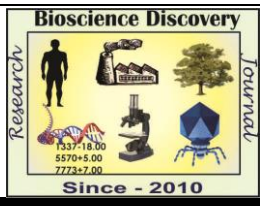
Print & Online, Open Access, Research Journal Available on http://jbsd.in
ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)
Short Communication



Aeromycological investigations over wheat, sugarcane and grape fields at Baramati (Pune), Maharashtra

Kanade, M. B.*, Atul Awatade, Akshay Gulave, Sujit Wagh, Akshay Kalkute, Sourabh Chandankar and Anjali Waghmare

P. G. Research Center, Department of Botany, Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati, Dist. Pune - 413 102, Maharashtra, India
*E-mail : mahadevkanade@yahoo.com

Article Info

Received: 22-06-2017,
Revised: 05-08-2017,
Accepted: 29-09-2017

Keywords:
Aeromycology, wheat, sugarcane and grape.

Abstract

The present investigation deals with the study of aeromycology over wheat, sugarcane and grape fields at Baramati (Pune), Maharashtra during August, 2016 to February, 2017. Air sampling was done by petriplates exposing method. Altogether 32 fungal genera were noticed. The contribution of Ascomycotina was dominated (56.25%) to the total aerospora followed by Basidiomycotina and Deuteromycotina (12.50%), Myxomycotina, Mastigomycotina and Zygomycotina (6.25%). Along with identified fungal spores many thallospores, smut spores, ascospores, conidia and hyphal fragments also reported.

INTRODUCTION

Pathogenic fungal bioaerosols are responsible to cause severe plant diseases to crop plants and they reduce crop yield (Karne, 2013). Stakman and Christensen (1946) made an intensive study and established the relationship between aerobiology and plant diseases and emphasized its role in forecasting the disease. The study of aeromycology is important in plant pathology and in disease forecasting of plant diseases (Lohare and Kareppa, 2010). In this connection, the present investigation was undertaken to study aeromycoflora over wheat, sugarcane and grape fields at Baramati area of Pune district of Maharashtra by using petriplates 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. 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).

RESULTS AND DISSCUSION

During the Aeromycological investigation 32 fungal genera were noticed over wheat, sugarcane and grape fields. Among these 02 fungi from Myxomycotina, Mastigomycotina and Zygomycotina, 18 from Ascomycotina, 04 from Basidiomycotina and Deuteromycotina were reported. Along with identified fungal spores many thallospores, smut spores, ascospores, conidia and hyphal fragments also reported. Maximum numbers of fungi i.e. 25 were trapped over wheat fields followed by grape (23) and sugarcane (22).

Table - 1 : List of fungi recorded from wheat, sugarcane and grape fields using PDA medium of different pH concentrations.

Sr. No.	Fungi	Sub-division	Crops			pH concentrations
			Wheat	Sugarcane	Grape	
1	*Physarum* sp.	Myxomycotina	-	+	+	6.8
2	*Stemonitis* sp.	Myxomycotina	+	+	+	6.8
3	*Albugo* sp.	Mastigomycotina	+	+	+	5.8, 6.6, 7.0
4	*Plasmopara* sp.	Mastigomycotina	-	-	+	5.4, 5.8, 6.2
5	*Mucor* sp.	Zygomycotina	+	+	+	6.2, 6.6, 6.8, 7.0
6	*Rhizopus* sp.	Zygomycotina	+	+	+	6.2, 6.4, 6.6, 6.8, 7.0
7	*Cladosporium* sp.	Ascomycotina	+	+	+	6.0, 6.6, 6.8
8	*Clasterosporium* sp.	Ascomycotina	-	+	-	5.4, 5.6, 6.2, 6.0
9	*Cordana* sp.	Ascomycotina	+	-	-	7.0
10	*Curvularialunata* sp.	Ascomycotina	-	+	+	5.0, 5.2, 5.6, 5.8
11	*Dendriphiopsis* sp.	Ascomycotina	+	-	-	6.6
12	*Spicaria* sp.	Ascomycotina	+	-	-	5.6
13	*Tetracoccosporium* sp.	Ascomycotina	+	-	-	5.0, 5.2
14	*Drechslere* sp.	Ascomycotina	+	+	+	5.2
15	*Fusarium* sp.	Ascomycotina	+	-	-	6.2, 6.8
16	*Microdochium* sp	Ascomycotina	-	-	+	5.0
17	*Lophiostoma* sp.	Ascomycotina	+	-	+	5.0, 5.6, 6.4
18	*Helminthosporium sp.*	Ascomycotina	+	+	+	5.4, 5.2, 6.6, 6.8
19	*Spegazzinia* sp.	Ascomycotina	+	+	+	5.2, 5.4
20	*Thielaviopsis* sp.	Ascomycotina	+	+	+	6.2, 6.6, 6.8
21	*Trichocladium* sp.	Ascomycotina	+	+	+	5.4, 5.8
22	*Trichoconis* sp.	Ascomycotina	+	+	+	5.8
23	*Trichoderma* sp.	Ascomycotina	+	+	+	5.2, 5.4, 6.2, 6.8
24	*Uncinulla* sp.	Ascomycotina	-	-	+	6.8, 6.2, 5.6
25	*Cryptococcus* sp.	Basidiomycotina	+	+	+	5.4, 5.8, 6.2, 6.8, 7.0
26	*Puccinia* sp.	Basidiomycotina	+	+	-	5.4, 6.4, 6.8
27	*Sporobolomyces* sp.	Basidiomycotina	+	-	-	5.8
28	*Ustilago sp.*	Basidiomycotina	-	+	-	5.0, 5.8, 6.2, 6.4, 6.8, 7.0
29	*Alternaria* sp.	Deuteromycotina	+	+	+	5.0, 5.2, 5.6, 6.0, 6.2, 6.4, 6.8, 7.0
30	*Aspergillus* sp.	Deuteromycotina	+	+	+	6.2, 6.4, 6.6, 6.8, 7.0
31	Colletotrichum sp.	Deuteromycotina	+	+	+	5.0, 5.8, 6.0, 6.2, 6.4, 6.8, 7.0
32	*Penicillium* sp.	Deuteromycotina	+	+	+	6.6, 6.8, 7.0
33	Thallospores (Clamydospores)	Zygomycotina, Basidiomycotina	+	+	+	5.6, 5.8, 6.0, 6.6
34	Smut spores	Basidiomycotina	+	+	+	5.0, 5.8, 6.2, 6.4, 6.8, 7.0
35	Ascospores	Ascomycotina	+	+	+	5.4, 5.6
36	Conidia	Ascomycotina	+	+	+	6.0, 6.6, 7.0
37	Hyphal fragments	-	+	+	+	5.2, 5.4, 5.8, 6.6, 7.0

The fungi *Dendriphiopsis* sp., *Spicaria* sp., *Tetracoccosporium* sp., *Fusarium* sp. and *Sporobolomyces* sp. were only found in wheat fields on the other hand fungi *Clasterosporium* sp. only found over sugarcane fields and fungi *Plasmopara* sp., *Microdochium* sp. and *Uncinulla* sp. were found over grape fields.

Effect of pH concentrations on the growth of aeromycoflora was also studied and interesting observations were recorded. The growth of fungi was varying according to pH of PDA medium.

The pH concentrations 5.2, 6.0, 6.2, 6.6, 6.8, 7.0, 7.2, 7.4, and 7.8 were most favour for fungal growth. *Alternaria* showed dominant growth compared to other fungal members; grow at various pH ranges like 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4, 6.8, 7.0, 7.2, 7.4 and 7.6. Myxomycotina members only grown on 6.8 pH on the other hand Deuteromycotina members were grown on number of pH concentrations i.e. 5.0, 5.2, 5.6, 5.8, 6.0, 6.2, 6.4, 6.8 and 7.0.

During the study *Puccinia* sp. and smut spores were found over wheat fields causes rust and smut diseases of wheat. Colletotrichum falcatum and *Ustilago scitaminea* spores found in sugarcane fields causes red rot and whip smut diseases respectively to the sugarcane. *Plasmopara viticola* and *Uncinulla necator* spores found in grape fields causes downy mildew and powdery mildew diseases respectively to the grapes.

Airborne Mycoflora are largely determined by topography, meterological parameters, vegetation and biotic factors including human activities (Lyon *et al*., 1984 and Juri Devi *et al*., 2010). According to Abdel-Hafez *et al.* (1987) the maximum numbers of airborne fungi were observed in winter compared to summer. *Mucor, Aspergillus, Helminthosporium,* smut spores, *Alternaria, Fusarium,* hyphal fragments are wind spread and they are abundantly found in air (Patil, 2016).

According to Eversmeyer and Kramer (1975) meteorological factors influence the percentage of spores [such as urediospores of the wheat rust fungi, and conidia of *Erysiphe graminis* (DC.) Mdrat, *Cladosporium* and *Alternaria*] that becomes airborne from a source area. Forty four species and 22 genera were collected from the air of wheat fields reported by Mazen and Shaban (1983) from Egypt and reported that *Aspergillus, Alternaria, Cladosporium, Humicola, Fusarium, Penicillium* and *Epicoccum* were isolated in high frequency of occurrence. Furthermore noticed that most of these genera are also dominant in the air of many places of the world. Karne (2013) recorded 50 bioaerosols over wheat fields of which 21 types (71.7%) were pathogenic and 25 types (85.8%) were allergenic. Out of 50 types of bioaerosols 2 belonged to Mastigomycotina (1.2%), 2 to Zygomycotina (3.3%), 11 to Ascomycotina (7.9%), 3 to Basidiomycotina (11.3%), and 27 to Deuteromycotina (60.5%). Elham and Modhi (2015) studied 600 grain samples collected from wheat fields in Hail area at the northern part of Saudi Arabia and reported 505 of external mycoflora and 705 of internal mycoflora were grouped into five fungal genera *viz*. *Aspergillus, Alternaria, Penicillium, Fusarium* and *Ulocladium* spp.

Aeromycological investigation over a sugarcane field at Ahamdpur district were studied by Kadam *et al*. (2010), during the investigation total 61 fungal spores types were recorded and *Ustilago, Cercospora, Helminthosporium, Colletotrichum, Fusarium* and *Alternaria* as pathogenic to sugarcane were recorded. Atmospheric concentration and seasonal variation in the smut spores over sugarcane fields at Nashik were investigated by Ahire *et al.* (2010) and recorded 69.98% of Deuteromycetes spores followed by Basidiomycetes (15.50%), Ascomycetes (4.50%), Phycomycetes (0.33%) and other types (11.19%). The contribution of Basidiomycetes spores *viz*. uredopores (0.36%) and teleutospores (0.15%) to the total aerospora over sugarcane fields from Nashik were noticed by Ahire *et al*. (2010a).

Acknowledgement: Authors are highly greatful to BCUD, Savitribai Phule Pune University for financial help

REFERENCES

Abdel Hafez SI, 1987. Survey of airborne fungus spores at Faif, Saudi Arabia. *Mycopathologia*, **30**:88:39-44.

Ahire PP, Kadam VB and Patel SI, 2010. Atmospheric concentration and seasonal variation in the smut spores at Nashik, Maharashtra, India. *Plant Archives*, **10**(2):963-964.

Ahire PP, Kadam VB and Patel SI, 2010a. Aeromycological (Basidiomycetes) studies at Nashik, Maharashtra, India. *Plant Archives*, **10**(2):967-968.

Ainsworth GC, Sparrow FK and Sussaman AS, 1973. The Fungi Vol. III and IV A. Academic Press, New York.

Elham SD and Modhi KE, 2015. Mycoflora of wheat (*Triticum aestivum* L.) at different locations in Hail Area- Saudi Arabia. *Asian Journal of Agriculture and Food Sciences*, **3**(3):302-307.

Eversmeyer MG and Kramer CL, 1975. Air-spora above a Kansas wheat field. *Phytopathology*, **65**:490-492.

Juri Devi, Sadhana Medhi and Sarma TC, 2010. Aeromycological study of store houses of onion and ginger in Guwahati. *The Bioscan*, **2**:547-552.

Kadam RM, Reddy NJM and Biradar RP, 2010. Aeromycoflora over a sugarcane field at Ahmedpur

Dist. Latur (M.S.). *International Journal of Plant Sciences*, **5**(2):587-589.

Karne AV, 2013. Aeromycological investigations in the ambient air over some crop fields in context to pathogenic and allergenic fungal bioaerosols. *Nature Environment and Pollution Technology*, **12**:695-698

Lohare SD and Kareppa BM, 2010. Air spora over onion field. *International Research Journal*, **I**(3&4):116-117.

Lyon FL, Framer CL and Eversmeyer MG, 1984. Variation of airspora in the atmosphere due to weather conditions. *Grana*, **23**:177-181.

Mazen MB and Shaban GM, 1983. Air-borne fungi of wheat fields in Egypt, *Qatar Univ. Sci. Bull*., **3**:131-139.

Patil MT, Kanade MB and Mali NS, 2016. Present Status of fungal diseases of jowar fields at Barshi area, Maharashtra. *Proceedings of International Conference Plant Research and Resource Management* organized by Tuljaram Chaturchand College, Baramati, Dist. Pune (M.S.), India, 166-168.

Stakman EC and Christensen CM, 1946. Aerobiology in relation to plant diseases. *Bot. Rev*., **12**:205-253.

How to cite this article

Kanade M. B., Atul Awatade, Akshay Gulave, Sujit Wagh, Akshay Kalkute, Sourabh Chandankar and Anjali Waghmare, 2018. Aeromycological investigations over wheat, sugarcane and grape fields at Baramati (Pune), Maharashtra. *Bioscience Discovery*, **9**(1): 86-89**.**