3.3.2. Number of research papers per teachers in the Journals notified on UGC website during the year

Dr. A. A. Fulzele

I J R B A T, Issue (IX), Vol. I, Jan 2021: 78-83
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCESS
e-ISSN 2347 – 517X
Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
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INHIBITORY EFFECT OF STATIN PRODUCED BY ENDOPHYTE *FUSARIUM SPECIES* ISOLATED FROM *AZADIRACHTA INDICA*

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Communicated: 13.12.20 | Revision :18.12.20 & 28.12.2020 Accepted: 21.01.2021 | Published: 30.01.2021

ABSTRACT:
Endophytes are organisms associated with plant tissues that are less explored ecological niche of novel fungi and bacteria. Such organisms are rich sources capable of producing bioactive metabolites, having immense pharmaceutical significance. *Azadirachta indica* is an evergreen tree with ethno-medicinal properties. In this investigation, an attempt has been made to isolate endophytes from different tissues of *A.indica* such as stem, leaf and bark. An endophyte identified as *Fusarium decemcellulare* isolated from leaf tissues, this endophytic fungus showed capacity of lovastatin production when subjected to solid state fermentation. The inhibitory effect of lovastatin extract from this endophytic *Fusarium* sp. on the growth of *Saccharomyces cerevisiae* was studied.

Key words: - *Azadirachta indica*, *Fusarium*, lovastatin, inhibitory, secondary metabolites.

INTRODUCTION:

Statins:

Statins are the group of compounds which are produced by fungi as secondary metabolites by Polyketide pathway. The basic structure of natural statins consists of hexahydronapthalene part and a polyketide part. Though statins are naturally produced compounds by certain microorganisms, it can be produced synthetically or semi synthetically (Huse *et al* 1998). Statins are significant for their bioactivities and pharmaceutical value. It has been highlighted that among top best selling drugs in 1995, six out of them are from fungal origin (Bhilabutra *et al* 2007). Statins are capable of producing benefits like inhibitory action on different pathogenic fungi (Macreadie2000).

Few investigations reports the ability of statins to reduce mortality due to cardiac disease and to some extent reduce cancer incidences on their combined application and differences Blais *et al* (2000).Statins have been also studied for their combined application and different antimycotics.

Endophytes that reside in the plant are found to be rich source of secondary metabolites, Kumar (2015). Present investigation is an attempt to study inhibitory activity of one such metabolite lovastatin from endophyte of *Azadirachta indica*.

MATERIAL & METHODS:

For isolation of endophytic fungus from Neem tree, leaves were surface sterilized and placed aseptically on sterilized potato dextrose agar plates and incubated for five days at 25^0 C.

For lovastatin production, solid state fermentation was carried out by using wheat bran as substrate with 70% moisture content and inoculating spore suspension of isolated fungi. The experimental set in triplicate along with control was incubated for 10 days at 25^{0}C.

After completion of fermentation, lovastatin was extracted by ethyl acetate extraction

https://ijrbat.in/upload_papers/1302202110142912.%20A%20A%20Fulzele.pdf

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I J R B A T, Issue (IX), Vol. II, May 2021: 44-51
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCES
e-ISSN 2347 – 517X
Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
www.ijrbat.in

STRAIN IMPROVEMENT AND EFFECT OF NATURAL INDUCER ON LIPASE PRODUCTION BY *RHIZOMUCOR PUSILLUS*

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Communicated: 14.02.21 | Revision :10.03.21 & 20.04.2021 Accepted: 09.05.2021 | Published: 30.05.2021

ABSTRACT:
Lipases are widely used enzyme, known for its application in various industries. The fungal strains are preferred for lipase production since their enzymes are secreted extracellular and the extraction technique is simple. Thermophilic fungal enzymes are more important because of their stability at high temperature. During present investigation a thermophilic fungi *Rhizomucour pusillus* was isolated from decomposing leaves collected from forest of Nagpur district. Strain improvement of *R. pusillus* was carried out the increase Lipase production by using chemical mutagen EMS. Mutant strains derived were evaluated for yield of lipases production. Lipase activity of mutants was assayed by evaluation of quantity of fatty acid released in unit time during enzyme reaction and its measured by the quantity of NaOH required to maintain pH neutral. Present work also includes the effect of natural inducer such as wheat bran and olive oil on lipase production. It was concluded that the wheat bran is good inducer for lipase production as compare to olive oil during the process of submerged fermentation.

Keywords: *Strain improvement lipase activity, inducer, fungi, Rhizomucour pusillus*

INTRODUCTION:

Lipases are widely used enzyme, known for its applications in various industries. The fungal strains are preferred for lipase production since their enzymes are secreted extracellular and the extraction technique is simple. Thermophilic fungal enzymes are more important because of their stability at high temperature. Present investigation on a thermophilic fungus Rhizomucor pusillus (Lindt) Schipper was isolated from decomposing leaves collected from forest of Nagpur district. Mutant was developed earlier in same laboratory by using EMS. Quantitative estimation of lipase was carried out to understand effect of natural inducer during fermentation on lipase production.

Lipases are widely used enzyme, known for its applications in various industries. The fungal strains are preferred for lipase production since their enzymes are secreted extracellular and the extraction technique is simple. Thermophilic fungal enzymes are more important because of their stability at high temperature. Present investigation on a thermophilic fungus *Rhizomucor pusillus* (Lindt) Schipper was isolated from decomposing leaves collected from forest of Nagpur district. Mutant was developed earlier in same laboratory by using EMS. Quantitative estimation of lipase was carried out to understand effect of natural inducer during fermentation on lipase production.

Rhizomucor pusillus – It is a thermophilic fungus that lives in hot environments such as decomposing leaf litter. Its growth optimum at 45^0 C and a maximum temperature 50^0 C or above and a minimum of 20 ^{0}C or above (Cooney Emerson, 1964, Maheshwari *et al.*, 2000). *Rhizomucor pusillus* structure shows rhizoids and branched sporangiophores. It is grey mycelium fungi grows naturally on dead and decaying

https://ijrbat.in/upload_papers/160720210608598.%20Kartiki%20Kawale,%20S.Chimurkar,%20A.A.%20Fulzele.pdf

Dr. A. M. Sawane

International Journal of Botany Studies

International Journal of Botany Studies
ISSN: 2455-541X; Impact Factor: RJIF 5.12
Received: 01-10-2020; Accepted: 15-10-2020; Published: 02-11-2020
www.botanyjournals.com
Volume 5; Issue 6; 2020; Page No. 11-13

Phytochemical analysis and antibacterial activity of galls of *Quercus infectoria* (Majuphala)

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Abstract
The study was undertaken to screen phytochemical activity and to study antibacterial activity of aqueous and ethanolic extracts of *Quercus infectoria* against bacteria namely *Staphylococcus aureus, Escherichia coli* and *Pseudomonas aeruginosa.* Phytochemical screening was done for different phytochemicals like tannins, alkaloids, phenolic compounds, glycosides, flavonoids, proteins and reducing sugar. Antibacterial activity was tested by Disc Diffusion technique. Tannins, alkaloids, phenolic compounds, glycosides and flavonoids were found to be present in both the extracts of *Q. infectoria.* Antibacterial activity of *Q. infectoria* was found to be comparable with the control antibiotics and even better for ethanolic extract against *P. aeruginosa* and *S. aureus*. The current study suggests potential of *Q. infectoria* as anti-bacterial agent with need of further studies on bioactive compounds in galls of *Q. infectoria* responsible for antibacterial activity.

Keywords: antibacterial activity, *Majuphala,* phytochemicals, *Quercus infectoria*

Introduction
Plant based drugs have been in use against various diseases since the time immemorial. The primitive man used plant as therapeutic agent and medicament, which they were able to procure easily. The nature has provided abundant plant wealth for all living creatures, which possess medicinal virtues [1].

Plants produce a diverse range of bioactive molecules, called phytochemicals. They are considered secondary metabolites because the plants that produce them may not need them. These secondary metabolites such as flavonoids, steroids, alkaloids, resins, fatty acids, tannins and phenolic compounds, etc are synthesized naturally in all parts of the body of the plant; bark, leaves, stem, root, flower, fruit, seeds, etc., that is, any part of the body of the plant may contain active components, making them rich sources of different types of phytochemicals. Today the herbal or natural products have become more popular due to their high antimicrobial activity, biocompatibility, anti-inflammatory and anti-oxidant properties. As the incidence of increased resistance by pathogenic bacteria to currently used antibiotics and chemotherapeutics agents is more, the researchers are developing interest towards alternative treatment options and products for diseases. Hence, the natural phytochemicals isolated from plants used in traditional medicine are considered as good alternatives to synthetic chemicals. [2].

The *Quercus infectoria* (Family-Fagaceae) is a small tree or shrub found in Greece, Asia, and Iran. The galls arise on branches of this tree, resulting from the deposition of eggs by gall wasp [3]. In Indian traditional medicine, the galls have been used to treat diarrhoea, dysentery, internal haemorrhages, gonorrhoea, impetigo, tonsillitis, and menorrhagia. The drug Mazu (Gall of Quercus infectoria) is described in detail in ethnobotanical and classical Unani literature and various actions of the drug have been reported such as analgesic, antidote, anti-inflammatory, antipyretic, antiseptic, deodorant, desiccant, expectorant, germicidal, hypnotic, hypoglycaemic, powerful astringent, sedative, styptic, tonic, tonic to teeth and gum, and wound healing. [4] Galls have also been shown to have high antibacterial activity, particularly against resistant bacteria. [5]

Incidence, and the emergence of multidrug resistant and disinfectant resistant bacteria—such as *Staphylococcus aureus* (*S. aureus*), *Escherichia coli* (*E. coli*) and *Pseudomonas aeruginosa* (*P. aeruginosa*)—has increased rapidly, causing the increase of morbidity and mortality. [6]

The present study was, therefore, undertaken to screen phytochemical activity and to study antibacterial activity of aqueous and ethanolic extracts of *Q. infectoria* against bacteria namely *S. aureus, E. coli,* and *P. aeruginosa.*

Material and Methods
Seed collection and extraction process
The galls of *Q. infectoria* were purchased from traditional vendors of medicinal plants in local market of Nagpur. The galls were washed thoroughly with tap water followed with sterilized distilled water and shade dried for few days and then were grinded separately in mechanical grinder to get fine powder.

Each of 0.5 gm of the fine powder of seeds were dissolved in 5 ml of sterile distilled water to make aqueous extract and in 80 % ethanol for ethanolic extract, centrifuged and then were filtered by Whatman filter paper no. 1 till clear filtrates were obtained. The extracts were then stored in screw capped bottles in refrigerator for further use. Extraction procedure adapted was as described by Gowdhami et al. [7]

Phytochemical tests
Phytochemical analysis was carried out for identification of different phytochemicals like tannins, Alkaloids, Phenolic compounds, Glycosides, flavonoids, proteins and reducing sugar according to standard methods [8, 9, 10].

Antibacterial Activity
The antibacterial activity was investigated against pure cultures of pathogenic strains of *Escherichia coli* (Gram-negative), *Staphylococcus aureus* (Gram- positive), and

http://www.botanyjournals.com/archives/2020/vol5/issue6/5-5-78

Dr. A. M. Sawane

International Journal of Botany Studies

International Journal of Botany Studies
ISSN: 2455-541X; Impact Factor: RJIF 5.12
Received: 26-07-2020; Accepted: 12-08-2020: Published: 19-08-2020
www.botanyjournals.com
Volume 5; Issue 4; 2020; Page No. 257-259

Study of pollen production and pollen: Ovule ratio in some common members of *Malvaceae* in Nagpur city

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Abstract
The family *Malvaceae* is one of the largest flowering plant families with 4465 species recorded worldwide belonging to 245 genera. 35 species are reported from Nagpur district. Plants have ornamental, economical and medicinal value. Though morphological pollen studies in these plants are published, very meagre quantitative data is available about pollen production and pollen:ovule ratio, which provides insight into breeding system of the plants. This project was, therefore, undertaken to evaluate the same in some common members of *Malvaceae* found in Nagpur city. 14 species belonging to 8 genera of *Malvaceae* were evaluated. With limitations of less sample size and smaller geographical area, this preliminary study has presented quantitative data on pollen production and pollen:ovule ratio. In our future studies, pollen production and P:O ratios would be studied in different regions of wider geographical area in different seasons and with larger sample size so that relationship of all these factors on breeding system can be better understood.

Keywords: *Malvaceae*, pollen production, Pollen: Ovule ratio

Introduction

The family *Malvaceae* commonly known as 'Mallow family', is one of the largest flowering plant families. Plants belonging to *Malvaceae* family are used as food to produce beverages, for fibre, for their ornamental value and also for their medicinal value. Some of the economically important species have been introduced and cultivated in different parts of the World. 4465 accepted species names belonging to 245 genera are reported in this family worldwide in *The Plant List*, 2013 [1]. Around 93 species belonging to 22 genera of the family are reported from India [2]. 35 species are reported from Nagpur district by Ugemuge, N.R. in Flora of Nagpur district [3].

Palynological studies can provide more accurate basis for the identification of plant species. The study of pollen biology has direct relevance in agriculture, horticulture, forestry, plant breeding, forensic sciences and biotechnology. For a taxonomist, the data about fertility of pollens is an important means to differentiate the potential hybrid and parental plant [4].

A plant during its entire flowering period produces large amount of pollen grains most of which are not involved in fertilization. This large amount of pollen released may float in air or water and finally get deposited in earth's surface. The knowledge of quantitative production gives some idea about the frequency of presence of particular plant pollen grains in the atmosphere [5].

The pollen-ovule ratio (P/O) provides the best insight into the breeding system of a species [6]. Pollen-ovule ratios reflect the pollination efficiency, i.e., the likelihood of a pollen grain reaching the stigma [7, 8]. There is a substantial decrease in P/O ration from xenogamy to facultative xenogamy to autogamy. P/O ratios are also affected by the sexual system, the pollen vectors, pollination mechanisms, and ecological factors.

Though morphological pollen studies in these plants are published, very meagre data is available about number of pollen production per flower and pollen:ovule ratio. Keeping in mind the immense importance of pollen study, this project was undertaken to evaluate the pollen production and pollen:ovule ratio in some common members of *Malvaceae*.

Materials and Methods

Pollen production in 14 species belonging to 8 genera was evaluated in this project (Table 1). These plants are used as vegetables, medicinal plants and are of economic importance. The study was conducted from September 2018 to March 2019.

Pollen production

The plants selected for this study were collected from road side and open spaces in residential areas of Nagpur city. Mature and undehisced anthers from the flower buds were collected in the morning hours and pollen productivity (number of pollens per anther) was determined as per the method of Nair and Rastogi [9].

Pollen ovule ratio

To calculate pollen ovule (p/o) ratios, the number of grains per anther was averaged for three anthers from a flower. The mean number of grains per anther was then multiplied by the total number of anthers in the flower examined, and this was divided by the number of ovules in that flower. For each species, ten such flowers belonging to different individual plants were studied and finally average of number of anthers per flower, pollen production per flower and Pollen/ovule ratios along with standard deviation was calculated. Pollen/ovule ratios were log transformed to generate similar data as done by Cruden [7] in their extensive breeding system data and data published by Erbar and Langlotz [10].

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International Journal of Life Sciences
International Peer Reviewed Open Access Refereed Journal

Int. J. of Life Sciences, 2020; 8 (2):411-416
ISSN:2320-7817(p) | 2320-964X(o)

Original Article | Open Access

Ethnobotanical study of medicinal plants used by tribal people Wadegaon and Ghot villages of Gadchiroli district of Maharashtra state

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Manuscript details:

Received: 27.05.2020
Accepted: 22.06.2020
Published: 30.06.2020

Cite this article as:
Sawane Archana, Chandrama Meghnad and Shrungarpawar Nishi (2020) Ethnobotanical study of medicinal plants used by tribal people Wadegaon and Ghot villages of Gadchiroli district of Maharashtra state, *Int. J. of Life Sciences*, Volume 8(2): 411-416.

Available online on http://www.ijlsci.in
ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

ABSTRACT

Gadchiroli district is located at the north-eastern side of the state of Maharashtra and has moderate tribal concentration i.e. between 25-50% of district's total population, the main tribes being Gond and Kawar. These people are highly dependent on medicinal plants as remedy for their medical illnesses. Identification of medicinal plants used by indigenous inhabitants for various ailments is a key to understand their properties. Most of the useful information in this regard is available with traditional healers. Hence the current project was undertaken with an aim to preserve and protect the traditional knowledge and also to prepare a database of traditional medicine. Information regarding the medicinal uses of plants was collected through face-to-face interviews with the **healers, called locally as "Baida". During the** interviews, local names, utilized parts and information on the types of ailments treated using traditional medicinal plant species were recorded and are presented here. Forty-five different plants belonging to 29 families were reported to be used by tribal people of the studied area for different medicinal uses. Plants were used for different common ailments like gastro-intestinal problems, fever, cough, skin diseases, menstrual problems, insect bites, urinary problems, weakness, etc.

Keywords: Ethnobotany, Gadchiroli, Medicinal plants, tribal medicine

INTRODUCTION

Since ancient times, man has used various plants parts of his surrounding habitat in the treatment and prevention of many ailments. All medicinal *preparations were derived from plants, in the simple form of plant parts or in* the more complex form of crude extracts, mixtures, etc. Even today, plants are the source of substantial number of drugs which are active against number of diseases. With passage of time, active ingredients were found from medicinal plant parts. In developed countries, 25 percent of the medical drugs are based on plants and their derivatives. Even today, in most of the developing countries, traditional knowledge of medicinal use of plants discovered through trial and error is used by the indigenous people in tribal and rural areas where the plant biodiversity is rich and the healthcare system is not easily accessible (Ayyanar, 2009).

https://ijlsci.in/ls/index.php/home/article/view/25

Dr. S. K. Giri

IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Airborne Culturable Fungi from Outdoor Environment of College Premises

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Abstract:

Exposure to mould significantly increased risks of respiratory symptoms such as rhinitis, sore throat, cough and common cold in adults. There is no doubt that fungi produce allergens, mycotoxins, neurotoxins and also cause a number of human diseases and adversely affect human health. Present study was carried out to find out the airborne culturable fungi from the outdoor environment of college premises. The study was conducted from November- 2013 to February-2014 at fortnight intervals by using Hi-Air sampler (LA-002). Altogether 17 fungal species were isolated and identified from the college premises by using two different media strips viz. RBS-640 and PS-290 one sampling after the next simultaneously. The dominant fungi isolated from the campus includes *Aspergillus, Penicillium, Cladosporium, Alternaria, Curvularia, Trichoderma, Mucor, Rhizopus, Fusarium, Nigrospora, Drechslera, Trichoderma* and non-sporulated fungi. The fungal isolates varied from 625 to 2181 CFU/m^3 on the RBS-640 and PS-290 media strips respectively. The highest colony forming units was recorded in the month of January-2014 which is 2181 CFU/m^3 on RBS-640 media strips and lowest 625 CFU/m^3 recorded in the month of December-2013 on PS-290 media strips. On an average of total CFU counts of four months, the maximum 5,144 CFU/m^3 was recorded on RBS-640 media strips, while lowest was recorded 3,731 CFU/m^3 on PS-290 media strips. This difference of colony forming units was recorded might be due to culture medium which favors the growth of fungi i.e. RBS-640 is Rose Bengal Agar for Yeasts and Moulds and PS-290 is TSA- Agar for total count. The results of this study provide basic information about the prevalence of airborne culturable fungi which are highly allergenic, toxigenic and producing many different types' of health complaints.

Key words: Airborne, Culturable fungi, Outdoor Environment, College Premises, *Aspergillus*.

http://ijcrt.org/papers/IJCRT2009145.pdf

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IRJMETS
e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
Volume:02/Issue:08/August-2020 Impact Factor- 5.354 www.irjmets.com

PREVALENCE OF AIR-BORNE FUNGI IN INDOOR ENVIRONMENT OF DENTAL CLINIC

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ABSTRACT

The present study was aim to find out the prevalence of airborne fungi in indoor air of dental clinic at Nagpur city. Air sampling was conducted during October, 2013 to March, 2014 by using Hi-Air sampler (Hi-Media-LA002 with RBS-290 and RBS-640 media strips) at monthly intervals. In the past few decades the public health has given more attention to the quality of air and their health impact issue associated with exposure to fungi. There is no uniformity in the suggested guidelines for acceptable levels of fungi in indoor ambient air. Thus, health professionals have no way to determine what levels of fungi may pose a threat to human health. The indoor air concentration of fungal spores was found higher than currently suggested guidance value. The average indoor air concentration was found in dental clinic 952 CFUs/^{3} (colony forming units per cubic meter), whereas in control air (outdoor) levels was averaged 614 CFUs/m^3. Total indoor colony counts ranged from 6 to 133 CFU/m^3, whereas in outdoor air it is ranged from 1 to 92 CFU/m^3 in studied environment. Without intentionally developing a sterile environment, a mold free, indoor environment is not possible to maintain. The most common fungal genera/species isolated from indoor as well as in outdoor environment of dental clinic includes *Aspergillus, Cladosporium, Curvularia, Alternaria, Penicillium, Rhizopus, Mucor, Trichoderma, Nigrospora* and *Candida*. Beside these yeasts and non-sporulated fungi are also isolated. Many health professionals suggest that if the indoor ambient air concentration is more than concentrations observed in outdoor air and if the fungi detected in both are similar, then there is high health risk to patients.

Keywords: Airborne, fungi, indoor, environment, dental clinic.

I. INTRODUCTION

Airborne fungal spores are present in outdoor air all year round, usually in high numbers. These spores can enter indoor environments via natural ventilation (open windows and doors). They are also brought indoors on people's clothing, shoes and pets. Therefore, indoor fungi can be a mixture of fungi from outdoors and fungi from indoor sources. All fungi are eukaryotes and exist in different growth forms such as rusts, mushrooms, mould and yeasts. Filamentous fungi (moulds) consist of long, branching filaments called hyphae and reproduce via formation of spores from sexual or asexual processes. Some fungi can exhibit both growth forms and are known as dimorphic fungi. They are ubiquitous in all environments like indoors and outdoors. Fungi in indoor environments are a problem for a number of reasons like they deteriorate or damage the surfaces, cause unpleasant odors, can cause an allergic response and also be responsible for infections, and other health problems.[1], [2].

Moulds produce millions of spores, which are loosely attached and even slight air currents will disturb the spores making them airborne. Due to their small size (large spores are 10-20mm, average 1-5mm) spores easily stay airborne and may be respirable and breathed deep into the airways. Spores are very tolerant to dryness, changes in temperature, UV light and some chemicals. The spores may carry allergens and toxins, which are stable and may stay active even after the spore has lost its viability. Some fungi do not produce infections but can cause allergic reactions. Fungal spores are generally recognized as important causes of respiratory allergies, in both the lower and upper respiratory tracts[3,4]. Allergic reactions usually occur at the site of allergen deposition. When larger fungal spores are inhaled, they are deposited in the naso-pharynx and are associated with nasal and/or ocular symptoms usually referred to

Dr. S. K. Giri

International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Monitoring of Airborne Fungi in Indoor Environments of Reading and Stock Sections of College Library

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Abstract: ***Mold sensitivity, particularly to Alternaria alternata, Cladosporium herbarum, Aspergillus fumigatus and other fungi including Candida, Penicillium and Curvularia species are mainly cause allergic bronchopulmonary mycosis and severe asthma.The studywas conducted from December-2013 to April-2015by using Ili-Air sampler (Ili-Media Ltd. IA-002), with the help of two different media strips PS-640 and PS-290 simultaneously. In both the sections of library, total 34fungal species excluding yeasts and non-sporulated fungi were isolated and identified (Reading & Stock section). The dominant fungal species isolated were Curvularia lunatarecorded 706 CFU/m^3, followed by Curvularia geniculata 412.5CFU/m^3,Curvularia tetramera 537.5CFU/m^3, Aspergillus niger 468.75 CFU/m^3, Aspergillus flavus431.25CFU/m^3, Aspergillus fumigatus475CFU/m^3,Alternaria alternata 350CFU/m^3,Cladosporium herbarum 287.5CFU/m^3, Alternaria solani 281.25CFU/m^3, Alternaria tenuissima262.5CFU/m^3, Cladosporium spp. 245.75CFU/m^3, Penicillium chrysogenum 450CFU/m^3, P. citrinum 456.25CFU/m^3, P. glaucus 556.25CFU/m^3, Penicillium spp. 331.25 CFU/m^3, and Non-sporulating fungi 737.5 CFU/m^3 in reading and stock sections of library. The total mean concentrations of airborne fungi in reading section of library was 7618.75 CFU/m^3, which is minimum as compare to the stock section of library 10306.25 CFU/m^3. Fungi are ubiquitous in the atmosphere, and often constitute the main biological component of the air. They are closely related with indoor and outdoor air pollution and human health. The prevalence of airborne fungi in the environments of library of college was meagerly studied. The present study was conducted to monitor the airborne fungi and their concentrations in two sections of library environments; to find out the fungi which are mainly responsible for the adverse health effects and deteriorating the book materials.***

Keywords: Monitoring, AirborneFungi, Indoor Environments, College Library, *Curvularia* spp.

1. Introduction

Molds in indoor niches are largely linked with the aetiology of asthma and respiratory allergy. Asthma is common in the developed and developing countries and increasing in frequency, despite better living conditions. *Aspergillus fumigatus*, *Alternaria alternata*, *Cladosporium cladosporoides*, *Curvularia tetramera*, *Mucor*, *Rhizopus*, *Penicillium citrinum*, *Penicillium chrysogenum*, *Aspergillus flavus*, *Aspergillus niger* and *Candida* spp. are the major respiratory allergens, which causes most known cases of allergic bronchopulmonary mycosis [10]. The deterioration of the library material by microorganism has attracted the attention of many in recent years. The efforts are directed towards reduction of these losses by finding out the conditions, the causes and the environmental factors which contribute in the biodeterioration of books and the binding material like leather, resins and cloth.The role of biological agents and the deterioration with reference to libraries and museums had been reviewed by [5].For recording the progress of mankind books have been in use for centuries and will probably continue as a medium for recording and exchanging information in future also. Depending upon the nature and the environmental conditions, paper is subjected to the attack from several sources which can be broadly classified as physical, chemical and biological. Heat, sunlight, moisture, dust and dirt are physical sources, which are known to damage paper and cause deterioration. Similarly, acidic and other gases present in the atmosphere and deleterious chemicals added during manufacture of paper are responsible for affecting storage life of paper.

Estimation of allergenic bioparticles in the indoor environment is of great significance. The role of fungi as a causative agent of allergenic rhinitis and bronchial asthma from library dust and book collection is well documented [11]. Fungi on papers and books belong to the species of *Alternaria*, *Monilia*, *Fusarium*, *Chaetomium*, *Myrotheciam*, *Torula*, *Stachybotrys*, *Cladosporium*, *Sporotrichium*, *Rhizopus*, *Epicoccum* and *Paecilomyces*. Most of these are active cellulose decomposing, many are also pigment forming and stain paper usually with yellow, brown and black spots. Some however form colorless colonies. But the action of fungi is very slow, requiring several months for damage to be detected by ordinary means [25]. The airborne fungi in library environment was the species of *Cladosporium*, *Curvularia*, *Alternaria*, *Penicillium*, *Aspergillus*, *Mucor*, *Rhizopus*, *Trichoderma*, *Fusarium* and numerous non-sporulated fungiat Bhopal [17].The study of aeromycoflora of libraries are few and sketchy [16, 20, 24].However, problems of students' health in schools, colleges and in universities were not concerned enough in Nagpur city. Aeromycological studies in intramural environmentsof Hospital ward and Library of Nagpur city were previously studied [21]. The aim of the present study was to monitor the airborne allergenic and book deteriorating fungi in indoor environments of reading and stock sections of college library.

2. Materials and Methods

Sampling site& Method of Sampling

Library of Shri Mathuradas Mohota College of Science, Nagpurwas selected for the study of airborne fungi (Plate 1). The indoor area of college library is measure about 1300

https://www.ijsr.net/get_abstract.php?paper_id=SR20920181708

Dr. S. K. Giri

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VIII Aug 2020- Available at www.ijraset.com

Airborne Viable and Settled Dust-Bound Micro-Fungi in Residential Homes

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Abstract: ***Recent reviews of the effects of home dampness and fungi have shown several positive associations between fungal exposure and increased risk of adverse respiratory symptoms in children's and adults. Present study was conducted to study the airborne viable and settled dust bound micro-fungi in residential homes of two different localities namely Ayodhya Nagar and Raghuji Nagar area of Nagpur city. Air and dust sampling were carried out simultaneously at monthly intervals from July, 2017 to December, 2017 (6 months) by using Hi-Media Air sampler (Hi-Media-LA002); and Eureka Forbes Mini vacuum cleaner (Eureka Forbes Co. ltd. India) were used for dust collection from various sources.***

Total 23 fungal species were isolated and counted their CFUs/m3 from the indoor air of residential homes. Nine species of Aspergillus were recorded and it was dominant throughout the study period followed by the species of the genera Curvularia (2 spp.), Cladosporium (2 spp.), Alternaria (2 spp.), Trichoderma, Mucor, Rhizopus and Yeasts. While 19 species were isolated from the settled dust samples collected from the various sources, these are Ceiling fan/table fan dust isolated 4 species of Aspergillus, out of which Aspergillus niger and Aspergillus flavus are the dominant.

Sofa dust isolated 6 species of Aspergillus of which Aspergillus niger is the dominant followed by Aspergillus flavus, Aspergillus fumigatus, A. ochraceous, A. terrus and A. zonatus. Carpet dust also isolated Aspergillus species dominantly followed by Cladosporium, Penicillium, Curvularia, Rhizopus, Alternaria, Trichoderma and Yeasts. Seven species were reported from the bed dust collected from two different localities. Bed dust isolated 5 species of which 3 were Aspergillus niger, A. flavus and A. fumigatus and one each of Penicillium chrysogenum and Curvularia tetramera. Indoor airborne mould exposure causes neurologic dysfunction and cognitive deficits including memory loss, irritability, anxiety, depression, numbness, tingling and tremor.

Keywords: Airborne, Viable, Settled dust bound Micro-fungi, Residential homes, and Aspergillus.

I. INTRODUCTION

The inhalation of fungal spores and also house dust of dwelling homes cause acute symptoms in allergenic individuals. The risk of respiratory symptoms, such as cough and wheeze or asthma as well as respiratory infections and general symptoms like headache and tiredness, is higher for occupants in residential buildings Peat et. al., [12], Borneheg et al., [2]. Many fungal genera were observed in homes and it is well described correctly as the "weeds of home" which are also responsible for dust allergy.

Allergic reactions to fungi (single or clusters of conidia, hyphae elements, spores, crystals) in air include rhinitis, asthma and extrinsic allergic alveolitis or hypersensitivity pneumonitis Hedayati et.al., [8]. Although it has not always been possible to find a high degree of correlation between the concentration of fungal spores and the incidence of asthmatic symptoms, the role of spores has been clearly identified in specific atopic individuals. Traditionally, allergists have assumed that mold-induced asthma was entirely due to an allergic reaction. It is clear, however, that some species such as *Aspergillus fumigatus* have particular properties that can result in more severe symptoms caused by direct lung infection allergic bronchopulmonary aspergillosis (ABPA) Dales [3] and Hedayati et al. [8].

Dwelling homes are one of the most important indoor environments. It may serve as a reservoir and source of allergens. The fungal spores in dwelling houses may come from many sources within the building. They may come from fungi growing in condensation on walls, paint works, and on foods or spores may come from outside and accumulate in house dust and grow, if the humidity is high enough.

They may then become dispersed by human activity such as sweeping, bed making, and building repairing work etc. Verhoeff & Burge [15]. Indoor airborne mould exposure causes neurologic dysfunction and cognitive deficits including memory loss, irritability, anxiety, depression, numbness, tingling and tremor etc. Luke Curtis et al., [11]. The purpose of this study was to assess quantitatively and qualitatively the occurrence of airborne viable and settled dust bound micro-fungi in indoor environment of residential homes which are mainly responsible for various human health hazards.

https://www.researchgate.net/publication/344053301_Airborne_Viable_and_Settled_Dust-Bound_Micro-Fungi_in_Residential_Homes

Dr. S. K. Giri

International Journal of Scientific Research in Biological Sciences
Vol.7, Issue.6, pp.120-130, December (2020)

Research Paper

E-ISSN: 2347-7520

Indoor Air Quality in College Laboratories: Exposure to Airborne Fungi

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Available online at: www.isroset.org

Received: 29/Oct/2020, Accepted: 10/Dec/2020, Online: 31/Dec/2020

***Abstract*-** The present study was undertaken to identify and find out the airborne viable fungi and their concentrations in indoor environment of college laboratories. Air sampling was conducted in Chemistry, Zoology, Botany, and Geology laboratories by using Hi-Air Sampler (Hi-media LA-002); two media strips were used for isolation of airborne fungi (PS-290 & PS-640). The average counts of total fungi isolated on two media strips were recorded maximum in chemistry laboratory (4088 CFU/m^3), followed by Botany (2681 CFU/m^3), Zoology laboratory (2300 CFU/m^3), and the lowest recorded in geology laboratory (1622 CFU/m^3). While comparing the total CFU counts of isolated fungi on two media strips, the maximum counts were recorded on PS-640 media strips (13618.75 CFU/m^3), and (9,637.50 CFU/m^3) recorded on PS-290 media strips. In chemistry laboratory total 31 species isolated along with Yeast and Non-sporulating fungi, followed by 29 species from Botany laboratory, 26 from Zoology and only 17 species from Geology laboratory. The total fungal counts of all the fungal species isolated from the studied laboratories were considered and found maximum CFU counts of *Curvularia clavata*, which is most predominant species followed by the species of *Cladosporium herbarum, Curvularia geniculata, Alternaria alternata, Aspergillus niger, Alternaria solani, Curvularia lunata, Yeasts, Aspergillus flavus, Penicillium lutem, Penicillium purpurogenum, Aspergillus fumigatus, Penicillium glabrum, Alternaria brassicicola, Alternaria tenuissima, Curvularia brachyspora, Rhizopus, Mucor,* and *Cladosporium oxysporum.*

Keywords – Indoor, Air-quality, Laboratories, Airborne, Fungi, *Curvularia spp.*

I. INTRODUCTION

Air contaminants, which includes fungus, mold, bacteria, inorganic and organic matter, cause many health-related problems. Many small size fungal spores are respirable into the alveoli of lung, and release soluble toxins contained in the spores enter the blood stream. Fungi are well known to colonized and caused diseases in skin, nails, sinuses or airways [1]. *Aspergillus flavus* and *A. fumigatus* are the second most important species causing human infections particularly fungal sinusitis, aspergillosis and lower proportion of pulmonary infections [2]. Occupational allergy is nothing but the any kind of clinical or physio-pathological event due to hypersensitivity prompted by allergens found in working indoor environments. The dust, dirt, moisture level, minimum and maximum temperature normally provide sufficient nutrients to support extensive fungal growth on various substrates. The Non-Infectious Fungal Indoor Exposure syndrome (NIFIES) has been proposed to described the illness typically first called SBS. Symptoms include eye, nose and throat irritation/inflammation, respiratory symptoms such as cough and chest tightness, fatigue, popular rash, and neurocognitive symptoms such as short-term memory loss and concentration problems [3]. The presence of Aspergillus species in the air is a major risk factor for both invasive and allergic aspergillosis [4]. Most students, faculties and laboratory staffs spend their maximum time in laboratories while performing practical's in college hours. However, poor indoor air quality has adversely affected not only known allergy sufferers, but also others who experience more frequent aggressive symptoms. The present study specifically monitors college laboratories to evaluate the indoor air quality in reference to presence of airborne viable fungi.

II. MATERIAL AND METHODS

SAMPLING SITE AND SAMPLING OF AIR:

The study was carried out in various laboratories of Shri Mathuradas Mohota College of Science, Nagpur city. Air sampling was conducted randomly in Chemistry, Botany, Zoology and Geology laboratories from December, 2013 to April, 2015. Air sampling was conducted by using Hi-Air sampler (Hi-Media Ltd. LA-002). Two media strips were used to sample the indoor air of laboratories (PS-640 and PS-290) for total CFU counts. Air sampler was ran 4 minutes during working hours of college (11.30 am to 2.30 pm). The minimum and maximum temperatures, relative humidity was recorded during sampling hours by temperature-hygrometer (Figure 1).

COLONY FORMING UNITS (CFUs) AND SPECIES IDENTIFICATION:

The exposed media strips were brought back and incubated in an inverted position in laboratory. After 4 to 7 days of

https://www.isroset.org/pdf_paper_view.php?paper_id=2192&15-ISROSET-IJSRBS-04938.pdf

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Journal of Interdisciplinary Cycle Research ISSN NO: 0022-1945

AFTERGLOW LUMINESCENCE IN TbAG:Ce GARNET PHOSPHOR

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ABSTRACT:

$Tb_3Al_5O_{12}$ (TAG) terbium–aluminum garnet is used in optical filters based on the Faraday effect [1] and in luminescence converters of blue LED radiation to obtain light sources with a white emission spectrum [2]. An intense 5d–4f photoluminescence of Ce^{3+} on the Tb^{3+} site in $Tb_3Al_5O_{12}$ (TAG) powder has been reported by Kummer et al. [3]. $Tb_3Al_5O_{12}$ activated with Ce phosphors were prepared by combustion synthesis. Reagent grade rare earth oxides/carbonates were converted to the corresponding nitrates by dissolving in nitric acid. The nitrates were dried by prolonged, gentle warming. A china dish containing the paste was inserted in a furnace preheated to 500^0C. Within minutes the paste foamed and a flame was produced which lasted for several seconds.

Green LL is observed in Ce doped $Tb_3Al_5O_{12\ 8y}$:Ce garnet phosphors. LL is well correlated with Ce^{3+} emission and a peak around 140°C in the TL glow curve. This can be well explained by referring figures above. In comparison with the commercial phosphor YAG, the $Tb_3Al_5O_{12}$:Ce (TAG) is more stable and shows more intense TL properties, this phosphor can be used for dosimetric detections and measurements. Luminescence that persists after the removal of the excitation is called afterglow or persistent phosphorescence or Long-lasting phosphorescence. It is a phenomenon due to the thermal stimulated recombination of holes and electrons at traps which leave holes or electrons in a long-lived excited state at room temperature [1]. The first record of persistent phosphorescent material is in the Song dynasty of China (11th century A.D.). In the miscellaneous notes by a Song monk, entitled Xiang-Shan Ye-Lu, there is a story about a long lasting phosphorescent painting. A cow on the painting appears eating grass outside the pen during the daytime, and resting in it at night. The ink used for the painting contains long lasting phosphorescent material [2,3]. The long afterglow phosphors are finding more and more applications such as traffic signs, emergency signage, watches and clocks, textile printing etc. Lanthanide activated alkaline earth silicates or aluminates yield desirable characteristics, such as longer duration time of the phosphorescence, high intensity and improved chemical stability, than the conventional sulfide materials used earlier [4].

$Tb_3Al_5O_{12}$ (TAG) terbium–aluminum garnet is used in optical filters based on the Faraday effect [5] and in luminescence converters of blue LED radiation to obtain light sources with a white emission spectrum [6]. An intense 5d–4f photoluminescence of Ce^{3+} on the Tb^{3+} site in $Tb_3Al_5O_{12}$ (TAG) powder has been reported by Kummer et al. [7] Effective processes of the energy transfer from TAG host to Ce^{3+} ions and simultaneously from Ce^{3+} to Eu^{3+} ions via the Tb^{3+} cation sublattice are realized [8]. Mn^{2+} doping also helps in shifting the emission to longer wavelengths. Mn^{2+} emission is at 595 nm. Due to the existence of the Mn^{2+} emission, TAG:Mn,Ce phosphor demonstrates the relatively higher contribution to the luminescence in the orange-red spectral range as compared with the YAG:Ce and TAG:Ce phosphors [9]. TAG single crystal is an excellent magneto-optical material [10] with good transmittance in the 500-

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Journal of Interdisciplinary Cycle Research ISSN NO: 0022-1945

RADIATION DOSIMETER NANOPHOSPHORS USED IN PERSONAL MONITORING

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ABSTRACT:

The programmable OSL (Optically stimulated Luminescence) reader systems are in great demand in all the research and academic institutions for their applications in advanced radiation dosimeters research Dosimeters for personnel monitoring are required in radiation department. The YAG:Ce phosphor developed in 1967 by Blasse and Brill has been practically used as cathode ray tube phosphors (P 46 and P 48) [1]. Blasse and Brill [2] also showed that this phosphor emitted in yellow region when excited by blue light. Modifications brought in the PL characterstics by substitutions continue to interest researcher to date [3]. The OSL graph of YAG:Ce,Yb phosphor shows intense optically stimulated luminescence, as the Yb concentration increases OSL also increases. Hence this phosphor can be used for detection in radiation dosimeters.

In the recent past, optically stimulated luminescence (OSL) technique has emerged as an alternative to the TLD and it has gained popularity in radiation dosimetry applications due to its significant advantages over the TL technique [1,2] The physical principles of OSL are closely related to those of TL technique. In contrast to TL OSL readout does not involve heating of the sample. Thus the problems due to thermal quenching of luminescence efficiency of the phosphor are eliminated and thus a significant increase in sensitivity is achieved due to better signal-to-noise (S/N) ratio, particularly at low doses.

In OSL the defects are stimulated by the light in the visible/IR region and as a result, release of either the electron or hole and subsequent capture at the recombination centre leads to emission of radiation which is generally at shorter wavelength compared to the wavelength of the stimulating radiation. The general requirement for material to be a good OSL phosphor is that the emission should be in between 350 and 425 nm and the defects should have high photo-ionization cross-section in blue-green region (450-550 nm) or IR region (650-800 nm). This limit on wavelength is due to availability of suitable filters, stimulation sources as well as sensitive PM tubes in this range, and most importantly the requirement of separation of stimulating wavelength from the emission wavelength which ensures better signal to noise ratio. Both the stimulation and emission spectra are characteristic of the phosphor. Blue excitation is needed for phosphors like Al_2O_3:C [3], BeO [4] and $LiMgPO_4$:Tb [5] green excitation for MgO:Tb [6], Y_2SiO_5 [7], Porcelain [8] red for KBr:Eu [9] and IR excitation for feldspar [10]. Even for Al_2O_3:C some workers prefer green excitation over blue [11]. Hence, a versatile OSL reader should incorporate a variety of excitation sources.

Mr. S. T. Rathod

International Journal of Scientific Research in Science and Technology
Print ISSN: 2395-6011 | Online ISSN: 2395-602X (www.ijsrst.com)
doi : https://doi.org/10.32628/IJSRST218328

Synthesis and Characterization of Conducting Polymer

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Article Info
Volume 8, Issue 3
Page Number : 113-116

Publication Issue
May-June-2021

Article History
Accepted : 07 May 2021
Published : 13 May 2021

ABSTRACT

In recent technology, considerable attention was given to the fabrication of light weight rechargeable batteries, electro chromic display devices, microelectronics, sensor and molecule design etc. As one of the most important conducting polymers, polyaniline because of its chemical stability and relatively high conductivity and its derivatives have been extensively studied in different fields of science, because of the demand for high performance materials in advanced technologies. However, the common uses of polyaniline are restricted, due to its poor process ability and low solubility. Various techniques were given for synthesis of conducting polymer. In the current studies, polyaniline (PANI) and its composites with semiconductor was prepared chemical oxidation method in the presence of different bronsted acids from aqueous solutions. The effect of thermal treatment on electrical conductivity (DC), of the pure PANI, PANI+10%, 15% and 20% $MnSO_4$ conducting polymers were investigated. It is found that conductivity of PANI enhancing due to stretching polymeric chain cause due to interaction with $MnSO_4$.

Keywords : Conducting polymer, DC Conductivity

I. INTRODUCTION

In the last two decades the field of conducting polymers has shown tremendous growth and it is now an important field of research, the conducting polymer when functionalized with other conjugate system can be very useful; in many applications. As seen in the literature survey the functionalization with macrocyclic molecules has been mainly used in electrode preparation for reduction of oxygen, the detailed study on functionalization of conducting polymers such as polyaniline with $MnSO_4$ is now reported so far. In order to have better understanding of physics of this material the present work was undertaken. The investigation are mainly clamed at looking at the structural changes taking place due to incorporation of $MnSO_4$and the effect of $MnSO_4$ on properties such as electrical conductivity, frequency response, and dielectric constant of the resulting polymer composite. In the present investigation, one

Dr. S. S. Bhonsale

B.Aadhar' International Peer-Reviewed Indexed Research Journal
Impact Factor - (SJIF) -7.675,Issue NO, 278 (CCLXXVIII) A
ISSN : 2278-9308
March, 2021

Prof. D. V. Nandanwar

Journal of Luminescence 235 (2021) 118017

Contents lists available at ScienceDirect

Journal of Luminescence

journal homepage: http://www.elsevier.com/locate/jlumin

Colour tuning of garnet phosphor through codoping

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ARTICLE INFO

Keywords:
Garnet
Photoluminescence
Phosphor
Silicate
Codoping

ABSTRACT

$Ca_3Sc_2Si_3O_{12}:Ce^{3+}$ is a well known green emitting phosphor for two phosphor converted LED lamp. It is shown that the emission colour can be tuned with the help of various co-dopents. For obtaining safer cyan emitting phosphor, partial substitution of Si by Ge found to be effective. Pr codoping is responsible for the addition of red component. The partial substitution of Y at Ca site and Mg at Sc site is the novel step into the work. This substitution converts the cyan emitting phosphor into yellow one. The colour changes are illustrated by calculating colour coordinates. Na codoping facilitates incorporation of the trivalent activator at Ca^{2+} site, as well as the grain growth, and enhances the PL intensity without changing emission colour. Addition of Cyan emitting phosphor in the blend can be useful for achieving super Colour Rendition Index (CRI > 95). Extended excitation in the violet region will result in removal of the harmful wavelengths from the LED lamp.

1. Introduction

Invention of blue LED based on nitride semi-conductors by Shuji Nakamura in 1994 provided great impetus to research in luminescence [1]. This was made possible by vital developments in growth of p-type doped GaN on sapphire substrates by Isamu Akasaki and H. Amano in Nagoya [2]. Initial efforts were directed towards obtaining phosphors which can be excited by blue light and generate white light when coated on blue LED [3,4]. Solid state lighting was the theme of many investigations in the field [5–10]. This aspect was highlighted even by the Nobel committee considering its widespread applications [11]. In the first LED lamp, yellow emitting YAG:Ce phosphor was used to generate white light. For improving colour rendition index (CRI) and correlated colour temperature (CCT), combination of red and green phosphors is envisaged.

Though solid state lighting is the most highlighted application of blue LED, its use is not limited to production of white light alone. Several other applications such as green house lighting [12,13], backlight for LCD displays [14], optical disc memories [15], signage [16], projector lamps [17], vehicle headlamp [18], fishing [19], solar simulator [20], radiation dosimetry using optical stimulation [21], hyperbilirubinemia treatment [22] make use of blue LED. Earlier studies were related to finding red, green, blue, yellow emitting phosphors for constructing white LED lamp. These lamps make use of the fact that human vision is tricolor and hence the need for phosphors emitting in primary or complimentary colors. Phosphors with different requirements are needed in applications other than household lighting. In applications like solar simulator and spectrophotometer lamps sources with "true" white emission are needed. Thus, phosphors with different colour coordinates and excitation in the blue region need to be developed.

Ce^{3+} activated $Ca_3Sc_2Si_3O_{12}$ introduced by Shimomura et al. [23], is a green emitting phosphor which can replace phosphors like $SrGa_2S_4:Eu^{2+}$ [24], $BaSrSiO_4:Eu^{2+}$ [25], $LuAG:Ce^{3+}$ [26]. Various substitutions at Ca and Sc sites can shift the emission to yellow region [27–29]. We have further studied colour tunability of this phosphor by using various codopents. Partial replacement of Si by Ge resulted in blue shift leading to cyan emitting phosphor which can be attributed to lattice expansion and in turn reduction in the crystal field. On the other hand, further substitutions by Y at Ca site and Mg and Sc site resulted in red shift, which in turn gives yellow emitting phosphor indicating strengthening of the crystal field. For getting red component, $Ce^{3+} \rightarrow Pr^{3+}$ energy transfer was successfully studied. Doping by Na did not change emission colour, but increased intensity by facilitating Ce^{3+} incorporation.

2. Experimental

Details of the experimental procedure can be found elsewhere [30]. "$Ca_3Sc_2Si_{1.5}Ge_{1.5}O_{12}:Ce^{3+}$ was synthesized by the conventional solid

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https://doi.org/10.1016/j.jlumin.2021.118017
Received 29 July 2020; Received in revised form 10 January 2021; Accepted 28 February 2021
Available online 3 March 2021

https://www.researchgate.net/publication/349842958_Colour_Tuning_of_Garnet_Phosphor_through_Codoping

Dr. P. U. Gajbe

RESEARCH ARTICLE Agricultural Science Digest, Volume 41 Special Issue: 211-214 (April 2021)

Urban Rooftop Farming – Model for Sustainable Vegetable Production and Environmental Well-being

Pawan U. Gajbe

10.18805/ag.D-5215

ABSTRACT

Background: Urban rooftop farming is a form of urban agriculture. Due to the scarcity of agricultural land in urban areas, rooftop farming is becoming popular in many countries. An experiment was conducted to grow herbs and vegetables in a small and sustainable urban rooftop farm in Nagpur City, India and the various ecological benefits of this form of urban agriculture were studied.

Methods: The experiment was conducted on a 230 sq ft rooftop area from July 2019 to March 2020. Environment friendly cultivation methods employed in the study include pest management by cultural means to produce pesticide-free vegetables, conversion of household green waste into compost for augmentation of soil nutrients and the use of harvested rain water and greywater for irrigation.

Result: The experiment resulted in the production of 61.7 kg of pesticide-free vegetables from an area of 230 sq ft using sustainable farming methods. Apart from this, the various ecological benefits obtained from the experiment point to the fact that sustainable urban rooftop farming can be an innovative means to promote urban agriculture without harming the environment.

Key words: Rooftop farming, Sustainable agriculture, Urban agriculture.

INTRODUCTION

In an uncertain future of climate change and constrained resources, urban agriculture is widely viewed as a sustainable and scalable approach to improving food security (Pollard *et al*., 2017). Urban rooftop farming is a form of urban agriculture. It is primarily concerned with the cultivation of plants on the rooftops of buildings in urban surroundings. Urban rooftop farming favours local food production (Sanyé-Mengual *et al*., 2015a). It is a practice that is well-suited to enhancing food security in cities and reducing the environmental impact that results from long transportation distances that are common in conventional agriculture (Buehler and Junge, 2016).

The population of India is growing at a fast pace. This is a thing of great concern, as agricultural land resources are limited and conventional agricultural production can be increased only to a certain extent. Hence, there is a need for new and innovative strategies for increasing the production of food crops without any harmful effects on the environment. It could be a good option for local authorities to promote rooftop farming (Grard *et al*., 2015). If urban rooftops are judicially used for cultivating edible plants, several tonnes of produce could be harvested through rooftop farming in the cities. Urban and peri-urban agriculture could play an important role in safeguarding livelihoods and urban food security (Maconachie *et al*., 2012).

Regarding the management of urban rooftop farms, crop planning may focus on selecting the vegetables with higher crop yield and establishing crop periods to produce year-round, while reducing the environmental impacts and economic costs of crops (Sanyé-Mengual *et al*., 2015a). There are economic, social and environmental opportunities of local and efficient food production through innovative urban rooftop farming (Sanyé-Mengual *et al*., 2015b).

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How to cite this article: Gajbe, P.U. (2021). Urban Rooftop Farming – Model for Sustainable Vegetable Production and Environmental Well-being. Agricultural Science Digest. 41 (Special Issue): 211-214. DOI: 10.18805/ag.D-5215.

Submitted: 16-05-2020 **Accepted:** 21-09-2020 **Online:** 18-12-2020

MATERIALS AND METHODS

Study area

Nagpur City (Coordinates: 21°9' N 79°5' E) is located in Maharashtra State in Central India. The rooftop farming experiment was carried out on the concrete rooftop of the author's house in Nagpur from July 2019 to March 2020 (Fig 1). Out of the total rooftop area of 900 sq ft available, approximately 230 sq ft area was used for cultivating edible plants.

Materials used

Sixteen types of edible plants were cultivated as depicted in (Table 1). The plants were grown in clay pots and grow bags of suitable sizes depending on the type of plant. Common garden soil was used for cultivation. The soil depth was maintained at 8-25 inches depending on plant size. Pots/ containers of diameters 9, 12 and 15 inches were used for cultivation and were filled with about 4.5 kg, 7 kg and 10 kg mixture of soil and compost, respectively.

Cultivation method

Plants were cultivated directly from seeds except onion, garlic, lemongrass and mint. Plants of the same type were

http://arccarticles.s3.amazonaws.com/arcc/Attachment-at-accept-article-D-5215.pdf

Dr. P. U. Gajbe

Sarkar (2021) vol. 17(4): 394-399.

Orb-Web spiders (Arachnida: Araneae) of Maharashtra State, India

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Abstract

Orb web spiders, a familiar feature of terrestrial ecosystems, are much admired for their intricate spiral wheel-shaped webs. Maharashtra is a State occupying the Central and Western regions of India. A checklist of the orb web spiders of Maharashtra has been prepared, which consists of 73 species in 24 genera of two families, Araneidae and Tetragnathidae. Of these, 61 species in 19 genera belong to family Araneidae and 12 species in 5 genera belong to family Tetragnathidae.

Keywords: Araneidae, Tetragnathidae, orb weaver, biodiversity, fauna, India.

Introduction

Spiders are an integral part of terrestrial ecosystems. Research into spider biology, particularly the diversity of silk, webs, and venoms, together with the associated ecology and behaviours, has greatly increased in recent decades (Gillespie & Spagna, 2009). Web-building spiders are forming an important model system to address questions in a variety of biological fields. They are attractive because of their intriguing biology and because they can be fairly easily collected and maintained in the laboratory (Zschokke & Herberstein, 2005). Orb web spiders are ubiquitous predators in terrestrial ecosystems. They are classified in two families of Araneae, namely Araneidae Clerck, 1757 and Tetragnathidae Menge, 1866. The common orb weavers belong to Araneidae, whereas, orb weavers belonging to Tetragnathidae are commonly known as long-jawed orb weavers on account of their long chelicerae. Orb webs are composite structures built from multiple types of silk, each with its own unique molecular structure and mechanical

Dr. P. U. Gajbe

Arthropods, 2021, 10(2): 60-65

Article

Impact of a small artificial water source on the diversity of odonates (Insecta : Odonata) in an urban landscape

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Received 22 December 2020; Accepted 30 January 2021; Published 1 June 2021

Abstract
Rapid urbanisation is mainly responsible for the degradation and fragmentation of natural ecosystems in urban areas. Dragonflies and damselflies (Odonata) constitute an important part of urban biodiversity. The odonate larval stage is aquatic and being dependent on freshwater ecosystems, odonates are often used as ecological indicators for such ecosystems. Both larval and adult odonates are carnivorous and prey on other insects including mosquitoes. Hence, they perform an important role as predators in the ecosystems where they are found. In this study, the impact of a small artificial water source on the diversity of odonates in an urban landscape has been evaluated. The impact of the water source was found to be positive as its availability resulted in an increase in odonate diversity.

Keywords damselfly; dragonfly; Odonate; urban biodiversity.

Arthropods
ISSN 2224-4255
URL: http://www.iaees.org/publications/journals/arthropods/online-version.asp
RSS: http://www.iaees.org/publications/journals/arthropods/rss.xml
E-mail: arthropods@iaees.org
Editor-in-Chief: WenJun Zhang
Publisher: International Academy of Ecology and Environmental Sciences

1 Introduction

The Odonata, that is dragonflies and damselflies are very familiar insects, as they are colourful, relatively larger than other insects, diurnal, and can be easily observed flying around freshwater bodies and nearby land areas (Thorp and Rogers, 2011). Odonates have large eyes with many ommatidia, which is an adaptation for the detection of movement. Odonates use their keen eye sight to catch living prey (Tennessen, 2009).

Odonates are aquatic as larvae and terrestrial as adults, and hence can be used as bioindicators in both aquatic and terrestrial habitats (Oertli, 2008). Odonates are ideal for studying movement through the landscape, as their adult stage exhibits high dispersal ability and is very conspicuous (Conrad et al., 1999). Being exclusively carnivorous and mostly preying on other insects, odonates play an important role as predators in the natural food web. Odonate larvae are known to prey on mosquito larvae, and this is a good example of biological control in nature (Saha et al., 2012). When foraging, dragonflies can be categorized as "perchers" or "fliers." Perchers spend much of their time stationary, making short flights from perches to capture prey and

http://www.iaees.org/publications/journals/arthropods/articles/2021-10(2)/diversity-of-odonates.pdf

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Arthropods, 2020, 9(4): 171-174

Article

First record of some jumping spiders (Arachnida: Araneae: Salticidae) from Pench National Park, Maharashtra State, India

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Received 19 May 2020; Accepted 25 June 2020; Published 1 December 2020

Abstract
Spiders are one of the most familiar and studied groups of arthropods. They are ubiquitous in most terrestrial ecosystems preying on other arthropods as well as their own type. Jumping spiders belong to family Salticidae and constitute the largest family of spiders. While studying animal diversity in Pench National Park, Maharashtra State, India, five species of jumping spiders were identified, which have not been previously described from the study area. These five species of jumping spiders, namely, *Hasarius adansoni*, *Menemerus bivittatus*, *Plexippus paykulli*, *Plexippus petersi*, and *Telamonia dimidiata* are new records for Pench National Park, Maharashtra.

Keywords Arachnida; Araneae; jumping spiders; Pench; Salticidae.

Arthropods
ISSN 2224-4255
URL: http://www.iaees.org/publications/journals/arthropods/online-version.asp
RSS: http://www.iaees.org/publications/journals/arthropods/rss.xml
E-mail: arthropods@iaees.org
Editor-in-Chief: Wenjun Zhang
Publisher: International Academy of Ecology and Environmental Sciences

1 Introduction

Family Salticidae is the largest family of spiders with over 6000 species. These spiders are commonly known as jumping spiders and possess some of the best vision among arthropods. Jumping spiders of the family Salticidae have well-developed eyes, which mediate their highly stereotyped predatory and communicative behaviour (Clark and Uetz, 1990). While moving, most species are capable of jumping very well, which gives them their common name. The largest numbers of species are found in tropical region, however, they are also found in temperate region and desert. They are generally diurnal and active hunters.

In India, not much work has been done on recording the diversity of jumping spiders and most of the Indian jumping spider species remain unknown. Pench National Park is a prominent conservation area in Central India spanning two states, Madhya Pradesh and Maharashtra. Previously, 15 species of spiders have been reported from Pench National Park, Madhya Pradesh (Gajbe, 2004) and 31 species of spiders have been recorded from Pench National Park, Maharashtra (Bastawade, 2004). None of these two studies have reported any spiders from family Salticidae. Hence, the present study is the first record of jumping spiders from Pench National Park, Maharashtra.

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Published online 23 October 2020 *Nucleic Acids Research, 2021, Vol. 49, Database issue* ***D1225–D1232***
doi: 10.1093/nar/gkaa923

IndiGenomes: a comprehensive resource of genetic variants from over 1000 Indian genomes

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Received August 10, 2020; Revised October 01, 2020; Editorial Decision October 02, 2020; Accepted October 22, 2020

ABSTRACT

With the advent of next-generation sequencing, large-scale initiatives for mining whole genomes and exomes have been employed to better understand global or population-level genetic architecture. India encompasses more than 17% of the world population with extensive genetic diversity, but is underrepresented in the global sequencing datasets. This gave us the impetus to perform and analyze the whole genome sequencing of 1029 healthy Indian individuals under the pilot phase of the 'IndiGen' program. We generated a compendium of 55,898,122 single allelic genetic variants from geographically distinct Indian genomes and calculated the allele frequency, allele count, allele number, along with the number of heterozygous or homozygous individuals. In the present study, these variants were sys-

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https://doi.org/10.1093/nar/gkaa923

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B.Aadhar International Peer-Reviewed Indexed Research Journal
Impact Factor - (SJIF) –7,675,Issue NO, 278 (CCLXXVIII) D
ISSN : 2278-9308
March, 2021

Seasonal Histomorphological Changes In The Testes Of *Channa Striata*

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Abstract

Striped snakehead, *Channa striata* is commonly known as mural (murrel). Due to its air breathing habit and hardy nature,it is found quite frequently in shallow or deep parts of rivers, lakes etc., with or without aquatic vegetation throughout India. Striped snakehead*C. striata* breeds annually in the natural water bodies. The sequence of spermatogenesis in *C. striata* is morphogically and histologically divided into 5 stages viz. resting, preparatory, pre-spawning, spawning and post-spawning. The testicular cycle of *C. striata* from Nagpur region are workout. The fish spawn only once in a year in this region. *C. striata* the testes are paired which are elongated flattened structures, situated on either side, ventral to the kidneys in the posterior region of the abdominal cavity. The testes remain attached to the body wall by means of mesorchia. They are equal in size. Sperm duct join posteriorly to open into the urinogenital papilla. Each testis contains numerous spermatozoa of different stages of development and degeneration. The wall of the testes is fairly thick during non-breeding season but become thin and highly vascular during spawning period. The testes were processed by standard histological technique. Histological characteristics of testes show well differentiated stages (i-iv) of maturation.

Keywords: - testes, histology, *Channa striata*

Introduction

Snakehead, *Channastriata* (Bloch, 1793)is hardy fish because of its air breathing habit. The biological process, especially the reproductive biology is the most important factor concerning the successful management of fisheries and mobilization of seed resources. Teleost are annual breeder, biannual breeder or multiple breeder depending upon the occurrence of egg laying. According the reproductive cyclical changes ensued in the gonads of fish. Depending upon the gonado-somatic index different phases were reported in reproductive cycle of teleosts. These phases described differently in several teleosts by different names. Thus reproductive cycle could be divided into resting phase,preparatory phase,prespawing phase,spawning phase and postspawning phase in *Labeo rohita* (Sonarghare,2010),*Heteropneustes fossilis* (Sonparote,2010) and in *Channa punctate punctate* (Salame and Masram,2019) . Teleosts exhibit variations in testicular structure and spermatogenic patterns.(Grier ,1998).

Material and Methods