

Isolation and Identification of Aeromycoflora in Banana Field from Baramati Area Dist. Pune, Maharashtra, India

Research Article

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Abstract

The present investigation deals with the isolation and identification of aeromycoflora of Banana field from Baramati Area, District Pune, Maharashtra (India). The area was selected because banana crop fields one of cash earning crops in mentioned survey area. Aeromycoflora which is refers to the airborne fungal spores in the atmosphere. A large number of airborne microfungi particles or spores were found in outdoor or open crop fields and generally widely distributed in nature. The assessment of aeromycoflora in banana crop fields was performed during month of August-2019 to February-2020. The culture plate exposure method was carried out for the isolation of fungal species. This aeromycological study shows total 23 fungi belongs to members from sub-division Ascomycotina, that was found 34.78% and were most frequent followed by Deuteromycotina 26.08%, Mastigomycotina 17.39%, Zygomycotina 8.69%, Basidiomycotina 8.72% and least member from sub-division Myxomycotina 4.34% were also reported. These studies in relation to phytopathology will put forth much useful results for implementation of cheaper and better preventive measures.

Keywords: Fungi; Aeromycoflora; Banana; Spores

Introduction

The study of aeromycology is essential in plant pathology and in disease forecasting of plant diseases [1]. Aeromycology is part of plant pathology which deals with study of fungal flora in air. The term aerobiology was coined by American plant pathologist Fred Campbell Meier. Investigated the aeromycology studies include not only fungal spores liberation from the sources [2,3], transport and deposition, but also their effects on plants, animals, humans and even over food, building, working places etc. Sharma, (2004) investigated that bioparticulates implicated to cause allergic symptoms are pollen grains, fungal spores, insect debris, house dust mites, animal dander, chemicals and foods etc. Among all these agents, pollen grains and fungal spores are the most predominant allergens in the indoor and outdoor places. Stated that information of concentrations of airborne fungal spores is especially important for agricultural and

occupational medicine [4]. The present investigation was undertaken to study aeromycoflora Isolation and Identification of Aeromycoflora of Banana (*Musa paradisiaca*) crop field from Baramati Area of Pune district by using culture plate exposure method. Effect of different concentrations of pH of Potato Dextrose Agar (PDA) medium on growth of aeromycoflora was also studied.

Materials and Methods

Potato Dextrose Agar plates were prepared as per the standard protocols at 5.0 to 8.0 pH concentrations Exposing media plates at centre and border at of the Banana crop fields at 2.5 ft. height from the ground level for 10 min. Exposed plates were kept for incubation for 1 to 2 weeks. After incubation photography of plates were done and fungal material slides were prepared using cotton blue stain and lactophenol as mounting medium. Slides were observed under light microscope and micro-photography was done. Fungal genera

were identified on the basis of morphological characters of conidia and conidiophores identified using standard literature and classified according to classification [5].

Percentage contributions of individual species were calculated as per the standard formula:

$$\% \text{ of Contribution} = \frac{\text{Total No. of colonies of One species}}{\text{Total No. of colonies of all species}} \times 100$$

Results and Discussion

In the present study total 23 fungal genera were recorded from the 6 sub-divisions. Among these 01 member belong to sub-division Myxomycotina, 04 from Mastigomycotina, 02 from Zygomycotina, 08 from Ascomycotina, 02 from Basidiomycotina and 06 belongs to subdivision Deuteromycotina and some conidia, clamydospores and hyphal fragments also recorded. The aeromycological study shows that members from sub-division Ascomycotina was found 34.78% and were most frequent followed by Deuteromycotina 26.08%, Mastigomycotina 17.39%, Zygomycotina 8.69%, Basidiomycotina 8.72% and least member from sub-division Myxomycotina 4.34% were present (Table 1). In the above listed members majority are plant pathogens, which causes various diseases in plants. *Alternaria*, *Microdochium*, *Ascochyta*, *Phytophthora*, *Exserohilum*, *Helminthosporium*, *Cercospora*, *Puccinia*, *Sphacelotheca*, *Plasmopara*, *Colletotrichum* and *Drechslera* are plant pathogenic fungi found on large scale. Rust disease is caused by *Puccinia* and the spores of these fungi were found in the investigation.

From the genera found some members are also allergic to humans and animals such as *Alternaria*, *Aspergillus*, *Fusarium*, *Penicillium*, *Rhizopus* and *Mucor*. *Alternaria* causes asthma and skin lesions and ulcers are caused by *Aspergillus* in humans and animals.

The present attempt also emphasized on effect of different pH concentrations of PDA medium on growth of fungi. Total 11 pH concentrations were selected from pH 6.0 to 8.0. Among this 7.2 pH concentration was most favour for the fungal growth at the same time 8.0 pH concentrations resulted very less growth of fungi. It is interesting to quote that *Alternaria* fungi can grow at various pH ranges viz. 6.0, 6.2, 6.4, 6.8, 7.0, 7.2, 7.4 and 7.6.

In Maharashtra, about 55000 hectares of land is under cultivation of banana crop. Banana (*Musa paradisiaca*) the agriculturally very important crop at Baramati region, Pune. The dominant genera of fungi found were *Cladosporium*, *Curvularia*, *Alternaria*, smut, and rust, *Helminthosporium*, *Cercospora* and *Nigrospora*. Noticed that *Alternaria*, *Puccinia*, *Cercospora*, *Helminthosporium*, *Colletotrichum* and *Fusarium* are plant pathogenic fungi and are found throughout the year over agricultural fields and infects the healthy crop [6]. Found that the spores of *Alternaria*, *Aspergillus*, *Cladosporium*, *Curvularia*, *Helminthosporium*, *Mucor*, *Penicillium* and *Rhizopus* were the major component in the air of Gorakhpur, UP [7]. The number of fungi collected showed the gradual decrease region to region.

In India *Alternaria*, *Rhizopus*, *Helminthosporium*, *Aspergillus*, *Cladosporium* and *Curvularia* are allergic fungi and cause various diseases in plants as well as in humans according to Shivpuri (1982). Found that the spores of *Alternaria*, *Aspergillus*, *Cladosporium*, *Curvularia*, *Helminthosporium*, *Mucor*, *Penicillium* and *Rhizopus* were the major component in the air of Gorakhpur, UP [7]. The number of fungi collected showed the gradual decrease region to region.

According to [8], plant diseases of different crops have been studied by various investigators through the aerobiological studies.

Table 1: List of fungi isolated from Banana field using PDA medium of different pH concentrations.

Sr. No.	Fungi	Sub-Division	pH Concentration	Occurrence (%)
1.	<i>Physarum</i> sp.	Myxomycotina	6.6	4.34%
2.	<i>Albugo</i> sp.	Mastigomycotina	7.0, 7.2	17.39%
3.	<i>Peronosclerospora</i> sp.	Mastigomycotina	6.8, 7.0	
4.	<i>Phytophthora</i> sp.	Mastigomycotina	6.4, 7.0	
5.	<i>Plasmopara</i> sp.	Mastigomycotina	6.6, 7.2	
6.	<i>Mucor</i> sp.	Zygomycotina	6.8, 7.0, 7.2	8.69%
7.	<i>Rhizopus</i> sp.	Zygomycotina	7.0, 7.2	
8.	<i>Ascochyta</i> sp.	Ascomycotina	6.4, 6.8	34.78%
9.	<i>Bipolaris</i> sp.	Ascomycotina	6.2, 6.6	
10.	<i>Drechslera</i> sp.	Ascomycotina	7.6	
11.	<i>Exserohilum</i> sp.	Ascomycotina	7.6	
12.	<i>Helminthosporium</i> sp.	Ascomycotina	7.8, 8.0	
13.	<i>Microdochium</i> sp.	Ascomycotina	7.0, 7.4	
14.	<i>Sphacelotheca</i> sp.	Ascomycotina	6.6, 6.8, 7.0, 7.2	
15.	<i>Trichoderma</i> sp.	Ascomycotina	6.6, 7.0	
16.	<i>Cryptococcus</i> sp.	Basidiomycotina	7.2	8.72%
17.	<i>Puccinia</i> sp.	Basidiomycotina	6.0, 6.4	
18.	<i>Alternaria</i> sp.	Deuteromycotina	6.0, 6.2, 6.4, 6.8, 7.0, 7.2, 7.4, 7.6	26.08%
19.	<i>Aspergillus</i> sp.	Deuteromycotina	6.4, 7.6	
20.	<i>Cercospora</i> sp.	Deuteromycotina	6.6, 6.8	
21.	<i>Colletotrichum</i> sp.	Deuteromycotina	6.8, 7.2	
22.	<i>Fusarium</i> sp.	Deuteromycotina	6.6, 7.8, 8.0	
23.	<i>Penicillium</i> sp.	Deuteromycotina	7.4, 7.8	

As well as many respiratory and cutaneous allergic diseases are caused by many fungal species. Reported that the *Alternaria* contaminate variety of crops in the field and causes variety of post-harvest decays in fruits and grains and also it is the most common pathogen on the cereals [9], vegetables and weeds. *Cercospora* sp., *Helminthosporium* sp., *Ramulariaareola*, and *Alternaria* sp. were reported pathogenic to the cotton crop by Ahmedapur, Maharashtra. Investigated air borne *Penicillium* in different environments of Nagpur area and concluded that its high percentage in the air as a potential risk factor for allergic disorders to people reside nearby [10,11].

Conclusion

The aerobiological survey was undertaken to understand the qualitative and quantitative incidence of fungal spores over Banana field. During the present investigation 23 fungal genera were recorded over a Banana field in different pH concentrations. Maximum number of fungal spore was registered in August and minimum in January. From these genera some are plant pathogens, some are allergic to humans and animals and some are saprophytic in nature. The fungal genera were varying according to different pH concentrations of PDA medium. These attempts are useful in forecasting of fungal diseases over Banana field in Baramati area and to control these diseases to reduce crop yield losses.

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