accession number prior to the Utilization of these grants for books and journals purchased are from 2013 to 2014

Signature of the Principal with seal

Signature of the Librarian

Signature of the Chartered Accountant

(With seal & Regd. No. of C.A.)

**UNIVERSITY GRANTS COMMISSION (WRO) PUNE**

Name of the scheme: **Minor Research Project**

**ASSETS CERTIFICATE FOR**

It is certified that inventories of permanent or semi-permanent assets created / acquired wholly or mainly out of the grants given by the University Grants Commission for **Minor research project** to **Dr Kalpana P. Ghoshal** are being maintained in the prescribed form and are being kept-up-to-date.

Signature of the Principal with seal

Signature of the Chartered Accountant

(With Seal &Regd No. of C.A.)

To,
The Additional Secretary
U G C Western Regional Office,
Ganeshkind, Pune University Campus
Pune – 411 007

Subject: Submission of Final report of Minor Research Project 47-085/12(WRO) entitled "**Aerobiological Analysis of Intramural Environment in Deori Dist: Gondia**".
Through:The Director, BCUD, RashtrasantTukadojiMaharaj Nagpur University, Nagpur.

Sir,

Please find the enclosed Final report for the Minor Research Project 47-085/12(WRO) entitled "**Aerobiological Analysis of Intramural Environment in Deori Dist: Gondia**" undertaken by Dr. K. P. Ghoshal, Department of Botany.

The relevant details of the report have been attached herewith.

This report has been submitted for your necessary action and further perusal.

With regards,

Yours truly

Principal

M.B. Patel College
Deori

Enclosure: Copy of Final report.

# FINAL REPORT OF WORK DONE

## Introduction, Aim and Objective

The home and work place are environment in which air borne fungal spores creates a major health concerns. In comparison with the extramural environment, intramural environment have limited circulations of external air and much less u.v. radiation exposure. Indoor environment also have controlled temperature and relative humidity, which are generally in the ranges that allow extended microbial survival. Thus, these conditions are suitable for the accumulation and survival of microorganisms within many enclosed environments, like hospitals, office buildings, laboratories, food storage places, cinema halls, libraries, poultry form and even space craft.

Air forms the most immediate environment of man with which he is in constant contact throughout his life. It is well to keep in mind that as man consumes 1.2 kg of solid food and drinks 1.8 kg of liquids, he breaths as much as 14 kg of air per day. The importance of human disease transmission by biological aerosols has been in part of a function of urbanization, because air some transmission of human disease is especially common in indoor environment. Thus intramural aerobiology is important in human diseases.

Aerobiological studies reveal that, the microbiology present in the air includes fungal spores, pollen grains, microorganisms, protozoan insect parts etc. Aerobiology is a multidisciprinary branch of science dealing with Plant pathology, Agriculture, Mycology, Entomology, Medicine, Palynology, Meterology, Biotechnology, Microbiology etc.

The fungal spore form important constituents of air spora all over the world. The atmosphere contains an incredible diversity of fungal spores. Fungi have a highly evolved liberation mechanism, next only to angiosperms and the number of spores liberated is very high. These spores occur chiefly in the air, both indoors and outdoors. They are ubiquitous due to the method of their discharge, their circadian rhythms their morphology and their influence of meteorological agents.

In our district a little work or no work is carried out to know about the fungal types present in intramural and extramural environment. Particularly working in intramural environment like library, hospitals, Theatre, Godown etc. We came across many problems like while handling the books and journals in a library, the dust deposited on them along with the cellulolytic and allergenic fungal spores causes problems like eye irritation, skin itching, sneezing, running of eyes, nose etc. It is due to the deposition of allergenic fungal spores in mucosal membrane which is very sensitized to these fungal forms. Therefore to know about the fungal types, their allerginicity and their presence in a particular environment will play a very important role to overcome these problems.

Keeping in view the importance, the present work was undertaken to know about the fungal spore type, their concentration and problems caused by them, and to suggest remedies against

such problems. The information generated from the present work is a great significance from the point of allergic disorders. There is tremendous scope for air i.e. correlation between fungal aeroallengens weather, factors and allergic manifestation.

Therefore the present work was carried out keeping in mind the following objectives.

1. To find out the predominant fungal spore type in intramural environment in Deori region.
2. To find out the fungal type which causes damage to the materials?
3. To find out aeroallergenic fungal spore types in intramural environment.
4. To find out their types concentration and seasonal variations.

## SUMMARY OF THE WORK DONE

The aeromycological studies in different indoor environments of Deori region reveals following few facts about the fungal spores which play a major role in the etiology of respiratory allergies. The seasonal variation of fungal spores showed that there was no spore free period during the entire study. Due to the constantly changing aerospora, there is need for its continuous monitoring for the incidence of allergenic fungal spores/particles.

It was found that moderate temperature around $25^0$C ($\pm$1 or $2^0$C),, high relative humidity usually between 68% and 89% provide most congenial environment for the maximum percentage contribution of fungal spores in indoor environment where the most people spend a major portion of their time in homes. Accordingly peak point of fungal spores incidence was recorded in September during both the years, which provide congenial environment. On the other hand low relative humidity (45%) and low temperature ($10^0$C) or high temperature ($43^0$C) were found unfavourable for the peak concentration of fungal spores as was revealed during cold dry winters and hot summers of May during 2013 and 2014. Thus temperature and relative humidity directly impact, while rainfall played indirect role affecting intramural temperature and relative humidity.

The concentration of the spores differed from month to month. The highest incidence were observed during July to October and the lowest during March to May. The incidence of fungal spores in the air was not homogenous and each type showed difference is seasonal and annual incidence and could be responsible for the allergy problem in that season. The difference may be due to the prevailing climate during that season and the growth of vegetation and intramural sources that supports the growth and sporulation of the fungi.

With the onset of monsoon a large number of weeds and grasses appear on the ground as well as decaying organic matter and these may form the important source for the growth of fungus particularly the Deuteromycetes. This variation could be attributed to the difference in climate and the development of host plants. The outdoor environment in close proximity to the home should be cleared of organic debris and the shade level should be minimized. Water disasters should be corrected immediately to minimize an increase in endogenous moulds.

In both volumetric and culture plate studies of residential quarters. Aspergillus, Penicillium, Cladosporium, Altermaria, Curvularia and Trichoderma were most frequently isolated genera which have been reported to be clinically significant.

A combination of two techniques, viz, rotorod sampler and culture plate exposure method has been used in the present investigation to get a fairly complete picture of mycoflora in indoor environments. The species of Aspergillus were found to be dominant in all the studied environment and this was revealed by both the sampling techniques.

The prevalence of Aspergillus spp. In human environment is not desirable and ways and means should be found to reduce its occurrence to the minimum possible level.

Although one objective of control may be the provision of highly purified air within an environment, this is usually the exception rather than the rule. When sources of airborne contamination exist within enclosed spaces, the principal method of removal of such contamination is by dilution ventilation.

Throughout the world fungus spores are present in the air, outdoor spores can penetrate indoor (home and occupational) environments, but common outdoor fungi may grow also indoors and contribute to toal exposure. However, the presence and growth of mould spores indoors, particularly in rooms with elevated humidity may lead to health problems of severity as well as biodeterioration and damage to various materias very efficiently. Consequently, in addition to health implications, the economic consequence of moulds attacking building material and other products are of considerable importance.

The dominance of fungal spores in indoor environment has been attributed to their ability to grow in various substrata. The presence of fungal propagules, volatiles and mycotoxins in air can present a health hazard for all segments of the population.

From the present investigation of aeromycoflora of hospitals it is concluded that ‘Aspergili’ spores were the most predominant aeroallergen in the studied indoor environments causing severe allergic diseases. Thus, aeromycological survey is very useful to physician or aeroallergists as it is correlated with meteorological parameters. Such correlation can develop an efficient disease forecasting system for the human beings particularly for the allergy patients.

The finding of funal counts at the level or beyond the level of safety and moreover, the type of fungi isolated (Aspergillus, Penicillium, Cladosporium, Alternaria, Curvularia, Mucor and Rhizopusspp) which can be potential risk for immunocompromised patients, indicates the need to adopt proper measures to eliminate or reduce the danger of contamination, especially in wards with patients at high risk. Control the environment and attention to personal hygiene must be strongly advocated.

It is clear from the brief study in library that student/workers handling dusty books and periodicals, which contain fungal spores run the risk of being exposed to very high concentration of allergenic mould spores. This problem is more acute in indoor environments, such as those surveyed in this study where spores are suspended in the air for longer periods due to poor ventilation resulting in prolonged inhalation by students and workers.

It is evident from the study of mycoflora in the godowns that low temperature associated with high humid conditions increased the percentage of gain toxic biopolluntants, while increase in temperature and decrease in humidity effectively reduced the concentration of phytotoxic biopolluntants.

The occurrence of grain toxic biopolluntants such as Rhizopus, Aspergillus and Penicillium and phytotoxic biopolluntants such as Alternaria, Curvularia, Helminthosporium, Cladosporium and Fusarium which cause serious damage to the stored grain indicate necessity of proper precautionary majors for storage of the cereal grains. Attachment of microorganisms to seeds in storage decrease the food value (content) and such seeds are dangerous for consumption. Insects and fungi are mainly responsible for the biodeterioration of food grains which are spoiled through the activities of grain toxic biopollutants. The storage losses constitute a major problem in developing countries like India where cereals constitute a staple food.

Fungi and their toxins can cause illness in human beings for example, respiratory and skin allergies or other damage at these sites, infection of tissues (especially pulmonary mycoses), as well as systemic toxicity (immunosuppression organ-specific-necrosis). Toxic effects may be due to exposure to mycotoxins, volatile chemicals and or airborne propagules (mycelia, spores, micro particles) Symptoms from documented exposures have ranged from very minor to severe. some exposures have led to death.

Conditions in the home and laboratories are crucial determinants of the air-flora. Fungi thrive in moist conditions, the presence of suitable substrate and moderate temperatures. A source in innoculum is necessary, and is usually supplied by the air.

The control of airborne spores is best achieved by the adequate drying of stored products, and also by preventing aerosols through good handling practice and the design of equipment. If the release of spores or aerosols is unavoidable, ventilation must be as close as possible to the point of released to prevent wide dispersal.

Fungi colonizing grain are the important cause of loss of dry matter and quality. Their importance is, perhaps often underestimated. Yet, much of the damage that they cause could be prevented if grain were dried adequately and stored in dry, weatherproof buildings. This may be readily achieved in some regions, where weather at harvest is normally dry, but is less easily achieved when harvest coincides with seasonal rains or when they arrive unexpectedly early. This may be a particular problem in tropical areas in monsoon season when drying grains

adequately may be difficult. Even so, drying after harvest may be too late to prevent some fungal colonization and mycotoxin formation.

Based on the observations of the aeromycological studies it is concluded that:

Altogether 72 fungal spore types on the rotorod sampling and 41 genera belonging to 91 species on culture plate method have been identified from the four different indoor environments of Deori taluka.

The dominant spore types are Aspergilli, Cladosporium, Alternaria, Curvularia, Chaetormium, Nigrospora, Drechslera and Helminthosporium.

Spore types exhibited seasonal and annual variations, majority of them with peak is September or rainy season.

Two spore seasons i) July to October and ii) March to May have been confirmed.

The spore season from March to May is lean period for fungal spores while July to October is dominated by fungal spores.

On the basis of the date further indoor aeromycological surveys are necessary in Deori. The identification of geographic areas of mould distribution could be helpful to the clinician, especially if associated with indoor fungal airspora recording, in determining the real clinical importance of sensitization to fungi and in establishing specific diagnoses.

During the period of investigation, the analysis of data showed that ther is no spore free speriod, in terms of 2 yer. Average of different spore types in various indoor environment. The spores of Aspergilli were predominantly observed followed by Cladosporium, Curvularia, Alternaria, Nigrospora and Smuts, Drechslera, Chaetomium, Sclerospora, Helminthosporium and Ganoderma which occurred in varying frequencies. However Hyphal fragments, Unidentifiable spores, Protozoan cysts, Insect parti/scales, Binding threads and Algal filament were also found abundantly in the total airspora.

On the whole, Deuteromycetes were predominant qualitatively and quantitatively to the total airspora, followed by Basidiomycetes, Ascomycetes and Phycomycetes on an average of both the years.

On an average, the percentage contribution of different groups of fungi showing a marked climatic variation. It is clear from the study of different climatic season that the Deuteromycetes showed more percentage contribution in winter months followed by summer and rainy season. Basidiomycetes showed an increase in concentration in winter months followed by rainy and summer seasons. Whereas, the percentage contribution of Ascomycetes was maximum in winter season followed by summer and rainy. On the other hand Phycomycetes showed a higher percentage contribution in summer followed by rainy and winter season.

When the distribution of average percentage contribution of fungal spores to the total airspora was considered from the climatic point of view. On an average rainy season (June to Septemeber) recorded the maximum concentration followed by winter season (October to January) and summer season (February to May) to the total airspora recorded.

On the basis of average of two years, August and September witnessed the highest occurrence of spore concentration to the total airspora followed by October, November, July, December, February, January, June, April, March and May.

It is clear that season affects the phenology of fungi. During the rainy months of June to September fungi in higher number were isolated, the highest spore types occurring in August and September, while in the summer mothrs, fungi is lesser number isolated.

The concentration of spores differed from month to month. The highest incidence were observed during September to December and the lowest during March to May. The incidence of fungal spores in the air was not homogenous and each type showed difference in seasonal and annual incidence. The difference may be due to the prevailing climate during that season and the growth of vegetation and indoor sources such as leakages of buildings, landscaping and landscape maintenance and organic debries near homes that supports the growth and sporulation of the fungi with the onset of monsoon. Large number of weeds and grasses appear on the ground as well as the decaying organic matter and these may form the important source for the growth of the fungus, particularly the Deuteromycetes.

Most of the Phycomycetes members are predominant forms during the monsoon period with heavy rainfall, high humidity and low temperature.

Saprophytic microorganisms, by contrast are able to grow in environmental reservoirs and therefore readily contaminate interior substrates. Nearly all fungi produce spores designed to be transported through the air. As a result, the outdoor air is usually well supplied with fungus spores, the types and levels of which vary with seasonal diurnal and geographic factors. These spores freely penetrate interiors through open windows, mechanical air intakes, and in otherwise closed buildings, through cracks or by the clothing of entering occupants and other fomites, therefore no interior environment is completely free of fungus spores and concentration in normally ventilated (Non air-conditioned) interiors usually are directly correlated with concentration in outdoor air during the local growing season. In addition, Many thousands of spore are present per gram of surface dust in most enclosed spaces.

The amount of water vapour in the air another controlling factor for microbial contamination. Appropriately high relative humidity will lead not only to condensation on cool surfaces but also will allow hygroscopic materials in the environment to absorb enough water to facilitate microbial growth. Inspection focuses an environment determinants for fungal spore concentration, including contributions from the outdoor air, venitilation mode and rate and factors allowing instrusion or accumulation of moisture indoors.

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However, indoor situations, marked by high humidity in rainy season and at least, traces of organic matter support the growth of fungi. Spores may come from many sources within buildings. They may come from fungi growing in vapour condensation on walls and paintwork and on food, or spores may accumulate in house dust and grow if the humidity is high enough.

There was a marked difference in the mean temperature and relative humidities in Deori taluka throughout the period of this survey. The amount of rainfall was noticeably high from June to September and the frequency of occurrence of mold spores was high in that period. In September, when there was maximum rainfall, we observed a appreciable change in the frequency or in the total number of genera of airborne fungi. In general, the over-all spore population of the atmosphere is high in the rainy season and gradually decrease in the dry season (winter), followed by Summer season which was minimum.

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## . **References**:-


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