BVG Trust

J. Sci. Trans. Environ. Technov. 2012, 5(4) : 202-211

Scientific Transactions in Environment and Technovation

A Preliminary study on the air borne mycoflora of Koyambedu Bus Terminus, Chennai, South India.

R. Pandian[1], K. Shanmugasundaram[2]*

[1]Reader, Department of Plant Biology and Plant Biotechnology, Presidency College, Chennai - 600 005, Tamil Nadu, India

[2*]No.3/106, Arunthathiyar Street, Kallangulam, R. Pudupalaiyam (Post), Rasipuram Taluk, Namakkal - 637408, Tamil Nadu, India.

Abstract

The horizontal distribution of mycoflora in the atmospheric air of Koyambedu bus terminus, Chennai was investigated by sampling air at three sites viz. car parking area, metro bus terminus and mofussil bus terminus, Koyambedu Chennai, South India.Air was sampled with Petri plates with Potato Dextrose Agar medium. The air sampling commenced from the 1st January 2009 and continued till the end of June 2009. The samples were taken once in a month. Thus, six samples were taken at three sites. Air sampling has been carried out between 4 pm and 5 pm on the day of sampling and the sampling duration was 10 minutes. The number and variety of fungi isolated were more at mofussil bus terminus, Koyambedu, Chennai. A large portion of fungi were common to all the three sites. However, a few were specific to the particular sites. *Aspergillus japonicus* was numerically more dominant in all the three sites. Although its percentage frequency was not the same, it was highest at mofussil bus terminus, followed by metro bus terminus, and car parking area at Koyambedu. Finally from the preliminary observations made in this study, it is noticed that air mycoflora of Koyambedu bus terminus, Chennai exhibit variation in their horizontal distributions.

Keywords: air borne mycoflora, *Aspergillus japonicus*, Chennai, fungi, Koyambedu bus terminus

INTRODUCTION

Fungal spores make a large contribution to the mycoflora of air. The fungal spores originate from living, dead and stored products. Inhaled spores can cause a number of respiratory disorders in human being. airborne fungal contaminants are increasingly gaining importance in view of health hazards caused by the spores themselves or by microbial metabolites (Fischer, *et al.*, 2003). Respiratory allergies are identified in the vendors and the people engaged in the cleaning and maintanance of the bus terminus Koyambedu, Chennai. The air samples collected periodically were analysed to get volumetric information on the culturable fungal species present in the atmospheric air of the bus terminus. The results of this six month survey on the air mycoflora of the bus terminus, Koyambedu, Chennai are described and discussed.

MATERIALS AND METHODS

Preparation of Sterilized petriplates:

The petriplates were sterilised with the help of autoclave. The autoclaved packages of petriplates were left in the hot air oven for 24 hours. The temperature was maintained at 60°C. After drying, the plates were ready for pouring of growth medium.In the present study Potato Dextrose Agar medium proved more suitable for growing the air borne fungal spores.

Composition of the Potato Dextrose Agar Medium:(for 1 liter medium) (Parks.,1997)

Potato- 200 g, Dextrose - 20 gm, Agar - 20 gm, Distilled water - 1000 ml .

Preparation of the Potato Dextrose Agar medium

The boiled potato was filtered and the potato extract was mixed with the boiled Agar. Dextrose was added to the Potato extract Agar mixer solution. The medium was thoroughly mixed and sterilized in an autoclave.The sterilized medium was poured into the sterilized Petri plates in an aseptic condition using laminar air flow chambers.

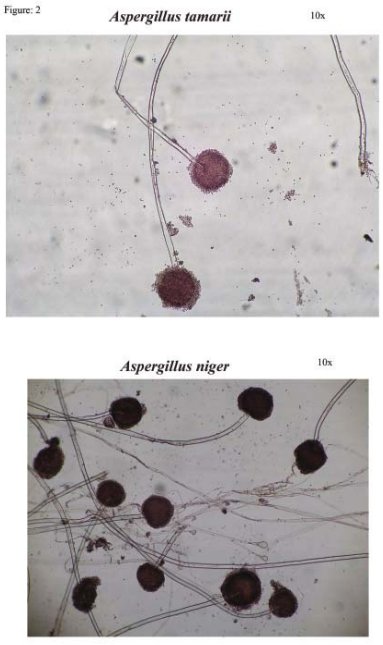
Collection of samples

The Petri plates with media were taken to the sampling sites in air tight containers without allowing any contamination. In the sampling sites, the air samples were collected by installing and exposing the petriplates with the Potato Dextrose Agar medium. The same method of sample collection was done in every sampling site at Chennai Koyambedu bus terminus. After the collection of air samples for about 10 minutes the Petri plate with media was properly closed with its lid and brought to the laboratory and left at room temperature in an aseptic condition for a period of 5 days. The fungal spores present in the air sample were

*Corresponding Author
email: *kshanmuga1984@gmail.com*

growing.The growth of the fungul spores were observed and recorded (figure-1).

Figure 1. Culture plates of air samples collected from Koyambedu Bus Terminus, Chennai



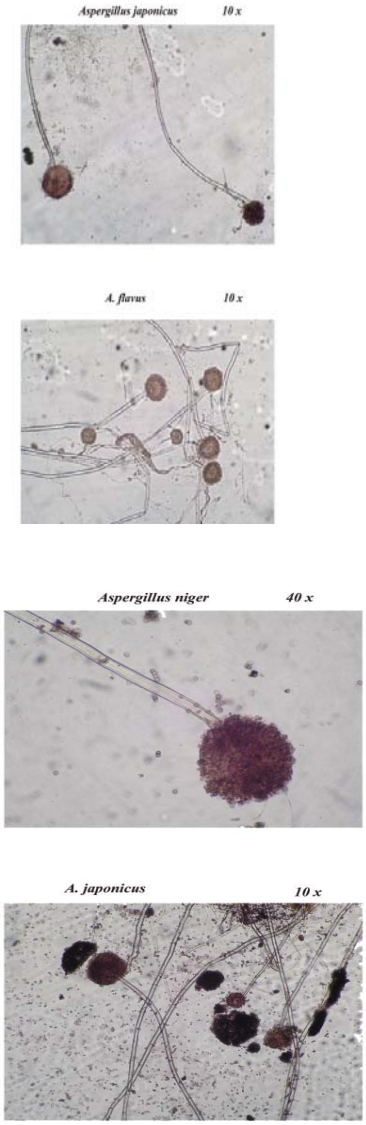


Figure 2. Fungal taxas sin the samples

Preparation of microslides

Clean microslides of the standard size were used. The fungal colonies grown in the petriplates were transferred to the micro slides and mounted, using the mounting solution Lactophenol in an aseptic condition. Then the specimen in the micro slide was sealed by DPX solution. The micro slide with sealed specimen was examined under light microscope in low magnification as well as high magnification (Fig. 2) for identification.

Identification of the fungal taxa

The texture and colour of the colony, the nature of mycelia, the structure of fruit body and the nature of spores were used as tools for identification. Thus different species of fungi present in the air samples collected from Chennai Koyambedu bus terminus were identified, listed and tabled. The results were discussed.

RESULT

In the present research the fungi isolated from the bus terminus, Koyambedu Chennai were described.

A) At Car Parking Area., Koyambedu Bus Terminus, Chennai.

Nineteen species of fungi belonging to 13 genera were isolated from car parking area. Of these one species belonged to zygomycotina and the remaining 18 species were mitosporic fungi, consisting of 17 Hyphomycetes and one Coelomycetes. The fungal taxa are listed in Table -1 along with their percentage frequency in individual sampling. The number of fungal taxa recorded per sampling varied from 11-15. Greater number of taxa was recorded during March 2009 sampling.

Periodicity of occurrence

The fungal taxa have been grouped in to "most common" "common" and "rare" categories depending on the periodicity of appearance. Of the 19 species recorded 8 were most common 6 were common and 5 species were of rare category. The most common four species were *Penicillium frequentans, Aspergillus japonicus, Aspergillus flavus* and *Aspergillus niger*. Among the "rare" group, *Monilia sitophila* and *Lasiodiplodia theobromae* were confined to only one sampling. With regards to the percentage frequencies of species, only 2 out of 19 species showed more than 10% of average

Table 1. List of fungi isolated from air samples collected at Car Parking area, Koyambedu Bus Terminus, Chennai and their percentage frequency in different months of sampling

S. No.	Species	2009						
		Jan	Feb	Mar	Apr	May	Jun	Average frequency
	ZYGOMYCOTINA							
01	*Rhizopus stolonifer*	1.75	-	1.56	-	4.16	2.56	1.67
	MITOSPORIC-FUNGI							
	HYPHOMYCETES							
02	*Alternaria alternata*	-	4.08	1.56	2.33	6.25	-	2.37
03	*Aspergillus terreus*	12.28	-	6.25	4.65	8.33	5.13	6.11
04	*A.niger*	8.77	-	4.95	2.33	12.5	2.16	5.11
05	*A.Japonicus*	1.75	4.08	-	4.65	-	6.13	2.8
06	*A.fumigatus*	21.05	16.33	21.87	13.95	16.66	5.38	15.87
07	*A. flavus*	7.01	4.08	1.56	9.3	4.16	-	4.35
08	*Drechslera australiensis*	10.52	16.33	7.81	4.65	12.5	12.82	10.77
09	*Cladosporium cladosporioides*	5.26	4.08	-	-	2.08	-	1.90
10	*Curvularia lunata*	-	-	3.12	-	-	-	0.52
11	*Nigrospora sphaerica*	-	8.16	1.56	11.62	10.41	7.69	6.57
12	*Monilia sitophila*	-	-	-	-	-	2.56	0.42
13	*Fusarium moniliformae*		2.04	1.56	-	-	-	0.6
14	*Paecilomyces varioti*	1.75	4.08	1.56	-	-	-	1.23
15	*Penicillium Purcpurogenum*	5.26	4.08	4.69	6.98	4.16	10.25	5.9
16	*P. citrinum*	-	-	4.69	4.65	4.16	2.56	2.67
17	*P.frequentans*	8.77	10.02	3.12	9.3	6.25	10.25	7.95
18	*Trichoderma harzianum*	-	-	3.12	2.33	-	-	0.9
	COELOMYCETES							
19	*Lasiodiplodia theobromae*	_	2.04		-	-		0.34
	Yeast Colonies	7.01	4.08	12.5	9.3	8.33	7.01	8.0
	Non sporulating colonies	8.77	16.33	18.75	13.95	12.5	8.77	13.18

Table 2. List of fungi isolated from air samples collected at Metro Bus Terminus, Koyambedu Bus Terminus, Chennai and their percentage frequency in different months of sampling

S. No.	Species	2009						
		Jan	Feb	Mar	Apr	May	Jun	Average frequency
	ZYGOMYCOTINA							
01	*Rhizopus stolonifer*	-	1.16	-	1.51	2.35	1.23	1.04
02	*Absidia corymbifera*	-	-	1.43	-	-	-	0.24
	ASCOMYCOTINA							
03	*Ascortricha chartarum*	_	-	1.43	-	-	-	0.24
	HYPHOMYCETES							
04	*Altenaria alternata*	1.18	1.23	-	-	2.44	4.54	1.57
05	*Acremonium strictum*	1.16	-	-	-	-	-	0.19
06	*Aspergillus versicolor*	-	2.32	1.22	-	1.18	-	0.79
07	*A.terreus*	2.86	3.49	7.32	1.51	-	4.94	3.35
08	*A.niger*	15.71	18.6	14.63	12.12	9.41	12.35	13.8
09	*A.japonicus*	10.34	14.28	13.56	13.95	10.81	23.53	14.41
10	*A.fumigatus*	8.57	5.81	9.76	10.61	14.12	9.87	9.79
11	*A.flavus*	4.28	1.16	6.1	12.12	4.7	2.47	5.14
12	*Chrysosporium Pannorum*	2.86	-	1.22	-	-		0.68
13	*Curvularia lunata*	-	5.81	2.44	3.03	2.35	4.94	3.09
14	*Cladosporium Cladosporioides*	4.28	5.81	-	1.51	5.88	4.94	3.74
15	*Drechslera hawaiiensis*	1.43	2.32	1.22	1.51	2.35	-	1.47
16	*D. australiensis*	-	4.65	2.44	1.51	-	4.94	2.26
17	*Paecilomyces varioti*	-	-	2.44	-	-	-	0.41
18	*Fusarium moniliformae*	2.86	4.65	4.88	3.03	4.7	1.23	3.56
19	*F.oxysporum*	2.86	3.49	-	-	-	2.47	1.47
20	*Penicillium purpurogenum*	-	1.16	-	1.51	-	1.23	0.65
21	*P. chrysogenum*	-	3.49	2.44	1.51	2.35	-	1.63
22	*P.frequentans*	11.43	5.81	4.88	4.54	9.41	8.64	7.45
23	*P.purpurescens*	2.86	5.81	1.22	6.06	7.06	2.47	4.25
24	*Trichoderma harzianum*	1.43	1.16	-	-	-	1.23	0.64
	COELOMYCETES							
25	*Phoma sp.*	1.43	-	-	-	-	-	0.24
26	*Pestalatiopsis sp.*	-	-	1.22	-	-	-	0.2
27	*Lasiodiplodia Theobromae*	-	1.16	-	-	-	1.23	0.4
	Yeast-like colonies	5.71	5.81	10.98	10.61	9.41	7.41	8.32
	Non-sporulating colonies	8.57	4.65	3.66	6.06	9.41	14.81	7.86

frequency with the maximum being 15.87% for *Aspergillus japonicus.*

B.At Metro Bus Terminus area, Koyambedu Bus Terminus, Chennai

A total of 27 species assigned to 17 genera were recorded from metro Bus terminus area in Koyambedu Bus terminus Chennai. Of these 2 were member of zygornycotina one of Ascomycotina and the remaining twenty-four were mitosporic fungi. Twenty one species belonged to Hyphomycetes and three to Coelomycetes (Table-2) The number of species recorded in individual sampling was ranged from 13-18. The maximum species was recorded in February 2009.

Periodicity of occurrence

Out of the 27 species recorded 10 were most common and of these seven species *Aspergillus fumigatus, Aspergillus niger, Aspergillus flavus, Cladosporium cladosporiodes, Fusarium moniliformae, Penicillium frequentaus and Penicillium purpurescens* were recorded in all the six samplings. Among the remaining taxa 6, were common and 11 species were rare in the three occurrence. Six species out of 11 in rare category were

Table 3. List of fungi isolated from air samples collected at Mofussil Bus Terminus, Koyambedu Bus Terminus, Chennai and their percentage frequency in different months of sampling

S. No.	Species	2009						
		Jan	Feb	Mar	Apr	May	Jun	Average frequency
	ZYGOMYCOTINA							
01	*Rhizopus stolonifer*	-	1.3	3.39	3.33	1.35	3.92	2.21
02	*Mucor racemosus*	8.62	-	-	2.33	1.35	5.88	3.03
	ASCOMYCOTINA							
03	*Chaetomium funicolum*	-	-	1.69	-	-	-	0.28
	HYPHOMYCETES							
04	*Alternaria alternata*	5.17	7.79	3.39	2.33	2.7	1.96	3.89
05	*Aspergillus versicolor*	-	3.39	-	-	-	-	0.56
06	*A.terreus*	3.45	6.49	6.78	2.33	2.7	3.92	4.28
07	*A.tamarii*	-	_	-	2.33	-	15.69	3.0
08	*A.niger*	10.34	18.18	18.64	18.6	16.22	-	13.66
09	*A.japonicus*	20.06	10.46	19.51	16.66	14.12	12.35	15.52
10	*A.fumigatus*	6.89	7.79	5.08	2.33	10.81	-	5.48
11	*A. flavus*	8.62	1.3	3.39	4.65	4.05	3.92	4.32
12	*Chrysosporium pannorum*	-	2.3	-	-	2.7	-	0.83
13	*Curvularia lunata*	-	2.3	6.78	2.33	4.05	3.92	3.23
14	*Cladosporium cladosporioides*	1.72	2.3	-	-	-	3.92	1.32
15	*Drechslera hawaiiensis*	-	-	1.69	-	-	-	0.28
16	*D.australiensis*	3.45	-	-	2.33	2.7	1.96	1.74
17	*Fusarium oxysporum*	3.45	1.3	-	2.33	-	-	1.18
18	*F. moniliformae*	-	-	6.78	-	2.7	1.96	1.9
19	*Nigrospora sphaerica*	1.72	-	-	-	-	-	0.29
20	*Monilia sitophila*	-	1.3	-	4.65	-	-	0.99
21	*Paecilomyces varioti*	-	1.3	-	4.65	2.7	-	1.44
22	*Penicillium purpurogenum*	6.89	1.3	..	4.65	4.05	3.92	3.47
23	*P.oxalicum*	-	-	-	2.33	-	-	0.39
24	*P. citrinum*	3.45	2.3	5.08	2.33	4.05	-	2.87
25	*P.frequentans*	-	1.3	1.69	-	6.76	3.93	2.28
26	*Trichoderma harzianum*	-	2.3	1.69	-	-	-	0.67
27	*T.virideii*	-	-	-	2.33	1.35	-	0.61
	COELOMYCETES			-				
28	*Lasiodiplodia theobromae*	-	-	1.69	-	-	-	0.28
29	*Phoma sp.*	-	-	-	-	-	1.96	0.33
	Yeast-like colonies	13.79	12.99	10.17	9.3	8.11	7.84	10.37
	Non-sporulating colonies	12.07	7.79	5.08	11.63	10.81	9.4	9.46

recorded in only one sampling. With regards to the percentage frequencies of the species only 2 out of 27 species showed more than 10% of average frequency, the maximum being 14.41% of *Aspergillus japonicus*. Followed by *Aspergillus niger* with an average percentage frequency of 13.8%

C.At Mofussil Bus terminus area, Koyambedu, Chennai.

A total number of 29 species belonging 17genera were recorded including 2 numbers of zygomycotina, 1 of Ascomycotina and 26 mitosporic fungi consisting of 24 Hyphomycetes, and 2 Coelomycetes at the mofussil bus terminus are the number of species recorded per sampling ranged from 18-20 with the maximum being recorded in February and April 2009 and the minimum in January 2009. The list of fungi and their percentage frequency in individual sampling were given in Table 3.

Periodicity of occurrence

Of the twenty nine species recorded 9 were most common and of them 6 species *Mucor racemosus, Alternaria alternata, Aspergillus fumigatus,S Aspergillus flavus, Aspergillus terreus* and *Aspergillus japonicus* were