

# Diversity Of Mycofungi From Paddy Field Soil Of Kanyakumari District

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**ABSTRACT:** Population dynamics of soil fungi in paddy field were studied using soil dilution technique. A total of 26 species belonging to nine genera were isolated. The effect of different environmental factors like temperature, moisture content, pH, organic carbon, organic matter organic nitrogen and the population of fungi is correlated. Totally 26 soil fungi such as *Aspergillus awamori*, *A. candidus*, *A.flavipes*, *A.flavus*, *A.nidulans*, *A.niger*, *A.ochraceous*, *A.oryzae*, *A.rugulosus*, *A.terreus*, *A.ustus*, *Curvularia indica*, *C.lunata*, *Fusarium sp*, *F.solani*, *F.oxysporum*, *A.variecolor*, *Helminthosporium velutinum*, *Mucor alboarter*, *Penicillium citrinum*, *P.chrysogenum*, *P.funiculosum*, *Rhizopus nigricans*, *Trichoderma viride*, *T.harzianum* and *Verticillium sp.* were isolated from paddy field soil in the year 2016- 2017 and total number of colonies and number of species were represented. The population of fungi and physicochemical parameters statistically significant results were recorded respectively.

**Key words:** soil, mycoflora, physicochemical properties

## 1. INTRODUCTION

Fungi are one of the interesting and important groups of microorganisms occurring everywhere throughout world with suitable modification with their habitat either as parasites or saprophytes. The saprophytic nature of fungi has been given recognition by their key function in the ecosystem processes viz. decomposition of organic matter and demineralization of elements. These processes are important for the fertility of any environment and thereby support biodiversity and productivity. The soil mycoflora has the potentiality to secrete antibiotic substances. Source of the fungi have the ability to make rapid growth on organic substrates in dry, acid coarse, textured soils and thus to reach nutrients available to be important in biological control of plant pathogen. Hence the present study was carried out to know the population dynamics of soil mycoflora in the paddy field. The physicochemical parameters were recognized the population of fungi from the soil.

The activity of the fungi is limited by the availability of organic substrate and the heterogeneity of the soil due to the presence of different substrates which provide different microhabitats for fungal colonization (Garrett 1963) It has also been reported that the physicochemical properties of the soil not only affect the activity of fungi but also the activity of various other micro organisms (warcup 1951). The fungi perform important services related to water dynamics, nutrient cycling, and disease suppression. Along with bacteria, fungi are important as decomposers in the soil food web. They cannot hard to digest organic

materials into forms that other organisms can use as possible. Fungal hyphae physically bind soil particle together and creating stable aggregates that help increase water infiltration and soil water holding capacity.

## 2. MATERIALS AND METHOD

The soil was used for isolating mycoflora from a paddy field of Kanyakumari, Tamil Nadu. It is located in the southernmost 8.3235° N, 77.3324° E. The climate of the area is tropical and monsoonic. It receives fairly good rain during the period of 2016-2017. The soil samples were collected from different places in the same field at 15cm depth randomly and pooled together. The pooled sample is taken as the represented soil sample. The population dynamics of mycoflora was studied by soil dilution technique with PDA medium (pH 6.5). Soil moisture, temperature and pH were determined as described by Mishra (1968). The total organic carbon and the total organic matter of the soil were estimated by rapid titration methods of Walkly and Black (1934) as described by Piper (1944). The total organic nitrogen was estimated by the Microkjeldhal distillation method (Jackson 1958).

## 3. RESULT AND DISCUSSION

The results of the physicochemical properties such as temperature, Moisture, pH, organic carbon, organic matter and organic nitrogen from the paddy field soil were represented in Table 1. In the present investigation 26 species of soil fungi were isolated from the paddy field (Table – 2 and plate - 1). Most of them belonged to the form class Deuteromycetes. The percentage frequency of the 26 species viz *Aspergillus awamori*, *A. candidus*, *A.flavipes*, *A.flavus*, *A.nidulans*, *A.niger*, *A.ochraceous*, *A.oryzae*, *A.rugulosus*, *A.terreus*, *A.ustus*, *Curvularia indica*, *C.lunata*, *Fusarium*, *F.solani*, *F.oxysporum*, *A.variecolor*, *Helminthosporium velutinum*, *Mucor alboarater*, *Penicillium citrinum*, *P.chrysogenum*, *P.funiculosum*, *Rhizopus nigricans*, *Trichoderma viride*, *T.harzianum* and *Verticillium* sp. The dominance and prevalence of the species have been reported from India and in various other parts of the world (Christensen *et al.*, 1989, Deka and Mishra 1984). The species of *Aspergillus* have been reported to the most tolerance to adverse condition in the laboratory (Rai *et al.*, 1970) and species of *Aspergillus* and *Penicillium* were tolerance to a wide range of environmental condition (Phanasenko, 1967).

In the present investigation it was found that an increase in the number of colonies of fungi in July after rain fall (Table -2). It has been reported that the density of fungal population occurred during the rainy season when the soil moisture was significantly high (Deka and Mishra 1984). The environmental factors pH, temperature and moisture content of the soil have been reported be affecting the mycoflora of arctic and alpine tundra sites. A positive correlation was obtained with organic nitrogen and moisture content of the soil has been reported on the population of fungi (Table - 3). The important factors influencing the variation in the population of fungi in the present study could possibly be due to temperature, organic nitrogen and moisture content of the soil. The paddy field soil was subjected to disturbances such as irrigation, fertilization and agricultural practices resulting in more homogeneity of soil which did not allow relatively wide fluctuation in the population of fungi

Soil fungi have relationship with plant roots that provide important nutrient like nitrogen, phosphorus and potassium. Fungi can colonise upper parts of plants and provide

many benefits including decompose from dead material drought tolerance, heat tolerance resistance to insects and resistance to plant diseases. However, the fungi help the plants to absorb nutrient and water more efficiently. Fungi are therefore a vital part of the huge agricultural industry.

Similar study was done in different parts of India where *Aspergillus* sp. and *Penicillium* sp. were dominant fungal genera (Kumar *et al.*, 2015) in Uttar Pradesh. Our results were supported by Sharma (2010) and Pintu Karmakar *et al.* (2018) isolated from paddy fields at Suryamaninagar, Agartala, Tripura. Raja *et al.* (2017) suggested that the isolated fungi were identified on the basis on of cultural, microscopic and morphological characteristics. It is known that PDA is the universal medium most widely used in the isolation of fungi, having a complete nutritional basis (Agrios, 1988); this is probably the reason why colony development was faster when compared to other media. Earlier work supported that the maximum growth of fungi were recorded in potato dextrose agar medium (Maheshwari *et al.*, 2000).

Table 1: Analysis of physico-chemical characteristics of the soil of paddy field

Months	Physicochemical parameters						
2016 - 2017	Temp.(°c)	Moisture (%)	pH	OC (%)	OM (%)	ON (%)	PD
<b>Aug</b>	37	4.31	7.0	0.39	0.41	40.3	151
<b>Sep</b>	35	5.23	7.2	0.42	0.46	45.5	128
<b>Oct</b>	32	Fs	7.2	0.44	0.56	43.6	134
<b>Nov</b>	28	Fs	6.7	0.36	0.37	39.6	72
<b>Dec</b>	27	Fs	7.5	0.22	0.33	23.5	53
<b>Jan</b>	29	3.12	6.9	0.26	0.35	26.3	70
<b>Feb</b>	32	3.04	7.1	0.28	0.26	10.2	61
<b>Mar</b>	35	3.02	7.3	0.24	0.22	26.3	60
<b>Apr</b>	43	3.19	6.8	0.15	0.24	09.2	76
<b>May</b>	40	3.01	7.0	0.29	0.26	22.3	71
<b>Jun</b>	42	3.31	6.5	0.16	0.25	12.2	58
<b>Jul</b>	38	4.15	6.9	0.13	0.14	10.5	86

FS = fully saturated OC = organic carbon OM = organic matter ON = organic nitrogen PD = population density

Table 2: Monthly variation in the population of soil fungi (No.of colonies  $\times 10^3$  g<sup>-1</sup> dry wt of the soil)



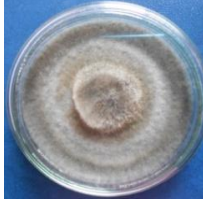




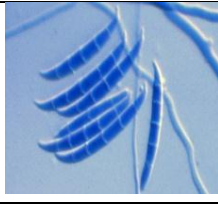


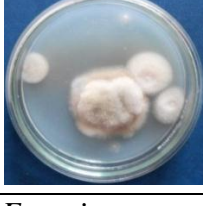


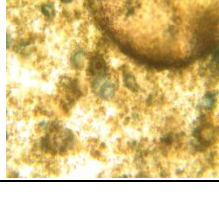
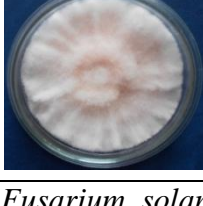
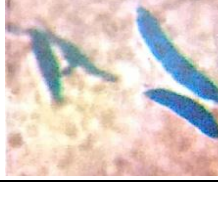

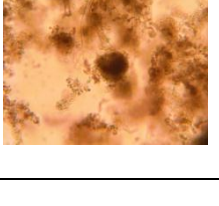


S.no	Name of the fungi	Month wise Population dynamics fungi in the year 2016-2017											
		Au g	Se p	Oc t	No v	De c	Ja n	Fe b	Ma r	Ap r	Ma y	Ju n	Ju l
1	<i>Aspergillus awamori</i>	07	02	04	02	03	04	03	02	05	02	01	03
2	<i>A. candidus</i>	12	05	06	05	05	04	02	03	04	03	-	-
3	<i>A.flavipes</i>	05	09	05	03	03	01	01	09	-	07	04	09
4	<i>A.flavus</i>	07	11	12	01	03	05	02	04	09	03	09	02
5	<i>A.nidulans</i>	08	07	10	01	02	-	04	-	09	-	02	07
6	<i>A.niger</i>	10	12	10	06	04	05	10	01	07	10	01	04
7	<i>A.ochraceous</i>	15	04	06	02	-	-	03	04	-	02	03	09
8	<i>A.oryzae</i>	06	02	04	02	04	03	-	-	05	04	01	05
9	<i>A.rugulosus</i>	05	01	07	-	-	-	-	01	03	-	01	06
10	<i>A.terreus</i>	08	06	07	06	-	05	05	07	-	05	02	08
11	<i>A.ustus</i>	04	08	06	-	03	01	-	-	04	05	02	02
12	<i>A.variecolor</i>	04	07	08	07	01	03	05	01	01	-	04	08
13	<i>Curvularia indica</i>	08	08	04	01	02	06	04	05	04	06	03	02
14	<i>C.lunata</i>	05	07	06	-	02	05	02	-	04	-	-	-
15	<i>Fusarium moniliforme</i>	04	03	05	01	01	-	-	03	-	02	01	01
16	<i>F.solani</i>	02	05	06	08	-	-	04	-	03	05	01	01
17	<i>F.oxysporum</i>	02	02	04	03	02	02	01	04	01	03	03	02
18	<i>Helminthosporium velutinum</i>	04	05	02	-	-	05	05	03	01	01	01	01
19	<i>Mucor alboarter</i>	03	-	02	-	-	01	-	-	-	-	-	01
20	<i>Penicillium citrinum</i>	05	04	04	05	02	05	04	01	03	03	04	01
21	<i>P.chrysogenum</i>	05	03	04	02	02	05	-	02	02	03	04	05
22	<i>P.funiculosum</i>	04	04	02	03	-	-	01	03	01	01	01	02
23	<i>Rhizopus nigricans</i>	03	04	02	03	01	03	-	-	-	-	02	01
24	<i>Trichoderma viride</i>	08	04	05	08	07	05	04	07	04	05	06	04
25	<i>T.harzianum</i>	04	03	-	01	05	02	-	-	05	01	02	02
26.	<i>Verticillium sp.</i>	03	02	03	02	01	-	01	-	01	-	-	-
	<b>Total no of colonies</b>	151	128	134	72	53	70	61	60	16	71	58	86
	<b>Total no of species</b>	26	25	25	20	19	20	18	17	20	19	22	23

Table 3: Pearson correlation matrix between fungal population and physico-chemical characteristic of paddy field soil

	<b>Temp.(°C )</b>	<b>Moisture (%)</b>	<b>pH</b>	<b>OC (%)</b>	<b>OM (%)</b>	<b>ON (%)</b>	<b>P D</b>
<b>Temp.(°C )</b>	1						
<b>Moisture (%)</b>	*0.599504	1					
<b>pH</b>	-0.46725	-0.19452	1				
<b>OC (%)</b>	-0.40021	-0.15975	0.30405 3	1			
<b>OM (%)</b>	-0.4261	-0.31537	0.27225 4	0.88314 9	1		
<b>ON (%)</b>	*0.43276	-0.19077	0.29993 3	0.90761 5	0.86223 4	1	
<b>PD</b>	0.084212	0.244787	0.13007 7	0.70643 5	0.68963 9	0.69203 1	1

FS = fully saturated OC = organic carbon OM = organic matter ON = organic nitrogen PD = population density p > 0.005 percentage level of significant

Plate1: Pure culture of fungal species isolated from the soil of paddy field

			
<i>Aspergillus fumigatus</i>		<i>Curvularia lunata</i>	
			
<i>A. niger</i>		<i>Fusarium moniliforme</i>	
			
<i>A. ochraceus</i>		<i>Fusarium oxysporum</i>	
			
<i>A. spinulosus</i>		<i>Fusarium solani</i>	
			
<i>A.terreus</i>		<i>Helminthosporium oryzae</i>	

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