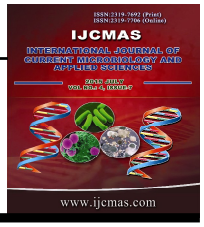
Int.J.Curr.Microbiol.App.Sci (2015) 4(7): 729-740

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 4 Number 7 (2015) pp. 729-740**
http://www.ijcmas.com



Original Research Article

Isolation and Identification of Soil Mycoflora in Banana Field at Manachanallur, Tiruchirappalli Dt., Tamil nadu, India

P. Gnanasekaran[1*], S.Mohamed Salique[1] and A. Panneerselvam[2]

[1]Department of Botany, Jamal Mohamed College (Aut.), Trichy - 620 020, Tamil Nadu, India
[2]PG and Research Department of Botany and Microbiology, A.V.V.M Sri Pushpam College (Autonomous), Poondi - 613 503, Thanjavur, Tamil Nadu, India
**Corresponding author*

Keywords

Diversity, mycoflora, banana field, physico – chemical characteristics

A B S T R A C T

The conservation of diversity of mycoflora in agricultural fields becomes very essential for the development of sustainable agriculture. In the present investigation, sixty five fungal species representing 26 genera were isolated and identified from banana field at Manachanallur, Tiruchirappalli Dt. The dominant genera in banana field were *Aspergillus*, *Penicillium* and *Trichoderma* species. The physico–chemical characteristics of soil samples showed variations collected from different months. The present study clearly revealed that the physico – chemical parameters influenced the diversity and distribution of soil fungi in agricultural field.

Introduction

Microorganisms in the soil are beneficial in increasing soil fertility and plant growth as they are involved in several biochemical transformations and mineralization activities in soils. Fungi are an important component of soil microbiota more in abundance than bacteria, depending on soil depth and nutrient conditions.

Some studies on soil fungi of agricultural fields of Tamil Nadu (Mahalingam *et al*., 2012; Prince *et al*., 2012), Andhra Pradesh (Gaddeyya *et al*., 2012), Uttar Pradesh (Pandey *et al*., 2014) and other remaining states of India enlightened the importance of soil mycoflora in agricultural fields.

The conservation of diversity of mycoflora in agricultural fields becomes very essential for the development of sustainable agriculture.

Banana is an important fruit crop of many tropical and subtropical regions of India. It is cultivated in India in an area of 830.5 thousand ha and total production is around 29,779.91 thousand tons. Main banana growing states are Tamil Nadu, Maharashtra, Gujarat, Andhra Pradesh and Karnataka. Hence in the present investigation was designed to study the soil mycoflora from banana field of Manachanallur, Tiruchirappalli Dt.

Materials and Methods

Collection of soil samples

The soil samples were collected from banana field at Manachanallur, Tiruchirappalli Dt. for a period of one year from January 2013 to December 2013.The soil samples were collected at a depth within 10 cm using a metal spatula and 5 to 7 samples were collected randomly and were pooled together. The samples were kept in new polythene bags, sealed and transported to the laboratory for the mycological examination. For the analysis of soil nutrients, one kg of soil was separately collected in polythene bags.

Isolation of soil mycoflora

Dilution plating technique described by Warcup (1950) was used to isolate the mycoflora from soils. Soil sample weighed 1g was diluted in 10 ml of distilled water. One ml of the diluted sample (10^{-2} and 10^{-3}) was poured and spreaded on the petri plates containing sterilized PDA medium (Potato - 200 gms, dextrose -20 gms, agar -15 gms, distilled water -1000 ml, pH -6.5) in replicates. One percent Streptomycin sulphate solution was added to the medium before pouring into petriplates for preventing bacterial growth. The inoculated plates were incubated in a dust free cupboard at the room temperature (24±2°C) for 3 - 5 days.

Observation

The colonies growing on PDA plates with different morphology were counted separately. The fungal cultures were then transferred, subcultured and the pure cultures were maintained on PDA medium. Fungal morphology were studied microscopically by staining with Lacto phenol cotton blue and observed under a compound microscope.

Identification

Colony colour and morphology were observed besides hyphal structure, spore size, shapes and spore bearing structures. They were compared with the standard works of Manual of Soil fungi (Gillman, 1957); Hyphomycetes (Subramanian, 1971); A Manual of Penicillia (Raper and Thom, 1949); Manual of *Aspergillus* (Raper and Fennell, 1965) and Soil fungi (Domsch *et al.*, 1980).

Presentation of data

$$\% \text{ contribution} = \frac{\text{No. of colonies of fungus in a sample}}{\text{Total number all colonies of all the species in a sample}} \times 100$$

$$\% \text{ frequency} = \frac{\text{Number of samples in which a particular fungus occurred}}{\text{Total number of samples examined}} \times 100$$

Based on the frequency occurrences the fungi were grouped as rare (0-25% frequency), Occasional (26-50% frequency), Frequent (51-75% frequency) and common (76-100% frequency) species.

Analysis of physico-chemical characteristics of the soil

pH, Electrical conductivity, cation exchange capacity, organic carbon, organic matter, available nitrogen, phosphorus, potassium, zinc, copper, iron, manganese, calcium, magnesium, sodium and potassium were analyzed by APHA method (1989).

Statistical analysis

Pearson's correlation analysis was used to assess the relationship between physico-chemical parameters and total fungal colonies. The data were computed and analyzed using Statistical Package for Social Sciences (SPSS) software.

Results and Discussion

In the present study, a dilution plating method was used for isolating fungi from banana field soils. Evidently, several authors used dilution plating method for isolation of fungi (Ishaq and Khan, 2011; Nilima Wahegaonkar *et al*., 2011; Shiny Niharika *et al*., 2013; Rakesh Sharma and Raju, 2013; Ibrahim and Shehu, 2014; Pandey *et al*., 2014; Chandrashekar *et al*., 2014).

Sixty five fungal species representing 26 genera were isolated and identified from banana field at Manachanallur, Tiruchirappalli Dt. (Table 1). Besides the above, maximum number of fungal species belonging to the class Deuteromycetes (54 species), followed by Ascomycetes (9 species) and Phycomycetes (2 species) were recorded. Likewise, Rakesh Sharma and Raju (2013) reported that a total of 12 species belonging to 6 genera of fungi were isolated from crop fields at Heggadadevana Kote of Mysore District. Recently, Pandey *et al*. (2014) accounted 13 genera and 42 fungal species from traditional sugarcane field in central Uttar Pradesh.

In general, among the 26 genera recorded, the genus *Aspergillus* (25 species) was dominant followed by *Penicillium* (8 species), *Trichoderma* (5 species), *Absidia*, *Fusarium*, *Metarrhizium* and *Paecilomyces* (2 species each). All other genera were represented by one species each.

In the present investigation, the genus *Aspergillus* was dominant followed by *Penicillium*, and *Trichoderma*. The data were coincident with the earlier published reports that the constant presence of *Aspergillus*, *Penicillium* and *Trichoderma* from different crop field (Ishaq and Khan, 2011; Nilima Wahegaonkar *et al*., 2011; Shiny Niharika *et al*., 2013; Ibrahim and Shehu, 2014; Pandey *et al*., 2014).

Percentage contribution of the individual species to the total fungal population showed variation. The maximum percentage contribution of 3.11% was found with *Aspergillus niger*. The minimum of 0.98% was found with *Cladosporium* sp. (Table 2). *Penicillium janthinellum* was the common one, which showed 83% frequency (Table 3). Correspondingly, Ibrahim and Shehu (2014) reported the highest percentage frequency of occurrence was observed in *Aspergillus niger* (39.5%) in Cassava growing fields, Sokoto, Nigeria.

The physico–chemical characteristics of soil samples showed variation collected from different months (Table 4). Fungal diversity and distribution were correlated with physico – chemical properties of soil (Table 5). The results showed no significant relationship with pH, electrical conductivity, organic carbon, organic matter, available potassium, available copper, available iron, available manganese, magnesium, available nitrogen, available phosphorus and available zinc.

However Cat ion exchange capacity ($r = 0.602$; $P < 0.05$), Calcium ($r = 0.584$; $P < 0.05$) and Potassium ($r = 0.596$; $P < 0.05$) showed positive correlation. The present study clearly revealed that the physico – chemical parameters influenced the diversity and distribution of fungi in agricultural field. Our results are accordance with the previous

findings of Gaddeyya *et al*. (2012); Rakesh Sharma and Raju (2013) and Shiny Niharika *et al*. (2013). Hence it could be concluded that the diversity and distribution of soil fungi are often influenced by the available nutrients and other physico - chemical conditions of the agricultural fields.

Table.1 List of isolated soil mycoflora from banana field of Manachanallur, Tiruchirappalli Dt

S. No.	Isolated mycoflora
1.	*Absidia glauca*
2.	*A. repens*
3.	*Acremonium rutilum*
4.	*Acrophialophora fusispora*
5.	*Acrostalagmus albus*
6.	*Alternaria tenuis*
7.	*Aspergillus aculeatus*
8.	*A . auratus*
9.	*A. avenaceus*
10.	*A. candidus*
11.	*A. chevalieri*
12.	*A. creneus*
13.	*A. flavus*
14.	*A. foetidus*
15.	*A. funiculosus*
16.	*A. fumigatus*
17.	*A. humicola*
18.	*A. itaconicus*
19.	*A. luchensis*
20.	*A. nidulans*
21.	*A. niger*
22.	*A. ochraceus*
23.	*A. oryzae*
24.	*A. rugulosus*
25.	*A. sachari*
26.	*A. sparsus*
27.	*A. tamarii*
28.	*A. terricola*
29.	*A. variegatus*
30.	*A. versicolor*
31.	*A. violaceofuscus*
32.	*Botrytis cinera*
33.	*Botryotrichum piluliferum*

S. No.	Isolated mycoflora
34.	*Cephalosporium acremonium*
35.	*Circinella sydowi*
36.	*Cladosporium* sp.
37.	*Curvularia pallescens*
38.	*Dendryphion nanum*
39.	*Fusarium moniliforme*
40.	*F. oxysporum*
41.	*Gliocladiopsis sagariensis*
42.	*Helminthosporium oryzae*
43.	*Hyalopus* sp.
44.	*Mammaria echinotryoides*
45.	*Metarrhizium anisopliae*
46.	*Metarrhizium* sp.
47.	*Paecilomyces elegans*
48.	*P. marquendi*
49.	*Penicillium* sp.
50.	*P. brevilompactum*
51.	*P. charlesii*
52.	*P. chrysogenum*
53.	*P. citrinum*
54.	*P. cyclopium*
55.	*P. janthinellum*
56.	*P. rugulosum*
57.	*Scolecobasidium humicola*
58.	*Thielavia terricola*
59.	*Trichoderma glaucum*
60.	*T. harzianum*
61.	*T. koningii*
62.	*T. lignorum*
63.	*T. viride*
64.	*Truncatella truncatta*
65.	*Ulolodium consortiale*

Table.2 Total number of colonies, mean density (CFU/g) and percentage contribution of fungi from Manachanallur, Tiruchirappalli Dt

S. No	Name of the organisms	January to December 2013																								Total no. of colonies	% contribution
		Jan.		Feb.		March		April		May		June		July		August		Sep.		October		Nov.		Dec.			
		TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD	TNC	MD		
1.	*Absidia glauca*	3	1.00	2	0.67	-	-	-	-	-	-	-	-	1	0.33	3	1.00	-	-	2	0.67	-	-	3	1.00	14	1.24
2.	*Absidia repens*	-	-	-	-	4	1.33	-	-	3	1.00	-	-	2	0.67	-	-	-	-	-	-	3	1.00	-	-	12	1.07
3.	*Acremonium rutilum*	-	-	3	1.00	-	-	5	1.67	-	-	3	1.00	-	-	-	-	-	-	-	-	-	-	3	1.00	14	1.24
4.	*Acrophialophora fusispora*	2	0.67	-	-	-	-	-	-	-	-	-	-	3	1.00	-	-	-	-	2	0.67	3	1.00	3	1.00	13	1.15
5.	*Acrostalagmus albus*	-	-	-	-	1	0.33	-	-	-	-	2	0.67	-	-	-	-	5	1.67	-	-	4	1.33	6	2.00	18	1.60
6.	*Alternaria tenuis*	-	-	-	-	2	0.67	-	-	5	1.67	-	-	-	-	-	-	-	-	5	1.67	-	-	5	1.67	17	1.51
7.	*Aspergillus aculeatus*	2	0.67	5	1.67	-	-	3	1.00	-	-	2	0.67	-	-	2	0.67	3	1.00	2	0.67	-	-	-	-	19	1.69
8.	*A . auratus*	-	-	4	1.33	-	-	-	-	-	-	-	-	2	0.67	-	-	-	-	5	1.67	5	1.67	5	1.67	21	1.87
9.	*A. avenaceus*	-	-	2	0.67	-	-	-	-	4	1.33	-	-	-	-	5	1.67	-	-	4	1.33	5	1.67	-	-	20	1.78
10.	*A. candidus*	-	-	-	-	5	1.67	-	-	-	-	-	-	-	-	-	-	5	1.67	3	1.00	4	1.33	6	2.00	23	2.04
11.	*A. chevalieri*	3	1.00	-	-	-	-	3	1.00	-	-	2	0.67	-	-	-	-	3	1.00	3	1.00	-	-	4	1.33	18	1.60
12.	*A. creneus*	-	-	-	-	5	1.67	-	-	1	0.33	-	-	5	1.67	-	-	2	0.67	3	1.00	5	1.67	5	1.67	26	2.31
13.	*A. flavus*	-	-	3	1.00	-	-	-	-	5	1.67	-	-	4	1.33	1	0.33	5	1.67	5	1.67	3	1.00	1	0.33	27	2.40
14.	*A. foetidus*	3	1.00	-	-	2	0.67	-	-	-	-	4	1.33	-	-	1	0.33	2	0.67	-	-	2	0.67	-	-	14	1.24
15.	*A. funiculosus*	1	0.33	1	0.33	-	-	4	1.33	-	-	-	-	-	-	-	-	2	0.67	4	1.33	3	1.00	5	1.67	20	1.78
16.	*A. fumigatus*	-	-	-	-	3	1.00	-	-	3	1.00	-	-	2	0.67	-	-	3	1.00	2	0.67	2	0.67	2	0.67	17	1.51
17.	*A. humicola*	1	0.33	7	2.33	-	-	2	0.67	-	-	2	0.67	-	-	-	-	-	-	3	1.00	1	0.33	-	-	16	1.42
18.	*A. itaconicus*	-	-	-	-	3	1.00	-	-	3	1.00	-	-	5	1.67	2	0.67	2	0.67	3	1.00	2	0.67	-	-	20	1.78
19.	*A. luchensis*	5	1.67	-	-	-	-	5	1.67	-	-	2	0.67	-	-	-	-	-	-	4	1.33	-	-	5	1.67	21	1.87
20.	*A. nidulans*	3	1.00	-	-	-	-	-	-	4	1.33	-	-	5	1.67	3	1.00	-	-	5	1.67	-	-	-	-	20	1.78
21.	*A. niger*	6	2.00	1	0.33	4	1.33	5	1.67	-	-	2	0.67	4	1.33	-	-	3	1.00	2	0.67	2	0.67	6	2.00		3.11
																										35	

22.	*A. ochraceus*	-	-	2	0.67	-	-	-	-	-	-	3	1.00	-	-	-	-	-	-	-	-	3	1.00	4	1.33	12	1.07
23.	*A. oryzae*	-	-	-	-	3	1.00	-	-	2	0.67	-	-	3	1.00	-	-	-	-	-	-	3	1.00	2	0.67	13	1.15
24.	*A. rugulosus*	2	0.67	-	-	-	-	3	1.00	-	-	-	-	-	-	4	1.33	1	0.33	5	1.67	2	0.67	-	-	17	1.51
25.	*A. sachari*	-	-	2	0.67	-	-	-	-	-	-	6	2.00	-	-	-	-	-	-	-	-	-	-	5	1.67	13	1.15
26.	*A. sparsus*	3	1.00	-	-	-	-	3	1.00	-	-	-	-	-	-	4	1.33	5	1.67	-	-	-	-	-	-	15	1.33
27.	*A. tamarii*	-	-	3	1.00	-	-	5	1.67	6	2.00	-	-	4	1.33	-	-	-	-	-	-	-	-	2	0.67	20	1.78
28.	*A. terricola*	-	-	-	-	5	1.67	-	-	-	-	3	1.00	-	-	5	1.67	1	0.33	-	-	2	0.67	-	-	16	1.42
29.	*A. variegatus*	5	1.67	5	1.67	-	-	3	1.00	-	-	-	-	-	-	-	-	-	-	-	-	4	1.33	5	1.67	22	1.95
30.	*A. versicolor*	-	-	-	-	-	-	-	-	5	1.67	-	-	3	1.00	-	-	1	0.33	4	1.33	-	-	-	-	13	1.15
31.	*A. violaceofuscus*	-	-	5	1.67	-	-	-	-	-	-	3	1.00	-	-	-	-	4	1.33	3	1.00	-	-	-	-	15	1.33
32.	*Botrytis cinera*	-	-	-	-	3	1.00	-	-	-	-	-	-	4	1.33	-	-	-	-	-	-	3	1.00	5	1.67	15	1.33
33.	*Botryotrichum piluliferum*	3	1.00	-	-	-	-	5	1.67	-	-	-	-	-	-	4	1.33	3	1.00	2	0.67	-	-	-	-	17	1.51
34.	*Cephalosporium acremonium*	-	-	-	-	-	-	-	-	1	0.33	5	1.67	-	-	-	-	-	-	-	-	5	1.67	5	1.67	16	1.42
35.	*Circinella sydowi*	4	1.33	-	-	-	-	3	1.00	-	-	-	-	-	-	3	1.00	2	0.67	2	0.67	-	-	-	-	14	1.24
36.	*Cladosporium* sp.	3	1.00	-	-	-	-	-	-	-	-	-	-	5	1.67	-	-	-	-	3	1.00	-	-	-	-	11	0.98
37.	*Curvularia pallescens*	-	-	-	-	5	1.67	-	-	-	-	-	-	-	-	2	0.67	-	-	-	-	5	1.67	-	-	12	1.07
38.	*Dendryphion nanum*	-	-	-	-	-	-	3	1.00	-	-	2	0.67	-	-	-	-	-	-	-	-	3	1.00	4	1.33	12	1.07
39.	*Fusarium moniliforme*	-	-	1	0.33	-	-	-	-	5	1.67	-	-	2	0.67	2	0.67	-	-	-	-	-	-	3	1.00	13	1.15
40.	*F. oxysporum*	-	-	-	-	3	1.00	-	-	-	-	-	-	4	1.33	-	-	-	-	-	-	5	1.67	6	2.00	18	1.60
41.	*Gliocladiopsis sagariensis*	-	-	-	-	-	-	3	1.00	-	-	2	0.67	-	-	3	1.00	1	0.33	5	1.67	-	-	-	-	14	1.24
42.	*Helminthosporium oryzae*	-	-	5	1.67	-	-	-	-	-	-	-	-	2	0.67	-	-	4	1.33	-	-	-	-	5	1.67	16	1.42
43.	*Hyalopus* sp.	-	-	-	-	4	1.33	-	-	4	1.33	-	-	-	-	-	-	2	0.67	-	-	3	1.00	-	-	13	1.15
44.	*Mammaria echinotryoides*	-	-	3	1.00	-	-	5	1.67	-	-	5	1.67	-	-	-	-	-	-	-	-	2	0.67	3	1.00	18	1.60
45.	*Metarrhizium anisopliae*	5	1.67	-	-	5	1.67	-	-	-	-	6	2.00	-	-	-	-	-	-	3	1.00	-	-	-	-	19	1.69
46.	*Metarrhizium* sp.	-	-	-	-	-	-	-	-	-	-	-	-	5	1.67	4	1.33	-	-	3	1.00	-	-	-	-	12	1.07

47.	*Paecilomyces elegans*	3	1.00	3	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0.67	2	0.67	5	1.67	15	1.33
48.	*P. marquendi*	-	-	-	-	5	1.67	-	-	-	-	6	2.00	-	-	3	1.00	3	1.00	4	1.33	-	-	-	-	21	1.87
49.	*Penicillium* sp.	-	-	-	-	5	1.67	-	-	-	-	6	2.00	-	-	-	-	-	-	-	-	2	0.67	3	1.00	16	1.42
50.	*P. brevilompactum*	2	0.67	-	-	-	-	1	0.33	5	1.67	-	-	-	-	-	-	3	1.00	4	1.33	-	-	-	-	15	1.33
51.	*P. charlesii*	3	1.00	1	0.33	-	-	-	-	-	-	-	-	4	1.33	5	1.67	-	-	-	-	-	-	6	2.00	19	1.69
52.	*P. chrysogenum*	5	1.67	-	-	-	-	5	1.67	-	-	-	-	-	-	-	-	-	-	6	2.00	4	1.33	-	-	20	1.78
53.	*P. citrinum*	-	-	-	-	5	1.67	-	-	-	-	6	2.00	-	-	6	2.00	-	-	5	1.67	1	0.33	-	-	23	2.04
54.	*P. cyclopium*	5	1.67	-	-	-	-	-	-	5	1.67	-	-	6	2.00	-	-	5	1.67	-	-	-	-	6	2.00	27	2.40
55.	*P. janthinellum*	-	-	7	2.33	-	-	3	1.00	-	-	5	1.67	-	-	-	-	-	-	5	1.67	-	-	-	-	20	1.78
56.	*P. rugulosum*	-	-	-	-	-	-	3	1.00	2	0.67	-	-	-	-	-	-	5	1.67	6	2.00	-	-	-	-	16	1.42
57.	*Scolecobasidium humicola*	-	-	-	-	2	0.67	-	-	-	-	5	1.67	-	-	-	-	3	1.00	-	-	-	-	5	1.67	15	1.33
58.	*Thielavia terricola*	-	-	-	-	5	1.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	1.67	3	1.00	13	1.15
59.	*Trichoderma glaucum*	-	-	1	0.33	-	-	3	1.00	-	-	-	-	-	-	-	-	-	-	5	1.67	5	1.67	-	-	14	1.24
60.	*T. harzianum*	-	-	3	1.00	-	-	-	-	4	1.33	-	-	5	1.67	-	-	2	0.67	3	1.00	-	-	-	-	17	1.51
61.	*T. koningii*	5	1.67	4	1.33	-	-	3	1.00	-	-	4	1.33	-	-	5	1.67	1	0.33	-	-	5	1.67	-	-	27	2.40
62.	*T. lignorum*	-	-	-	-	6	2.00	-	-	4	1.33	-	-	-	-	-	-	-	-	4	1.33	-	-	5	1.67	19	1.69
63.	*T. viride*	5	1.67	-	-	-	-	5	1.67	-	-	-	-	-	-	4	1.33	-	-	-	-	4	1.33	-	-	18	1.60
64.	Truncatella truncatta	-	-	1	0.33	6	2.00	-	-	-	-	1	0.33	-	-	3	1.00	-	-	-	-	5	1.67	-	-	16	1.42
65.	Ulolodium consortiale	5	1.67	-	-	-	-	-	-	-	-	-	-	5	1.67	-	-	4	1.33	-	-	-	-	-	-	14	1.24
	Total	87	29	74	24.6	91	30.3	83	27.6	71	23.6	87	29	85	28.3	74	24.6	85	28.4	131	43.6	117	39	141	47	1126	100

TNC – Total Number of Colonies; MD – Mean Density

Table.3 Percentage frequency and frequency class of different species of fungi recorded at Manachanallur, Tiruchirappalli Dt. (n=12)

S. No.	Name of the organisms	Manachanallur		
		No. of months in which the fungus occurred	Percentage frequency	Frequency class
1.	*Absidia glauca*	6	50	O
2.	*Absidia repens*	4	33	O
3.	*Acremonium rutilum*	4	33	O
4.	*Acrophialophora*	4	33	O
5.	*Acrostalagmus albus*	5	42	O
6.	*Alternaria tenuis*	4	33	O
7.	*Aspergillus aculeatus*	7	58	F
8.	*A . auratus*	5	42	O
9.	*A. avenaceus*	5	42	O
10.	*A. candidus*	5	42	O
11.	*A. chevalieri*	6	50	O
12.	*A. creneus*	7	58	F
13.	*A. flavus*	8	67	F
14.	*A. foetidus*	6	50	O
15.	*A. funiculosus*	7	58	F
16.	*A. fumigatus*	7	58	F
17.	*A. humicola*	6	50	O
18.	*A. itaconicus*	7	58	F
19.	*A. luchensis*	5	42	O
20.	*A. nidulans*	5	42	O
21.	*A. niger*	10	83	C
22.	*A. ochraceus*	4	33	O
23.	*A. oryzae*	5	42	O
24.	*A. rugulosus*	6	50	O
25.	*A. sachari*	3	25	R
26.	*A. sparsus*	4	33	O
27.	*A. tamarii*	5	42	O
28.	*A. terricola*	5	42	O
29.	*A. variegatus*	5	42	O
30.	*A. versicolor*	4	33	O
31.	*A. violaceofuscus*	4	33	O
32.	*Botrytis cinera*	4	33	O

33.	*Botryotrichum piluliterum*	5	42	O
34.	*Cephalosporium*	4	33	O
35.	*Circinella sydowi*	5	42	O
36.	*Cladosporium* sp.	3	25	R
37.	*Curvularia pallescens*	3	25	R
38.	*Dendryphion nanum*	4	33	O
39.	*Fusarium moniliforme*	5	42	O
40.	*F. oxysporum*	4	33	O
41.	*Gliocladiopsis sagariensis*	5	42	O
42.	*Helminthosporium oryzae*	4	33	O
43.	*Hyalopus* sp.	4	33	O
44.	*Mammaria echinotryoides*	5	42	O
45.	*Metarrhizium anisopliae*	4	33	O
46.	*Metarrhizium* sp.	3	25	R
47.	*Paecilomyces elegans*	5	42	O
48.	*Paccilomyces mar quendi*	5	42	O
49.	*Penicillium* sp.	4	33	O
50.	*P. brevilompactum*	5	42	O
51.	*P. charlesii*	5	42	O
52.	*Penicillium chrysogenum*	4	33	O
53.	*P. citrinum*	5	42	O
54.	*P. cyclopium*	5	42	O
55.	*P. janthinellum*	4	33	O
56.	*P. rugulosum*	4	33	O
57.	*Scolecobasidium humicola*	4	33	O
58.	*Thielavia terricola*	3	25	R
59.	*Trichoderma glaucum*	4	33	O
60.	*T. harzianum*	5	42	O
61.	*T. koningii*	7	58	F
62.	*T. lignorum*	4	33	O
63.	*T. viride*	4	33	O
64.	*Truncatella truncatta*	5	42	O
65.	*Ulolodium consortiale*	3	25	R

R – Rare (0-25%); O – Occasional (26-50%); F – Frequent (51-75%); C – Common (76-100%)

Table.4 Physico – chemical characteristics of the soil samples

Sl. No.	Name of the Parameter	Jan.	Feb.	March	April	May	June	July	August	September	October	November	December
1.	pH	7.26	7.56	7.41	7.62	7.23	7.41	7.21	7.26	7.22	7.54	7.29	7.16
2.	EC (dsm^{-1})	0.89	0.72	0.67	0.82	0.86	0.74	0.58	0.59	0.58	0.58	0.55	0.62
3.	Organic Carbon (%)	0.56	0.61	0.49	0.52	0.49	0.42	0.62	0.63	0.54	0.58	0.52	0.58
4.	Available Nitrogen (%)	0.967	1.026	0.819	0.924	0.826	0.746	0.982	1.215	0.925	0.936	0.916	0.825
5.	Available Phosphorus (%)	0.125	0.198	0.154	0.196	0.172	0.211	0.135	0.213	0.168	0.216	0.216	0.236
6.	Available Potassium (%)	0.712	0.825	0.756	0.658	0.845	0.793	0.842	0.849	0.812	0.712	0.945	0.879
7.	Available Zinc (ppm)	0.89	0.92	1.06	1.04	0.89	0.71	0.96	1.08	1.12	1.16	0.96	0.87
8.	Available Copper (ppm)	0.62	0.58	0.64	0.49	0.63	0.52	0.85	0.69	0.72	0.59	0.82	0.74
9.	Available Iron (ppm)	4.59	4.68	4.12	4.30	4.59	4.37	5.36	5.12	4.58	4.63	4.69	4.52
10.	Available Manganese (ppm)	1.96	1.58	1.48	1.27	1.85	1.92	2.36	2.14	2.06	1.59	2.21	2.36
11.	Cat ion Exchange Capacity C. Mole $Proton^{+}$/kg	32.19	33.25	34.16	36.25	35.66	36.71	33.25	34.26	35.12	37.65	35.6	37.2
12.	Calcium C. Mole $Proton^{+}$/kg	15.69	16.25	17.29	18.62	16.72	17.85	16.25	17.15	18.65	19.26	17.54	18.62
13.	Magnesium C. Mole $Proton^{+}$/kg	12.68	13.65	12.68	13.25	15.26	14.52	13.54	13.21	13.20	13.65	16.24	15.36
14.	Sodium C. Mole $Proton^{+}$/kg	3.96	4.25	4.68	4.71	3.96	4.02	4.56	4.19	4.28	4.62	4.25	4.21
15.	Potassium C. Mole $Proton^{+}$/kg	0.09	0.16	0.14	0.19	0.16	0.14	0.12	0.18	0.16	0.21	0.22	0.21

Table.5 Correlation coefficient (r) values for various physico-chemical parameters and total fungal colonies of banana field soils of Manachanallur, Tiruchirappalli Dt

	pH	EC	OC	AN	AP	AK	AZ	AC	AI	AM	CEC	Ca	Mg	Na	K	TFC
pH	1															
EC	0.213	1														
OC	-0.137	-0.383	1													
AN	-0.002	-0.251	0.803**	1												
AP	0.222	-0.364	-0.016	-0.023	1											
AK	-0.620*	-0.503	0.144	0.063	0.301	1										
AZ	0.197	-0.450	0.426	0.472	-0.043	-0.260	1									
AC	-0.739**	-0.647*	0.416	0.202	-0.137	0.732**	0.128	1								
AI	-0.416	-0.413	0.719**	0.675*	-0.128	0.431	0.111	0.619*	1							
AM	-0.877**	-0.452	0.292	0.127	0.029	0.743**	-0.271	0.809**	0.624*	1						
CEC	0.185	-0.222	-0.369	-0.476	0.746**	-0.002	0.024	-0.220	-0.361	-0.094	1					
Ca	0.247	-0.396	-0.199	-0.284	0.625*	-0.174	0.383	-0.177	-0.376	-0.174	0.872**	1				
Mg	-0.294	-0.173	-0.258	-0.380	0.557	0.709**	-0.444	0.325	0.017	0.427	0.509	0.166	1			
Na	0.503	-0.366	0.180	0.054	-0.023	-0.401	0.645*	-0.008	-0.087	-0.449	0.149	0.404	-0.371	1		
K	0.184	-0.487	0.089	0.023	0.856**	0.297	0.320	0.087	-0.090	-0.016	0.736**	0.709**	0.561	0.251	1	
TFC	-0.087	-0.467	0.077	-0.301	0.508	0.154	0.088	0.266	-0.148	0.246	0.602*	0.584*	0.432	0.203	0.596*	1

Ec - Electrical conductivity; OC - Organic carbon; AN - Available nitrogen; AP - Available phosphorous; AK - Available potassium; AZ - Available zinc; AC - Available copper; AI - Available iron; AM - Available manganese; CEC - Cat ion exchange capacity; CA – Calcium; Mg – Magnesium; Na – Sodium; K – Potassium; TFC - Total fungal colonies.

*. Correlation is significant at the 0.05 level. **. Correlation is significant at the 0.01 level.

Acknowledgement

The author gratefully acknowledge the Secretary and Correspondence of Jamal Mohamed College (Aut.), Trichy - 620 020 for the permission to carry out the research work in the college of excellence.

References

APHA, 1989. Standard Methods for the Examination of Water and Wastewater. 17th edition, American Public Health Association, USA.

Chandrashekar, M. A., Soumya Pai, K. and Raju, N. S., 2014. Fungal diversity of rhizosphere soils in different agricultural fields of Nanjangud Taluk of Mysore District, Karnataka, India. *Int.J.Curr.Microbiol.App.Sci.*, 3(5): 559-566.

Domsch, K.H., Gams, W. and Anderson, T.H., 1980. Compendium of soil fungi. Academic Press, New York, USA.

Gaddeyya, G., Shiny, P., Niharika, Bharathi, P. and Ratna Kumar, P. K., 2012. Isolation and identification of soil mycoflora in different crop fields at Salur Mandal. *Advances in Applied Science Research*, 3 (4):2020-2026.

Gillman, J.C., 1957. A Manual of Soil Fungi. Revised 2nd edition Oxford and IBH publishing company (Indian reprint) Calcutta, Bombay, New Delhi.

Ibrahim, M. and Shehu, K., 2014. Relationship of soilborne mycoflora of cassava growing fields to incidence of postharvest rots of cassava tubers in Sokoto, Nigeria. *Aceh Int. J. Sci. Technol*., 3(3): 168-173.

Ishaq, F. and Khan, A., 2011. Isolation, identification and comparative study of fungal and bacterial strains found in organic and inorganic soils of different agricultural fields, *Recent Research in Science and Technology*, 3(11): 30-36.

Mahalingam R., Bharathidasan R., Ambikapathy V and V., Panneerselvam A., 2012. An investigation of the soil mycoflora in sugarcane field of Dharmapuri District, Tamilnadu, *Adv .Appl.Sci. Res*, 3(3), 1255-1261.

Nilima Wahegaonkar, S.M., Salunkhe, P., Palsingankar, L. and Shinde, S.Y., 2011. Diversity of fungi from soils of Aurangabad, M.S., India. *Annals of Biological Research*, 2 (2):198-205.

Pandey, V., Singh, P. K., Mishra, R. K., Srivastva, V. and Shukla, D. N., 2014. Studies on soil mycoflora of sugarcane field in central Uttar Pradesh, *Arch. Appl. Sci. Res.*, 6 (4):230-237.

Prince L. and Prabakaran P., 2012. Studies on the Soil Mycoflora from the Sugarcane field in Thanjavur District, Tamilnadu, *J. Microbiol. Biotech. Res* , 2(1), 63-69.

Rakesh Sharma, M.S. and Raju, N.S., 2013. Frequency and percentage occurrence of soil mycoflora in different crop fields at H D Kote of Mysore district. *International Journal of Environmental Sciences*, 3(5): 1569 – 1576.

Raper, K.B. and Fennell, D.I., 1965. The genus *Aspergillus*, The Williams and Wilkins Co., Baltimore, U.S.A.

Raper, K.B. and Thom, C., 1949. A Manual of Penicillia. Williams and Wilkins Co., Baltimore, Md., U.S.A.

Shiny Niharika, P., Gaddeyya G. and Ratna Kumar P.K., 2013. An investigation on soil mycoflora of different crop fields at Narasannapeta Mandal, Srikakulam District. *Int. Res. J. Environment Sci.* 2(9), 38-44,

Subramanian, C.V., 1971. Hypomycetes: An account of Indian species, *Indian Counc. Agri. Res.*, New Delhi.

Warcup, J.H., 1950. The soil plate method for isolation of fungi from soil. *Nature*, 166: 117-117.