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Studies on Isolation and Identification of Mycoflora in *Carica papaya* L. Field Soil from Perumalagaram, Thiruvarur dt., Tamil Nadu, India

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A B S T R A C T

In the present research work, a total of 59 species belonging to 19 genera of mycoflora were isolated from papaya field soil at Perumalagaram, Thiruvarur Dt., Tamil Nadu during the months of July 2013 – June 2014. Maximum number of fungal isolates belonged to the class Deuteromycetes (48 species). Ascomycetes (6 species) and Phycomycetes (5 species) occurred in very low frequencies. Among the 19 genera recorded, *Aspergillus* was the dominant genus followed by *Penicillium* and *Trichoderma* in papaya field soil. The physico - chemical characteristics of soil samples were found to affect the distribution and population of fungi.

Introduction

Soil is the major component of earth ecosystem which comprises of organic matter, minerals, gases and large numbers of macro and microorganisms. Micro organisms are beneficial in increasing the soil fertility and plant growth as they are involved in several biochemical transformation and mineralization activities in soil (Buscot and Varma, 2005). Fungi are a major component of biodiversity, essential for the survival of other organisms and are crucial in global ecological processes. Fungi being ubiquitous organisms occur in all

types of habitats and are the most adaptable organisms (Hawksworth, 2001).

From the numerous studies on soil fungi there has gradually grown up the concept of a fungal flora of the soil, fungal flora may vary depends on its native soils (Shi *et al.*, 2002; Gleason *et al.*, 2004). Some fungi are widely distributed in soil and others are limited to certain habitats. Fungal diversity of any soil depends on a large number of factors of the soil such as pH, organic

content, organic carbon, nitrogen and moisture (Gaddeyya *et al.*, 2012).

The conservation of diversity of soil fungi in agricultural fields becomes very essential for the development of sustainable agriculture. Study of soil mycoflora and physicochemical parameters is important to agricultural scientists for plants growth and soil management. For this reason, the main goal of this investigation is to assess the diversity of soil mycoflora in *Carica papaya* L. (Papaya) cultivated field of Perumalagaram, Thiruvarur Dt., Tamil Nadu.

Materials and Methods

Collection of soil samples

This study was carried out in the papaya garden at Perumalagaram, Thiruvarur Dt., Tamil Nadu between the months of July 2013 – June 2014. The soil samples were collected at a depth within 15 cm using a metal spatula into a small sterilized polythene bags and brought to laboratory for mycological examination (Fig. 1).

Isolation of soil fungi

Dilution plating technique described by Waksman (1922) 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 petriplates containing sterilized PDA medium (Potato - 200 gms, dextrose- 20 gms, agar -15 gms, distilled water -1000 ml, pH -6.5) supplemented with one percent streptomycin sulphate solution for preventing bacterial growth. The inoculated plates were incubated in a dust free cupboard at the room temperature ($27\pm 2^{\circ}\text{C}$) for 3 - 5 days. Individual fungal colonies were isolated and pure cultures were maintained in PDA medium for further study.

Identification of soil fungi

Fungal morphology were studied macroscopically by observing colony features (Colour and Texture) and microscopically by staining with lactophenol cotton blue and observed under Nikon microscope for the conidia, conidiophores and arrangement of spores. Identification and characterization of the isolated mycoflora were made with the help of authentic manuals of fungi such as A manual of soil fungi (Gillman, 1957), A manual of Penicillia (Raper and Thom, 1949), The genus *Aspergillus* (Raper and Fennell, 1965) and Fungi in agricultural soils (Domsch and Gams, 1972).

Analysis of Physico-chemical characteristics of the soil

The physico-chemical parameters of the soil samples were analyzed at Soil Testing Laboratory, Department of Agriculture, Government of Tamil Nadu, Tiruchirappalli - 20. Soil samples after removing the debris were suspended in distilled water (1:2 w/v) and allowed to settle down the sand particles. The pH of the suspension was read using pH meter (Systronics, India), to find out the soil pH. Electrical conductivity, organic Carbon, organic Matter, available Nitrogen, available Phosphorus, available Potassium, available Zinc, available Copper, available Iron, cation exchange capacity, available 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 research work, a total of 59 species belonging to 19 genera of mycoflora were isolated and identified from papaya field soil at Perumalagaram, Thiruvarur Dt., Tamil Nadu during the months of July 2013 – June 2014 (Table 1). Correspondingly, 18 species belonging to 6 genera of fungi from paddy field (Ratna Kumar *et al.*, 2015), 42 species belonging to 13 genera of mycoflora from sugarcane field (Pandey *et al.*, 2014) and 26 fungal species belonging 11 genera from *Brassica* growing agricultural fields (Guleri *et al.*, 2016) have been reported in the other part of India.

In the present study, maximum number of fungal isolates belonged to the class Deuteromycetes (48 species). Ascomycetes (6 species) and Phycomycetes (5 species) occurred in very low frequencies (Fig. 2). Our results are harmony with the previous findings of Ratna Kumar *et al.* (2015), Gnanasekaran *et al.* (2015) and Guleri *et al.* (2016) who reported that Deuteromycetes were prevailing group of fungi in paddy,

banana and *Brassica* cultivated agricultural fields respectively.

In the present investigation, among the 19 genera recorded, *Aspergillus* was the dominant genus followed by *Penicillium* and *Trichoderma* in papaya field soil. This is in accordance with the studies of Prince *et al.* (2011), Steffi and Mary Josephine (2013), Guleri *et al.* (2014) and Saini *et al.* (2016) who reported that *Aspergillus* and *Penicillium* were most dominant genera in various agricultural field. The incidence of abundance of *Aspergillus* and *Penicillium* species in papaya field were probably due to their high sporulation capacity, production of antibiotics and mycotoxins and it may prevent the growth of other fungal species.

The monthly variation, percentage contribution and percentage frequency of the papaya field mycoflora were analyzed (Table 2 & 3). The maximum number of 41 fungal species was isolated from the month of June 2014 and the minimum of 32 soil fungi were recorded in the month of May 2013.

Figure.1 Study site and Collection of soil from papaya field at Perumalagaram, Thiruvarur Dt.



Table.1 List of isolated soil mycoflora from papaya field at Perumalagaram, Thiruvarur Dt.

S. No.	Isolated soil mycoflora
1.	<i>Absidia glauca</i> Hagen
2.	<i>Acremonium rutilum</i> W. Gams
3.	<i>Acrophialophora fusispora</i>
4.	<i>Aspergillus asperescens</i> Stolk,
5.	<i>A. aureoles</i> Fennell & Raper
6.	<i>A. carbonarius</i>
7.	<i>A. candidus</i> Link
8.	<i>A. crystallinus</i> Kwon – Chung and
9.	<i>A. flavus</i> Link
10.	<i>A. flavipes</i> Bainer and Sartory
11.	<i>A. fumigatus</i> Fresenius
12.	<i>A. funiculosus</i> Fresenius
13.	<i>A. glaucus</i> Link
14.	<i>A. granulatus</i> Raper and Thom
15.	<i>A. luteus</i> (Tiegh) C.W.Dodge
16.	<i>A. melleus</i> Yukawa
17.	<i>A. nidulans</i> Winter
18.	<i>A. niger</i> Van Tieghem
19.	<i>A. ochraceus</i> Wilhelm
20.	<i>A. oryzae</i> (Ahlburgin Korschelt)
21.	<i>A. repens</i> (Corda) de Bary
22.	<i>Aspergillus</i> sp.
23.	<i>A. sparsus</i> Raper and Thom
24.	<i>A. subolivaceus</i> Raper and Fennell
25.	<i>A. terreus</i> Thom
26.	<i>A. unguis</i> (Emile Weil and Gowden)
27.	<i>A. ustus</i> Thom and Church
28.	<i>A. versicolor</i> Thom and Raper
29.	<i>A. violaceus</i> Fennell and Raper
30.	<i>Chaetomium globosum</i> Kunze
S. No.	Isolated soil mycoflora
31.	<i>Chaetomium</i> sp. Kunze and Schmit
32.	<i>Cunninghamella elegans</i> Lendner
33.	<i>Curvularia geniculata</i> (Tracy and
34.	<i>Cylindrocladium parvum</i> P.J.
35.	<i>Dendrochium gracile</i> Daszewska
36.	<i>Fusarium moniliforme</i> sheldon
37.	<i>F. oxysporum</i> Schlechendahl
38.	<i>F. solani</i> (Martius) Appel and
39.	<i>Gliocladium</i> sp.
40.	<i>Gonitrichum macrocladium</i> Iqbal
41.	<i>Memnoniella echinata</i> (Rivolta)
42.	<i>Penicillium citrinum</i> Thom
43.	<i>P. frequentans</i> Westling
44.	<i>P. italicum</i> Wehmer
45.	<i>P. janthinellum</i> Blourge
46.	<i>P. lanosum</i> Westling
47.	<i>P. martensii</i> Blourge
48.	<i>P. nigricans</i> Bainier
49.	<i>P. purpurogenum</i> Stoll
50.	<i>Phytophthora palmivora</i> E.J.Butler
51.	<i>Rhizopus nigricans</i> Ehrenberg
52.	<i>Rhizopus</i> sp.
53.	<i>Syncephalastrum racemosum</i> (Cohn)
54.	<i>Torula herbarum</i> (Pers) Link
55.	<i>Trichoderma glaucum</i> E.V. Abbott
56.	<i>T. harzianum</i> Rifai
57.	<i>T. koningii</i> Oudem
58.	<i>T. lignorum</i> (Tode) Harz
59.	<i>T. viride</i> Pers.

Table.2 Total number of colonies, mean density (CFU/g) and percentage contribution of fungi from papaya field at Perumalagaram, Thiruvvarur Dt.

S. No.	Name of the fungi	July		August		September		October		November		December		January		February		March		April		May		June		Total No of colonies	% of contribution
		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.	<i>Absidia glauca</i>	-	-	-	-	4	1.33	-	-	2	0.66	2	0.66	5	1.66	2	0.66	3	1.00	-	-	-	-	4	1.33	22	1.61
2.	<i>Acremonium rutilum</i>	-	-	-	-	2	0.66	2	0.66	-	-	2	0.66	-	-	-	-	2	0.66	-	-	-	-	2	0.66	10	0.73
3.	<i>Acrophialophora fuispora</i>	3	1.00	2	0.66	2	0.66	-	-	-	-	5	1.66	-	-	-	-	4	1.33	-	-	2	0.66	-	-	18	1.31
4.	<i>Aspergillus asperescens</i>	3	1.00	-	-	3	1.00	-	-	-	-	2	0.66	-	-	4	1.33	4	1.33	2	0.66	-	-	3	1.0	21	1.53
5.	<i>A. aureoles</i>	-	-	4	1.33	-	-	3	1.00	2	0.66	-	-	3	1.00	-	-	2	0.66	-	-	3	1.00	-	-	17	1.24
6.	<i>A. carbonarius</i>	3	1.00	3	1.00	-	-	4	1.33	3	1.00	4	1.33	5	1.66	-	-	-	-	-	-	3	1.00	4	1.33	29	2.12
7.	<i>A. candidus</i>	4	1.33	-	-	3	1.00	-	-	2	0.66	-	-	-	-	5	1.66	2	0.66	-	-	4	1.33	2	0.66	22	1.61
8.	<i>A. crystallinus</i>	-	-	2	0.66	2	0.66	3	1.00	-	-	3	1.00	4	1.33	-	-	-	-	2	0.66	2	0.66	-	-	18	1.32
9.	<i>A. flavus</i>	5	1.66	7	2.33	4	1.33	3	1.00	5	1.66	6	2.00	2	0.66	-	-	4	1.33	4	1.33	-	-	2	0.66	42	3.08
10.	<i>A. flavipes</i>	3	1.00	3	1.00	-	-	2	0.66	2	0.66	2	0.66	-	-	-	-	-	-	4	1.33	-	-	2	0.66	18	1.31
11.	<i>A. fumigatus</i>	4	1.33	-	-	3	1.00	-	-	3	1.00	3	1.00	-	-	-	-	2	0.66	-	-	4	1.33	4	1.33	23	1.68
12.	<i>A. funiculosus</i>	-	-	4	1.33	-	-	3	1.00	2	0.66	-	-	2	0.66	-	-	-	-	2	0.66	2	0.66	-	-	15	1.09
13.	<i>A. glaucus</i>	-	-	2	0.66	4	1.33	-	-	2	0.66	-	-	3	1.00	4	1.33	-	-	3	1.00	-	-	4	1.33	22	1.61
14.	<i>A. granulosis</i>	3	1.00	-	-	-	-	3	1.00	1	0.33	2	0.66	-	-	-	-	4	1.33	5	1.66	-	-	2	0.66	20	1.46
15.	<i>A. luteus</i>	2	0.66	-	-	-	-	-	-	-	-	-	-	2	0.66	3	1.00	2	0.66	3	1.00	2	0.66	2	0.66	16	1.17
16.	<i>A. melleus</i>	-	-	2	0.66	4	1.33	-	-	-	-	2	0.66	-	-	4	1.33	-	-	4	1.33	-	-	5	1.66	21	1.53
17.	<i>A. nidulans</i>	-	-	-	-	-	-	-	-	2	0.66	3	1.00	4	1.33	2	0.66	2	0.66	2	0.66	2	0.66	-	-	17	1.24
18.	<i>A. niger</i>	4	1.33	5	1.66	2	0.66	5	1.66	3	1.00	3	1.00	4	1.33	2	0.66	2	0.66	6	2.00	-	-	2	0.66	38	2.78
19.	<i>A. ochraceus</i>	3	1.00	3	1.00	-	-	2	0.66	-	-	-	-	1	0.33	-	-	4	1.33	-	-	2	0.66	2	0.66	17	1.24
20.	<i>A. oryzae</i>	2	0.66	2	0.66	2	0.66	-	-	3	1.00	-	-	3	1.00	5	1.66	3	1.00	-	-	-	-	2	0.66	22	1.61
21.	<i>A. repens</i>	4	1.33	2	0.66	4	1.33	7	2.33	4	1.33	-	-	5	1.66	3	1.00	3	1.00	2	0.66	4	1.33	-	-	38	2.78
22.	<i>Aspergillus sp.</i>	2	0.66	-	-	-	-	2	0.66	4	1.33	-	-	-	-	3	1.00	-	-	2	0.66	-	-	3	1.00	16	1.17
23.	<i>A. sparsus</i>	2	0.66	2	0.66	2	0.66	3	1.00	-	-	2	0.66	4	1.33	2	0.66	2	0.66	-	-	-	-	3	1.00	22	1.61
24.	<i>A. subolivaceus</i>	-	-	4	1.33	-	-	3	1.00	-	-	2	0.66	2	0.66	3	1.00	3	1.00	-	-	-	-	2	0.66	19	1.39
25.	<i>A. terreus</i>	-	-	3	1.00	-	-	4	1.33	-	-	2	0.66	3	1.00	5	1.66	2	0.66	2	0.66	-	-	2	0.66	23	1.68
26.	<i>A. unguis</i>	4	1.33	4	1.33	3	1.00	-	-	3	1.00	-	-	-	-	2	0.66	-	-	2	0.66	2	0.66	-	-	20	1.46
27.	<i>A. ustus</i>	-	-	2	0.66	-	-	2	0.66	2	0.66	3	1.00	3	1.00	-	-	2	0.66	-	-	-	-	4	1.33	18	1.31

28.	<i>A. versicolor</i>	2	0.66	2	0.66	-	-	3	1.00	5	1.66	4	1.33	-	-	-	-	3	1.00	-	-	-	-	2	0.66	21	1.53	
29.	<i>A. violaceus</i>	4	1.33	-	-	2	0.66	2	0.66	4	1.33	2	0.66	-	-	3	1.00	2	0.66	-	-	3	1.00	-	-	22	1.61	
30.	<i>Chaetomium globosum</i>	3	1.00	-	-	3	1.00	4	1.33	-	-	5	1.66	2	0.66	-	-	3	1.00	-	-	5	1.66	2	0.66	27	1.61	
31.	<i>Chaetomium</i> sp.	-	-	3	1.00	-	-	3	1.00	2	0.66	3	1.00	-	-	-	-	-	-	2	0.66	-	-	2	0.66	15	1.09	
32.	<i>Cunninghamella elegans</i>	2	0.66	-	-	4	1.33	4	1.33	5	1.66	3	1.00	6	2.00	4	1.33	3	1.00	2	0.66	-	-	3	1.00	36	2.63	
33.	<i>Curvularia geniculata</i>	4	1.33	2	0.66	-	-	4	1.33	5	1.66	-	-	2	0.66	2	0.66	-	-	-	-	-	-	-	3	1.00	22	1.61
34.	<i>Cylindrocladium parvum</i>	4	1.33	2	0.66	4	1.33	-	-	2	0.66	3	1.00	2	0.66	-	-	-	-	3	1.00	-	-	3	1.00	23	1.68	
35.	<i>Dendrochium gracile</i>	3	1.00	2	0.66	4	1.33	3	1.00	3	1.00	-	-	-	-	3	1.00	-	-	-	-	4	1.33	-	-	22	1.61	
36.	<i>Fusarium moniliforme</i>	-	-	3	1.00	-	-	2	0.66	-	-	-	-	-	-	4	1.33	3	1.00	2	0.66	2	0.66	3	1.00	19	1.39	
37.	<i>F. oxysporum</i>	-	-	2	0.66	2	0.66	2	0.66	2	0.66	2	0.66	-	-	4	1.33	4	1.33	-	-	2	0.66	-	-	20	1.46	
38.	<i>F. solani</i>	2	0.66	2	0.66	4	1.33	2	0.66	-	-	2	0.66	3	1.00	-	-	-	-	2	0.66	-	-	2	0.66	19	1.39	
39.	<i>Gliocladium</i> sp.	-	-	-	-	3	1.00	2	0.66	-	-	2	0.66	2	0.66	3	1.00	4	1.33	-	-	-	-	4	1.33	20	1.46	
40.	<i>Gonitrichum macrocladium</i>	-	-	3	1.00	2	0.66	2	0.66	2	0.66	-	-	2	0.66	4	1.33	4	1.33	-	-	-	-	2	0.66	21	1.53	
41.	<i>Memnoniella echinata</i>	2	0.66	-	-	4	1.33	2	0.66	4	1.33	-	-	-	-	-	-	-	-	3	1.00	2	0.66	-	-	17	1.24	
42.	<i>Penicillium citrinum</i>	-	-	4	1.33	2	0.66	-	-	4	1.33	-	-	-	-	3	1.00	2	0.66	-	-	3	1.00	-	-	18	1.31	
43.	<i>P. frequentans</i>	2	0.66	-	-	-	-	3	1.00	-	-	4	1.33	2	0.66	-	-	-	-	3	1.00	-	-	4	1.33	18	1.31	
44.	<i>P. italicum</i>	2	-	4	1.33	2	0.66	2	0.66	4	1.33	3	1.00	-	-	2	0.66	-	-	2	0.66	2	0.66	-	-	23	1.69	
45.	<i>P. janthinellum</i>	-	-	2	0.66	4	1.33	-	-	-	-	-	-	4	1.33	3	1.00	3	1.00	-	-	4	1.33	-	-	20	1.46	
46.	<i>P. lanosum</i>	2	0.66	-	-	2	0.66	-	-	-	-	2	-	2	-	3	1.00	-	-	2	0.66	2	0.66	3	1.00	18	1.31	
47.	<i>P. martensii</i>	3	1.00	-	-	4	1.33	3	1.00	-	-	2	0.66	-	-	-	-	2	0.66	-	-	5	1.66	-	-	19	1.39	
48.	<i>P. nigricans</i>	3	1.00	6	2.00	5	1.66	-	-	4	1.33	4	1.33	3	1.00	5	1.66	-	-	2	0.66	2	0.66	4	1.33	38	2.78	
49.	<i>P. purpurogenum</i>	2	0.66	2	0.66	4	1.33	-	-	-	-	-	-	2	0.66	2	0.66	4	1.33	-	-	-	-	4	1.33	20	1.46	
50.	<i>Phytophthora palmivora</i>	5	1.66	3	1.00	3	1.00	2	0.66	3	1.00	4	1.33	4	1.33	2	0.66	3	1.00	2	0.66	2	0.66	-	-	33	2.41	
51.	<i>Rhizopus nigricans</i>	-	-	2	0.66	2	0.66	-	-	4	1.33	-	-	2	0.66	2	0.66	-	-	2	0.66	2	0.66	3	1.00	19	1.39	
52.	<i>Rhizopus</i> sp.	3	1.00	-	-	2	0.66	2	0.66	-	-	-	-	-	-	4	1.33	3	1.00	-	-	4	1.33	18	1.31			
53.	<i>Syncephalastrum racemosum</i>	-	-	-	-	4	1.33	-	-	-	-	2	0.66	2	0.66	-	-	-	-	-	-	3	1.00	6	2.00	17	1.24	
54.	<i>Torula herbarum</i>	3	1.00	3	1.00	-	-	2	0.66	2	0.66	2	0.66	-	-	3	1.00	2	0.66	4	1.33	2	0.66	-	-	23	1.68	
55.	<i>Trichoderma glaucum</i>	4	1.33	4	1.33	3	1.00	-	-	2	0.66	3	1.00	4	1.33	7	2.33	3	1.00	-	-	5	1.66	4	1.33	39	2.86	
56.	<i>T. harzianum</i>	5	1.66	4	1.33	2	0.66	2	0.66	4	1.33	4	1.33	-	-	2	0.66	-	-	5	1.66	6	2.00	4	1.33	38	2.78	
57.	<i>T. koningii</i>	4	1.33	6	2.00	2	0.66	5	1.66	2	0.66	3	1.00	4	1.33	2	0.66	2	0.66	6	2.00	3	1.00	-	-	39	2.85	
58.	<i>T. lignorum</i>	4	1.33	5	1.66	5	1.66	3	1.00	-	-	7	2.33	2	0.66	4	1.33	3	1.00	4	1.33	-	-	2	0.66	39	2.85	
59.	<i>T. viride</i>	5	1.66	4	1.33	3	1.00	4	1.33	2	0.66	-	-	-	-	2	0.66	6	2.00	7	2.33	2	0.66	4	1.33	39	2.85	
		124		126		125		114		110		114		105		118		112		101		93		124		1364		

TNC – Total Number of Colonies; MD – Mean Density

Table.3 Percentage frequency and frequency class of different species of fungi recorded at papaya field of Perumalagaram, Thiruvarur Dt. (n=12)

S. No.	Name of the organisms	No. of months in which the fungus occurred	Percentage frequency	Frequency class
1	<i>Absidia glauca</i>	7	58	F
2	<i>Acremonium rutilum</i>	5	42	O
3	<i>Acrophialophora fuispora</i>	6	50	O
4	<i>Aspergillus asperescens</i>	7	58	F
5	<i>A. aureoles</i>	6	50	O
6	<i>A. carbonarius</i>	8	67	F
7	<i>A. candidus</i>	7	58	F
8	<i>A. crystallinus</i>	7	58	F
9	<i>A. flavus</i>	10	83	C
10	<i>A. flavipes</i>	7	58	F
11	<i>A. fumigatus</i>	7	58	F
12	<i>A. funiculosus</i>	6	50	O
13	<i>A. glaucus</i>	7	58	F
14	<i>A. granulosis</i>	7	58	F
15	<i>A. luteus</i>	7	58	F
16	<i>A. melleus</i>	6	50	O
17	<i>A. nidulans</i>	7	58	F
18	<i>A. niger</i>	11	92	C
19	<i>A. ochraceus</i>	7	58	F
20	<i>A. oryzae</i>	8	67	F
21	<i>A. repens</i>	10	83	C
22	<i>Aspergillus sp.</i>	6	50	O
23	<i>A. sparsus</i>	9	75	F
24	<i>A. subolivaceus</i>	7	58	F
25	<i>A. terreus</i>	8	67	F
26	<i>A. unguis</i>	7	58	F
27	<i>A. ustus</i>	7	58	F
28	<i>A. versicolor</i>	7	58	F

29	<i>A. violaceus</i>	8	67	F
30	<i>Chaetomium globosum</i>	8	67	F
31	<i>Chaetomium</i> sp.	6	50	O
32	<i>Cunninghamella elegans</i>	10	83	C
33	<i>Curvularia geniculata</i>	7	58	F
34	<i>Cylindrocladium parvum</i>	8	67	F
35	<i>Dendrochium gracile</i>	7	58	F
36	<i>Fusarium moniliforme</i>	7	58	F
37	<i>F. oxysporum</i>	8	67	F
38	<i>F. solani</i>	8	67	F
39	<i>Gliocladium</i> sp.	7	58	F
40	<i>Gonitrichum macrocladium</i>	8	67	F
41	<i>Memnoniella echinata</i>	6	50	O
42	<i>Penicillium citrinum</i>	6	50	O
43	<i>P. frequentans</i>	6	50	O
44	<i>P. italicum</i>	9	75	F
45	<i>P. janthinellum</i>	6	50	O
46	<i>P. lanosum</i>	8	67	F
47	<i>P. martensii</i>	6	50	O
48	<i>P. nigricans</i>	10	83	C
49	<i>P. purpurogenum</i>	7	58	F
50	<i>Phytophthora palmivora</i>	11	92	C
51	<i>Rhizopus nigricans</i>	8	67	F
52	<i>Rhizopus</i> sp.	6	50	O
53	<i>Syncephalastrum</i>	5	42	O
54	<i>Torula herbarum</i>	9	75	F
55	<i>Trichoderma glaucum</i>	10	83	C
56	<i>T. harzianum</i>	10	83	C
57	<i>T. koningii</i>	11	92	C
58	<i>T. lignorum</i>	10	83	C
59	<i>T. viride</i>	10	83	C

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 collected from papaya field at Perumalagaram, Thiruvarur Dt

S. No.	Name of the parameter	Soil samples (2013)											
		July	August	September	October	November	December	January	February	March	April	May	June
1.	pH	7.29	7.16	7.09	7.48	7.19	7.22	7.31	7.36	7.25	7.48	7.51	7.31
2.	Electrical conductivity (dsm ⁻¹)	0.28	0.18	0.12	0.41	0.26	0.49	0.51	0.38	0.34	0.52	0.56	0.26
3.	Organic Carbon (%)	0.29	0.38	0.35	0.18	0.16	0.32	0.25	0.29	0.24	0.28	0.21	0.15
4.	Organic Matter (%)	0.74	0.82	0.75	0.62	0.32	0.44	0.48	0.38	0.38	0.36	0.31	0.40
5.	Available Nitrogen (mg/Kg)	120.2	128.5	124.2	105.2	97.8	115.6	112.0	113.6	106.8	97.6	95.3	103.8
6.	Available Phosphorus (mg/Kg)	2.75	3.25	3.45	4.50	4.00	4.85	4.25	3.75	3.89	3.75	4.25	4.75
7.	Available Potassium(mg/Kg)	108	115	120	119	125	112.6	120.5	119.2	118	124.6	126.5	124
8.	Available Zinc (ppm)	0.79	0.69	0.72	0.96	1.02	0.89	0.84	0.74	0.76	0.89	0.79	0.82
9.	Available Copper (ppm)	0.38	0.39	0.42	0.48	0.52	0.49	0.42	0.46	0.49	0.48	0.49	0.42
10.	Available Iron (ppm)	3.89	3.58	3.63	4.57	4.62	4.26	4.13	4.23	4.56	4.89	4.58	4.63
11.	Available Manganese (ppm)	1.16	1.48	1.69	1.89	1.84	2.89	2.36	2.16	2.16	2.16	2.48	1.59
12.	Cat ion Exchange Capacity (C. Mole Proton ⁺ /kg)	22.6	21.8	20.6	27.1	28.6	24.8	23.0	19.8	25.0	23.6	25.8	24.6
Exchangeable Bases (C. Mole Proton ⁺ /kg)													
13.	Calcium	9.6	9.2	9.7	10.5	11.3	13.2	12.6	10.8	11.6	10.6	11.2	10.7
14.	Magnesium	5.8	5.9	5.8	6.4	6.5	7.9	7.6	7.2	7.9	6.8	6.9	6.8
15.	Sodium	1.06	1.15	1.13	1.35	1.29	1.28	1.26	1.45	1.24	1.45	1.50	1.63
16.	Potassium	0.20	0.24	0.25	0.21	0.23	0.16	0.13	0.24	0.21	0.28	0.29	0.26

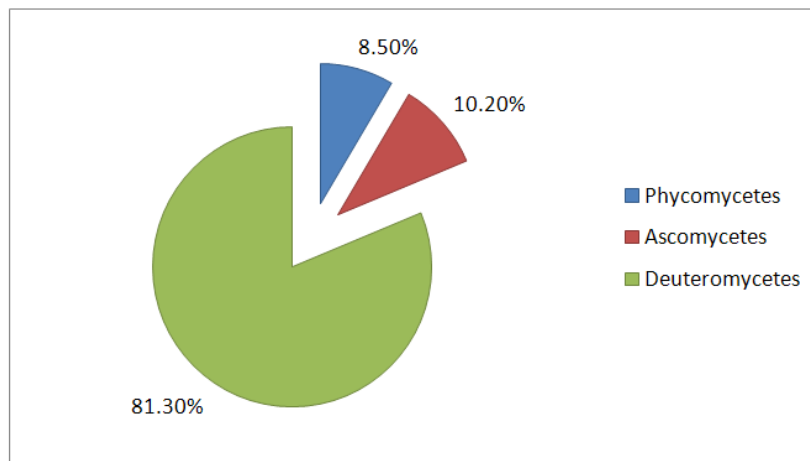
Table.5 Correlation coefficient (r) values for various physico-chemical parameters and total fungal colonies of papaya field at Perumalagaram, Thiruvarur Dt.

	pH	EC	OC	OM	AN	AP	AK	AZ	AC	AI	AM	CEC	CA	MG	NA	K	TNC
pH	1																
EC	0.758**	1															
OC	-0.455	-0.243	1														
OM	-0.449	-0.605*	0.604*	1													
AN	-0.667*	-0.571	0.806**	0.840**	1												
AP	0.292	0.486	-0.548	-0.578*	-0.508	1											
AK	0.373	0.241	-0.563	-0.637*	-0.745**	0.420	1										
AZ	0.284	0.345	-0.633*	-0.426	-0.622*	0.489	0.288	1									
AC	0.322	0.477	-0.468	-0.757**	-0.732**	0.536	0.499	0.622*	1								
AI	0.664*	0.581*	-0.759**	-0.835**	-0.945**	0.572	0.609*	0.635*	0.736**	1							
AM	0.290	0.770**	-0.039	-0.627*	-0.367	0.651*	0.253	0.233	0.648*	0.395	1						
CEC	0.270	0.272	-0.752**	-0.450	-0.702*	0.523	0.351	0.802**	0.661*	0.662*	0.198	1					
CA	0.107	0.653*	-0.266	-0.640*	-0.361	0.712**	0.126	0.416	0.547	0.409	0.852**	0.361	1				
MG	0.195	0.640*	-0.201	-0.692*	-0.347	0.625*	0.126	0.150	0.512	0.465	0.822**	0.179	0.891**	1			
NA	0.624*	0.446	-0.601*	-0.716**	-0.707*	0.652*	0.704*	0.227	0.397	0.730**	0.339	0.252	0.241	0.352	1		
K	0.283	-0.160	-0.111	-0.164	-0.346	-0.169	0.546	-0.190	0.129	0.261	-0.246	-0.019	-0.567	-0.414	0.463	1	
TNC	-0.655*	-0.838**	0.363	0.691*	0.759**	-0.356	-0.577*	-0.388	-0.639*	-0.641*	-0.670*	-0.450	-0.517	-0.468	-0.405	-0.112	1

EC - Electrical conductivity (dsm^{-1}), OC - Organic Carbon (%), OM - Organic Matter (%), AN - Available Nitrogen (mg/Kg), AP - Available Phosphorus (mg/Kg), AK - Available Potassium(mg/Kg), AZ - Available Zinc (ppm), AC - Available Copper (ppm), AI - Available Iron (ppm), AM - Available Manganese (ppm), CEC - Cat ion Exchange Capacity (C. Mole Proton⁺/kg), CA – Calcium, MG – Magnesium, NA – Sodium, K – Potassium, TFC - Total Fungal Colonies

** Correlation is significant at the 00.01 level0. * Correlation is significant at the 00.05 level0.

Figure.2 Percentage of different classes of isolated soil fungi from papaya field at Perumalagaram, Thiruvarur Dt.



The fungal population was low in May month may be due to high temperature in the soil. The soil pH, temperature and organic content are the main factors affecting the fungal population and diversity (Yu *et al.*, 2007).

In the present investigation, physico – chemical characteristics of the soil samples collected from papaya field of Perumalagaram revealed that pH was slightly alkaline in all the soil samples and the pH of soil was ranged from 7.09 to 7.51 (Table 4). Fungal diversity and distribution were correlated with physico – chemical properties of soil (Table 5). Organic matter ($r = 0.691$; $P < 0.05$) and available Nitrogen ($r = 0.759$; $P < 0.01$) showed positive correlation.

The result obtained clearly indicates that the diversity of mycoflora in papaya field was found to be regulated by physico – chemical characteristics of the soil like organic matter and available Nitrogen, etc. These results are agreement with the previous study of Gnanasekaran *et al.* (2015) who reported that the diversity and distribution of soil fungi in the banana cultivated of Manachanallur are influenced by the physico-chemical properties of soil.

Conclusion

The present study provides a description of the soil mycoflora in papaya cultivated field of Perumalagaram. Based on the results, it could be concluded that the papaya cultivated soils are one of the most significant sources for the novel, potential mycoflora from agricultural ecosystem.

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