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Research Article



Aeromycoflora over jowar and pomegranate fields at Baramati, Dist. Pune (M. S.)

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Abstract

Incidence of Aeromycoflora over the jowar and pomegranate fields at Baramati (Pune), Maharashtra was carried by using petriplates exposing method during August, 2016 to February, 2017. Total 34 fungi belongs to Myxomycotina (5.88%), Mastigomycotina (11.76%), Zygomycotina (5.88%), Ascomycotina (50.00%), Basidiomycotina (5.88%) and Deuteromycotina (20.58%) were reported. In addition to fungal spores thallospores, smut spores, ascospores, conidia and hyphal fragments were also reported.

INTRODUCTION

Aeromycology is branch of Botany which deals with study of fungal flora in air. Aeromycology studies include not only fungal spores liberation from the sources, transport and deposition, but also their effects on plants, animals, humans and even over food, building, work of art etc. (Patil, 2016). The numbers of fungal spores are present in indoor as well as outdoor environment. According to Singh and Dahiya (2008), there are more than 80,000 species of fungi and these have evolved with elaborate mechanisms for their dispersal. The content of fungal spores in air is depending on climatic conditions and seasonal variation. Due to small size, fungal spores remain suspended in the atmosphere for a long time and causes number of plant diseases, respiratory disorders (Woolcock *et al.*, 2001) and many other allergic ailments. Kasprzyk (2008) stated that, knowledge of concentrations of airborne fungal spores is especially important for agricultural and occupational medicine. The information of air borne fungal flora in Baramati area of Pune district is not

yet studied, so this work is being carried out for the first time in our area. The present investigation is carried out to find out different types of fungal spores and their seasonal variation in jowar and pomegranate fields in Baramati (Pune), Maharashtra using nutrient media plates exposing method. This piece of work will act as guidelines for future research in aerobiology.

MATERIALS AND METHODS

Czapek Dox Agar (CDA) pH range 6.0 to 8.0 and Sabouraud Dextrose Agar (SDA) pH range 5.0 to 7.0 plates were prepared as per the standard protocols. Air sampling were done by exposing media plates at border and at centre of the selected crop fields at 3 ft height from the ground level for 5 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. Fungi were identified using standard literature and classified according to classification of G. C. Ainsworth (1973).

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RESULTS AND DISCUSSION

During the aeromycological investigation 34 fungal genera were noticed over jowar and pomegranate fields. Among these 02 fungi from Myxomycotina, 04 from Mastigomycotina, 02 from Zygomycotina, 17 from Ascomycotina, 02 from Basidiomycotina and 07 from Deuteromycotina were reported. Along with identified fungal spores many thallospores, smut spores, ascospores, conidia and hyphal fragments also reported (Table 1 & 2). Effect of pH concentrations of nutrient media on the growth of aeromycoflora was also studied. On CDA medium plates *Physarum* sp., *Drechslera* sp., *Exserohilum* sp. and *Cryptococcus* sp. were grown only on one pH concentration i.e. 6.6, 7.6, 7.6 and 7.2 respectively over jowar fields (Table 1). On SDA medium plates *Thielaviopsis* sp., *Trichocladium* sp., *Trichoconis* sp., *Spegazzinia* sp. and *Helminthosporium* sp. were grown only one pH concentration i.e. 5.6, 6.2, 5.8, 5.4 and 5.6 respectively over pomegranate fields (Table 2). *Alternaria* sp. (6.0, 6.2, 6.4, 6.8, 7.0, 7.2, 7.4 and 7.6 pH) and hyphal fragments (6.0, 6.2, 6.6, 7.2, 7.4 and 7.8 pH) were grown on maximum ranges of pH concentrations of CDA medium over jowar fields on the contrary, *Aspergillus* sp. (5.0, 5.6, 5.8, 6.4 and 7.0 pH), smut spores (5.2, 5.6, 6.2, 6.4, 6.8 and 7.0 pH) and hyphal fragments (5.0, 5.2, 5.4, 5.6, 5.8, 6.6 and 7.0 pH) were grown on maximum ranges of pH concentrations of SDA medium over pomegranate fields.

Several factors are responsible for to reduce the yield of crop plants among which fungal diseases are found to be destructive as it reduces the quality and quantity of the crop (Lohare *et al.*, 2009). Aeromycological investigations over jowar fields for kharif seasons in Barshi area of Solapur district, Maharashtra were undertaken by Patil *et al.* (2016a) and found 61 spore types including 30 forms of Deuteromycotina, 20 forms of Ascomycotina, 04 Mastigomycotina, 03 Zygomycotina, 02 Basidiomycotina and 01 of Myxomycotina. The 5 biocomponents *viz.* hyphal fragments, insect scales, pollen grains, trichomes and unidentified spores were reported by Karne (2013) from agricultural fields and their contribution to the total airspora was over jowar field (2758/m³, 2.4%), wheat field (7112/m³, 5.4%), groundnut field (4984/m³, 3.7%) and maize field (2198/m³, 2.8%). The fungal aerospora over the jowar fields at Barshi (Dist. Solapur, Maharashtra, India) was studied by Patil and Mali

(2017). They carried out fungal survey for one year from June, 2015 to January, 2016 for two consecutive seasons i.e., kharif and rabi. In the study season 57946 spores/m³ were captured from kharif season while 37870 spores/m³ from rabi season. The most occurring species were *Alternaria*, *Plasmopara*, *Physarum*, uredospores, *Leptosphaeria*, *Cladosporium* etc. The fungal spore incidence inside a warehouse was studied by exposing PDA culture medium plates for a period of five months by Kulkarni and Karne (2010) and isolated 333 colonies these were assigned to 16 genera with 13 genera of Deuteromycotina (82.83%), 3 to mycelia sterile (9.99%), 2 to Zygomycotina (4.20%) and 1 to Ascomycotina (1.20%). According to Khedkar and Nasreen (2010) *Cladosporium* was dominated to the airspora composition and contributed (20.55%) followed by *Alternaria* (7.23%), *Nigrospora* (5.99%), *Curvularia* (5.78%), rust spores (5.4%), *Periconia* (5.35%), hyphal fragments (4.74%), basidiospores (4.31%), *Helminthosporium* (4.07%), *Pseudotrulla* (2.50%) from bajra and jowar fields at Kada (M.S.).

In Maharashtra, 25000 hectares of land is under cultivation of pomegranate. However, it is subjected to various air borne fungal diseases like leaf spot disease, caused by *Curvularia*, fruit rot caused by *Colletotrichum*, spot on fruits caused by *Cercospora*, burning of fruits and leaves by *Alternaria alternata* (Aher *et al.*, 2015). The aerobiological survey was undertaken to understand the qualitative and quantitative incidence of fungal spores over pomegranate field was done by Aher *et al.* (2015). They found 42 spore types of Deuteromycetes to the total air spora. Percentage contribution of each spore type of Deuteromycetes to the total air spora revealed that *Cladosporium* contributed the highest toll (29.49%) followed by *Epicoccum* (9.27%), *Nigrospora* (2.86%), *Alternaria* (2.30%), *Botrytis* (2.18%), *Botrydipodia* (2.00%).

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Table - 1 : List of fungi recorded from jowar field using CDA medium of different pH concentrations

Sr. No.	Fungi	Sub-Division	pH Concentration
1.	<i>Physarum</i> sp.	Myxomycotina	6.6
2.	<i>Albugo</i> sp.	Mastigomycotina	7.0, 7.2
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
7.	<i>Rhizopus</i> sp.	Zygomycotina	7.0, 7.2
8.	<i>Ascochyta</i> sp.	Ascomycotina	6.4, 6.8
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, 6.8, 7.0
16.	<i>Cryptococcus</i> sp.	Basidiomycotina	7.2
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
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
24.	Conidia	Ascomycotina	6.2, 6.8, 7.0
25.	Clamydospores (Thallospores)	Basidiomycotina, Zygomycotina	6.0, 6.4, 6.6
26.	Hyphal fragments	-	6.0, 6.2, 6.6, 7.2, 7.4, 7.8

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Table 2 : List of fungi recorded from pomegranate field using SDA medium of different pH concentrations

Sr. No.	Fungi	Sub-division	pH concentrations
1	<i>Physarum sp.</i>	Myxomycotina	6.4, 6.8, 7.0
2	<i>Stemonitis sp.</i>	Myxomycotina	5.2, 5.4
3	<i>Albugo sp.</i>	Mastigomycotina	5.4, 5.8
4	<i>Mucor sp.</i>	Zygomycotina	5.4, 6.2, 6.6
5	<i>Rhizopus sp.</i>	Zygomycotina	5.6, 6.2
6	<i>Nigrospora sp.</i>	Ascomycotina	5.4, 5.6, 6.2
7	<i>Botrytis sp.</i>	Ascomycotina	6.2, 6.4, 7.0
8	<i>Drechslera sp.</i>	Ascomycotina	5.0, 5.6
9	<i>Thielaviopsis sp.</i>	Ascomycotina	5.6
10	<i>Clasterosporium sp.</i>	Ascomycotina	5.8, 6.4
11	<i>Trichocladium sp.</i>	Ascomycotina	6.2
12	<i>Trichoconis sp.</i>	Ascomycotina	5.8
13	<i>Spegazzinia sp.</i>	Ascomycotina	5.4
14	<i>Cladosporium sp.</i>	Ascomycotina	5.0, 6.2, 6.4
15	<i>Curvularia sp.</i>	Ascomycotina	5.4, 5.8, 6.0
16	<i>Helminthosporium sp.</i>	Ascomycotina	5.6
17	<i>Trichoderma sp.</i>	Ascomycotina	6.4, 6.8, 7.0
18	<i>Cryptococcus sp.</i>	Basidiomycotina	5.0, 5.2, 6.8
19	<i>Aspergillus sp.</i>	Deuteromycotina	5.0, 5.6, 5.8, 6.4, 7.0
20	<i>Penicillium sp.</i>	Deuteromycotina	5.4, 6.2, 7.0
21	<i>Phaetrichoconis sp.</i>	Deuteromycotina	5.2, 5.6
22	<i>Alternaria sp.</i>	Deuteromycotina	5.4, 5.8, 6.2
23	Ascospores	Ascomycotina	5.4, 5.6, 6.2, 7.0
24	Conidia	Ascomycotina	5.4, 5.6, 6.0, 6.8
25	Clamydospores (Thalospores)	Basidiomycotina, Zygomycotina	5.6, 5.8, 6.2, 6.6
26	Smut spores	Basidiomycotina	5.2, 5.6, 6.2, 6.4, 6.8, 7.0
27	Hyphal fragments	-	5.0, 5.2, 5.4, 5.6 5.8, 6.6, 7.0

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