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AN INVESTIGATION OF THE SOIL MYCOFLORA IN TURMERIC FIELD OF PUDUKKOTTAI DISTRICT-TAMIL NADU

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ABSTRACT

Soil is a complex ecosystem, delimited by physico-chemical parameters that hold enormous number of living organisms. This study deals with the seasonal variations in soil fungal population of traditional turmeric field in Pudukkottai district, Tamil Nadu viz., Ganapathipuram, Adhanakkottai, Pudunagar, Manjapettai and Thethuvasalpatti. About 66 different species belonging toPhycomycetes, Ascomycetes and Deuteromycetes were isolated by using potato dextrose agar medium and identified by using standard manual. The predominant species were Aspergillus flavus, Pythium aphanidermatum, Penicillium chrysogenum, P.citrinumfollowed by T.viride, and T.glaucumfrom the turmeric field soils of Ganapathipura in various seasons whereas, in Adhanakkottai soils the predominant species werePythium aphanidermatum, Aspergillus niger, Fusarium solani, Penicillium citrinum, Mucor sp. and Trichoderma viride. In Pudunagarsoils the predominant species were Verticillium species, Pythiumaphanidermatum, Penicillium chrysogenum and P.lanosum, A.flavus, Mucor sp. and T.harzianum, in Manjapettai soils the dominant species wereA.niger, A.flavus, A.awamori, Pythium aphanidermatum, P.japanicum, P.citrinum and Trichoderma viride and Thethuvasalpatti soils the dominant species wereA.conicus, Pythium aphanidermatum, A.terreus followed by A.flavus, P.chrysogenum, T.harzianum, T. glaucum and Verticillium speciesrespectively. Total fungus in five station, they are 44 species belong to 15genera were identified from Ganapathipuram station, 37 species belong to 16 genera were identified from Adhanakkottai, 38 species belong to 16 genera were identified from Pudu Nagar, 38 species

belong to 12 genera were identified from Manjapettai, 42 species belong to 12 genera were identified from Thethuvasal patti.

KEY WORDS: Turmeric field, Biodiversity, Fungal population, Phycomycetes, Deuteromycetes, Moniliales.

INTRODUCTION

Soil is a complex ecosystem, delimited by physicochemical parameters that hold enormous number of living microorganisms. Nevertheless, microbes are the least unstated mechanism of soil by both agronomists and soil practitioners. On the farm several soil organisms offer benefits to crop growing in an ecosystem, but are not well understood. The soil microbes decompose the plant and animal residues entering the soil and convert them into soil organic matter, which influences on soil physical, chemical and biological properties and on creating a complimentary medium for biological reactions and life support in the soil environment. Nonetheless, enhanced site-specific diversity typically results in higher levels of below ground microbial diversity and production (Olson et al., 2000).

Large quantities of readily decomposable organic matter are added to agricultural soils every year as crop residues or animal wastes and have a significant outcome on soil microbial commotion. The plant species growing on the soil also equally influence the population and species composition of the soil fungi (Hackle et al., 2000). Microfungi play a focal role in nutrient cycling by regulating soil biological activity (Arunachalam et al., 1997). However, the rate at which organic matter is decomposed by the microbes is interrelated to the chemical composition of the substrate as well as environmental conditions. There have been a number of studies on the distribution of soil micro fungi in agricultural field. Some studies dealt with the influence of plant community (Chung et al., 1997) and others attempted to examine seasonal trends (Kennedy et al., 2005). This study deals with the seasonal variations in soil fungal population of traditional agricultural field in South India.

MATERIALS AND METHODS

Collection of soil sample

About 5 soil samples were collected from the five villages, viz.,Ganapathipuram, Adhanakkottai, Pudunagar, Manjapettai and Thethuvasalpatti in Pudukkottai District Tamil Nadu. The soil samples were taken during the four seasons in turmeric field.

Sampling schedules

Soil samples were collected in each sampling station for a period of one year from January 2012 to December 2012. The climate is monsoonal and the calendar year has been divided into four season viz., post monsoon (January - March), summer (April - June), premonsoon (July - September) and monsoon (October - December).

Soil analysis

The mechanical and chemical analysis of the soils were made with the help of Lamotte's soil testing outfit, Nitrogen and Organic matter, etc., were estimated as outlined in piper's book (1950).

Isolation of soil mycoflora

Dilution plating method

Dilution technique described by Warcup (1950) was used to isolate the fungi from soil sample weighing 1g was diluted in 10 ml of distilled water. One ml of the diluted sample was poured and spread on petriplates containing sterilized PDA medium (Extract from 200 g potato (boiled and filtered), dextrose 20 g, agar 15 g and distilled water 1000 ml pH 7.0) in replicates. The inoculated plates were incubated in a dust free cupboard at the room temperature for 3 days. One percent streptomycin solution was added to the medium before pouring into petriplates for preventing bacterial growth.

Observation

The colonies growing on PDA plates with different morphology were counted separately. A portion of the growing edge of the picked up with the help of a paw of needles and mounted on a clean slide with lacto-phenol cotton blue stain. The slide was gently heated in a spirit lamp so as to facilitate the staining and remove air bubbles, if any. The excess stain was removed with the help of tissue paper and then the cover slip was sealed with transparent nail polish. The slide was observed under a compound microscope.

Microphotography of the individual fungal species was also taken using Nikon phase contrast microscope, Japan.

Identification

Colony colour and morphology were noted besides hyphal structure, spore size, shapes and spores bearing structures. They were compared with the standard works ofManual of soil fungi, Gillman (1975), A manual penicillia Raper and Thom (1949), The genera of fungi sporulating in pure culture 2ndedn.Von Arx (1974). Ainsworth et al., (1973);The genus

Aspergillus, Raper and Fennell (1965), Soil fungi, Domsch et al., (1980), Higher fungi, Kohlmeyer and Kohlmeyer (1979)and More Dematiaceous hyphomycetes,Ellis (1976) among others are identification of the species.

Presentation of Data

Number of species is referred as species diversity. Population's density expressed in terms of colony forming unit (CFU) per gram of soil with dilution factors. In order to arrears the dominance of individual species in species site percentage contribution was worked out as follows.

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

RESULTS

Table-1 isolation of fungi from soil samples of turmeric field

Fungal species		
Phycomycetes	23. A.sulphureus	46. P.granulatum
1. Mucor sp.	24. A.sydowi	47. P.janthinellum
2. M.zygospora	25. A.terreus	48. P.japonicum
3. Pythium sp.	26. A.terricola	49. P.lanosum
4. P.aphanidermatum	27. A.tamarii	50. P.notatum
5. Rhizopus sp.	28. A.ustus	51. P.purpurescens
6. R.nigricans	29. A.versicolor	52. P.purpurogenum
7. R.stolonifer	30. A.wentii	53. P.turbatum
Ascomycetes	31. Acrocylindrium oryzae	54. Sterile mycelium
8. Neurospora crassa	32. Acrophialophora fusispora	55. Thamnidium elegans
Deuteromycetes	33. Acrostalagmus sp.	56. Torula allii
9. Aspergillus awamori	34. Bauveria bassiana	57. Trichoderma glaucum
10. A.conicus	35. Botrytis cinerea	58. T. hamatum
11. A.flavus	36. Curvularia lunata	59. T. harzianum
12. A.funiculosus	37. C.senegalensis	60. T.koeningi
13. A.granulosus	38. Fusarium oxysporum	61. T.lignorum
14. A.humicola	39. F. semitectum	62. T.pseudokoningii
15. A.luchuensis	40. F.solani	63. T.reseei
16. A.nidulans	41. Helminthosporium oryzae	64. T.viride
17. A.niger	42. Hyalopus ater	65. Verticillium
18. A.ochraceous	43. Penicillium chrysogenum	66. Verticillium lecanii
19. A.oryzae	44. P.citrinum	
20. A.rugulosus	45. P.expansum	
21. A.rugulotus		
22. A.ruber		

Table-2 Total number of colonies, mean density and percentage contribution of fungi recorded during different season from Pudukkottai District (Jan 2012 – Dec 2012) Station 1 (Ganapathipuram)

S. No.	Name of the organisms	Post monsoon		Summer		Pre monsoon		Monsoon		Total Number of colonies	% of contribution
		TNC	MD	TNC	MD	TNC	MD	TNC	MD		
1.	Acrostalagmus sp.	1	0.33	-	-	1	0.33	2	0.66	4	1.1730
2.	Aspergillus awamori	6	2	4	1.33	5	1.66	3	1	18	5.2786
3.	A. conicus	6	2	3	1	4	1.33	6	2	19	5.5719
4.	A.flavus	8	2.66	6	2	6	2	7	2.33	27	7.9178
5.	A.funiculosus	1	0.33	1	0.33	4	1.33	2	0.66	8	2.3460
6.	A.humicola	-	-	1	0.33	2	0.66	-	-	3	0.8797
7.	A.luchuensis	4	1.33	5	1.66	3	1	5	1.66	17	4.9853
8.	A.nidulans	1	0.33	2	0.66	4	1.33	1	0.33	8	2.3460
9.	A.ochraceous	3	1	4	1.33	4	1.33	3	1	14	4.1055
10.	A.niger	4	1.33	3	1	5	1.66	4	1.33	16	4.6920
11.	A.rugulosus	2	0.66	1	0.33	1	0.33	1	0.33	5	1.4662
12.	A.sulphureus	-	-	1	0.33	1	0.33	-	-	2	0.5865
13.	A.sydowi	5	1.66	2	0.66	3	1	4	1.33	14	4.1055
14.	A.terreus	1	0.33	3	1	1	0.33	4	1.33	9	2.6393
15.	A.versicolor	4	1.33	6	2	5	1.66	4	1.33	18	5.2786
16.	A.wentii	2	0.66	1	0.33	1	0.33	2	0.66	6	1.7595
17.	Acrocylindrium oryzae	1	0.33	1	0.33	-	-	1	0.33	3	0.8797
18.	Acrophialophora fusispora	-	-	1	0.33	2	0.66	1	0.33	4	1.1730
19.	Curvularia senegalensis	1	0.33	-	-	1	0.33	-	-	2	0.5865
20.	C.lunata	2	0.66	-	-	-	-	1	0.33	3	0.8797
21.	Fusarium semitectum	-	-	-	-	4	1.33	5	1.66	9	2.6393
22.	F.solani	3	0.66	-	-	-	-	1	0.33	4	1.1730
23.	Helminthosporium sp.	1	0.33	2	0.66	1	0.33	1	0.33	5	1.4662
24.	Hyalopus ater	1	0.33	1	0.33	-	-	1	0.33	3	0.8797
25.	Mucor sp.	2	0.66	1	0.33	1	0.33	1	0.33	5	1.4662
26.	Mucor zygospora	2	0.66	1	0.33	2	0.66	-	-	5	1.4662
27.	Penicillium chrysogenum	3	1	4	1.33	2	0.66	1	0.33	10	2.9325
28.	P.citrinum	2	0.66	3	1	3	1	2	0.66	10	2.9325
29.	P.expansum	-	-	1	0.33	1	0.33	-	-	2	0.5865
30.	P.granulatum	3	1	3	1	4	1.33	3	1	13	3.8123
31.	P.japonicum	1	0.33	-	-	-	-	3	1	4	1.1730
32.	P.lanosum	-	-	-	-	-	-	3	1	3	0.8797
33.	P.notatum	2	0.66	1	0.33	1	0.33	-	-	4	1.1730
34.	Pythium sp.	3	1	2	0.66	2	0.66	1	0.33	8	2.3460
35.	Pythium aphanidermatum	2	0.66	4	1.33	2	0.66	2	0.66	10	2.9325

36.	Rhizopus sp.	1	0.33	-	-	1	0.33	2	0.66	4	1.1730
37.	R.nigricans	-	-	1	0.33	2	0.66	-	-	3	0.8797
38.	Sterile mycelium	3	1	1	0.33	3	1	2	0.66	9	2.6393
39.	Trichoderma glaucum	1	0.33	2	0.66	1	0.33	2	0.66	6	1.7595
40.	T.harzianum	1	0.33	-	-	-	-	1	0.33	2	0.5865
41.	T.lignorum	3	1	1	0.33	2	0.66	2	0.66	8	2.3460
42.	T.viride	2	0.66	1	0.33	2	0.66	1	0.33	6	1.7595
43.	Verticillium lecanii	1	0.33	-	-	2	0.66	2	0.66	5	1.4662
44.	Verticillium sp.	2	0.66	-	-	-	-	1	0.33	3	0.8797
	Total	91	29.86	74	24.89	89	29.52	88	29.19	341	

44 species belonging to 15 genera; TNC-Total Number of Colonies, MD-Mean Density

Post monsoon – (January-March), Summer (April-June), Pre monsoon (July-September) and Monsoon (October-December)

Fungal diversity in turmeric soils

Altogether 5 soil samples from 5 different stations representing the entire Pudukkottai District were examined for fungal diversity. The study resulted the presence of 66 species of fungi in all of them 7 species belonging to 3 genera were Phycomycetes, 1 species belonging to 1 genera were Ascomycetes and remaining 58 species belonging to 16 genera were assignable to Deuteromycetes.

Station wise occurrence

Altogether 44 species belonging to 15 genera (5 Phycomycetes,39 Deuteromycetes) were identified from Ganapathipuram (Table-2), 37 species belonging to 16 genera (2 Phycomycetes, 35 Deuteromycetes) were identified from Adhanakkottai (Table-3), 38species belong to16 genera (1 Ascomycetes, 4 Phycomycetes, 33 Deuteromycetes) were identified from Pudunagar (Table-4), 38 species belong to 12 genera (2 Phycomycetes, 36 Deuteromycetes) were identified from Manjapettai (Table-5), 42 species belong to 12 genera (1 Phycomycetes, 41 Deuteromycetes) were identified from Thethuvasal patti (Table-6).

Species composition

Among the 20 genera recorded, the genus Aspergillus was considered by more number of (22 species) followed by Penicillium (11 species) Trichoderma (8 species) Fusariumand Rhizopus (3 species) Curvularia, Mucor, Pythium and Verticillium (2 species each). All other genera were represented one species each.

Species Diversity

Altogether 66 species to 20 genera (1 Ascomycetes, 7 Phycomycetes, 58 Deuteromycetes) were identified from the station (Ganapathipuram, Adhanakkottai, Pudunagar, Manjapettai and Thethuvasal patti).

Table-3 Total number of colonies, mean density and percentage contribution of fungi recorded during different season from Pudukkottai District (Jan 2012 – Dec 2012) Station 2 (Aathanakkottai)

S. No.	Name of the organisms	Post monsoon		Summer		Pre monsoon		Monsoon		Total Number of colonies	% of contribution
		TNC	MD	TNC	MD	TNC	MD	TNC	MD		
1.	Acrophialophora fusispora	2	0.66	1	0.33	-	-	2	0.66	5	1.6891
2.	Acrocylindrium oryzae	-	-	2	0.66	1	0.33	1	0.33	4	1.3513
3.	Acrostalagmus sp.	1	0.33	2	0.66	1	0.33	-	-	4	1.3513
4.	Aspergillus awamori	5	1.66	3	1	4	1.33	3	1	15	5.0675
5.	A. conicus	3	1	3	1	2	0.66	4	1.33	12	4.0540
6.	A.flavus	6	2	5	1.66	6	2	7	2.33	24	8.1081
7.	A.luchuensis	5	1.66	3	1	5	1.66	2	0.66	15	5.0675
8.	A.nidulans	1	0.33	1	0.33	3	1	2	0.66	7	2.3648
9.	A.niger	8	2.66	6	2	7	2.33	6	2	27	9.1216
10.	A.ochraceous	2	0.66	2	0.66	1	0.33	3	1	8	2.7027
11.	A.rugulosus	-	-	3	1	3	1	1	0.33	7	2.3648
12.	A.sydowi	-	-	2	0.66	1	0.33	-	-	3	1.0135
13	A.terreus	2	0.66	3	1	4	1.33	7	2.33	16	5.4054
14.	A.versicolor	2	0.66	-	-	3	1	2	0.66	7	2.3648
15.	A.wentii	2	0.66	1	0.33	2	0.66	4	1.33	9	3.0405
16.	Beauveria bassiana	3	1	2	0.66	3	1	1	0.33	9	3.0405
17.	Curvularia lunata	1	0.33	-	-	1	0.33	-	-	2	0.6756
18.	C. senegalensis	-	-	2	0.66	-	-	1	0.33	3	1.0135
19.	Fusarium semitectum	1	0.33	-	-	-	-	-	-	1	0.3378
20.	F.solani	-	-	-	-	3	1	2	0.66	5	1.6891
21.	Helminthosporium sp.	2	0.66	3	1	2	0.66	-	-	7	2.3648
22.	Hyalopus ater	1	0.33	-	-	1	0.33	2	0.66	4	1.3513
23.	Mucor sp.	3	1	2	0.66	2	0.66	1	0.33	8	2.7027
24.	Mucor zygospora	-	-	3	1	2	0.66	2	0.66	7	2.3648
25.	Penicillium chrysogenum	4	1.33	2	0.66	2	0.66	1	0.33	8	2.7027
26.	P.citrinum	2	0.66	4	1.33	2	0.66	3	1	11	3.7162
27.	P.granulatum	1	0.33	-	-	2	0.66	1	0.33	4	1.3513
28.	P.lanosum	1	0.33	1	0.33	4	1.33	3	1	9	3.0405
29.	P.notatum	-	-	2	0.66	1	0.33	1	0.33	4	1.3513
30.	Pythium sp.	3	1	4	1.33	3	1	2	0.66	12	4.0540
31.	Pythium	2	0.66	1	0.33	3	1	2	0.66	8	2.7027

	aphanidermatum										
32.	Thamnidium elegans	2	0.66	1	0.33	1	0.33	1	0.33	5	1.6891
33.	Trichodermaharzianum	3	1	-	-	-	-	1	0.33	4	1.3513
34.	T.hamatum	2	0.66	2	0.66	1	0.33	1	0.33	6	2.0270
35.	T.viride	1	0.33	3	1	1	0.33	2	0.66	8	2.7027
36.	Torula allii	3	1	-	-	-	-	2	0.66	5	1.6891
37.	Verticillium sp.	-	-	2	0.66	1	0.33	-	-	3	1.0135
	Total	74	24.55	71	23.56	78	25.89	71	24.21	296	

37 species belonging to 16 genera; TNC-Total Number of Colonies, MD-Mean Density
Post monsoon – (January-March), Summer (April-June), Pre monsoon (July-September) and Monsoon (October-December)

Table-4 Total number of colonies, mean density and percentage contribution of fungi recorded during different season from Pudukkottai District (Jan 2012 – Dec 2012) Station 3 (Pudu Nagar)

S. No.	Name of the organisms	Post monsoon		Summer		Pre monsoon		Monsoon		Total Number of colonies	% of contribution
		TNC	MD	TNC	MD	TNC	MD	TNC	MD		
1.	Acrophialophora fusispora	1	0.33	-	-	2	0.66	1	0.33	4	1.5810
2.	Acrocylindrium oryzae	-	-	1	0.33	2	0.66	1	0.33	4	1.5810
3.	Acrostalagmus sp.	2	0.66	-	-	1	0.33	2	0.66	5	1.9762
4.	Aspergillus awamori	4	1.33	3	1	5	1.66	3	1	15	5.9288
5.	A. conicus	5	1.66	2	0.66	2	0.66	3	1	12	4.7430
6.	A.flavus	7	2.33	5	1.66	2	0.66	2	0.66	16	6.3241
7.	A.luchuensis	3	1	2	0.66	-	-	3	1	8	3.1620
8.	A.nidulans	2	0.66	1	0.33	3	1	1	0.33	7	2.7667
9.	A.niger	5	1.66	3	1	2	0.66	4	1.33	14	5.5335
10.	A.sydowi	3	1	-	-	1	0.33	1	0.33	5	1.9762
11.	A.terreus	2	0.66	4	1.33	2	0.66	5	1.66	13	5.1383
12.	A.versicolor	3	1	2	0.66	1	0.33	1	0.33	7	2.7667
13.	A.wentii	1	0.33	1	0.33	2	0.66	3	1	7	2.7667
14.	Beauveria bassiana	2	0.66	-	-	2	0.66	1	0.33	5	1.9762
15.	Curvularia lunata	2	0.66	-	-	2	0.66	-	-	4	1.5810
16.	Curvularia senegalensis	1	0.33	2	0.66	-	-	1	0.33	4	1.5810
17.	Fusarium solani	-	-	1	0.33	-	-	2	0.66	3	1.1857
18.	Helminthosporium sp.	1	0.33	3	1	2	0.66	1	0.33	7	2.7667

19.	Hyalopus ater	-	-	-	-	1	0.33	1	0.33	2	0.7905
20.	Mucor sp.	4	1.33	3	1	2	0.66	2	0.66	11	4.3478
21.	Neurospora crassa	2	0.66	3	1	2	0.66	2	0.66	9	3.5573
22.	Penicilliumexpansum	1	0.33	-	-	-	-	1	0.33	2	0.7905
23.	P.janthinellum	1	0.33	2	0.66	1	0.33	1	0.33	5	1.9762
24.	P.japonicum	2	0.66	1	0.33	-	-	2	0.66	5	1.9762
25.	P.lanosum	1	0.33	2	0.66	-	-	3	1	6	2.3715
26.	P.notatum	1	0.33	-	-	-	-	2	0.33	3	1.1857
27.	P.purpurescens	2	0.66	-	-	1	0.33	2	0.66	5	1.9762
28.	Pythium sp.	4	1.33	3	1	2	0.66	3	1	12	4.7430
29.	P.aphanidermatum	2	0.66	2	0.66	1	0.33	3	1	8	3.1620
30.	Rhizopus sp.	-	-	1	0.33	1	0.33	1	0.33	3	1.1857
31.	R.nigricans	1	0.33	1	0.33	-	-	-	-	2	0.7905
32.	R.stolonifer	1	0.33	2	0.66	1	0.33	1	0.33	5	1.9762
33.	Trichoderma glaucum	2	0.66	1	0.33	1	0.33	2	0.66	6	2.3715
34.	T. koeningi	4	1.33	-	-	2	0.66	1	0.33	7	2.7667
35.	T.reseei	1	0.33	3	1	1	0.33	1	0.33	6	2.3715
36.	T. viride	3	1	1	0.33	1	0.33	2	0.66	7	2.7667
37.	Verticillium lecanii	1	0.33	-	-	1	0.33	2	0.66	4	1.5810
38.	Verticillium sp.	3	1	1	0.33	1	0.33	-	-	5	1.9762
	Total	80	26.53	56	18.57	50	16.52	62	21.87	253	

38 species belonging to 16 genera; TNC-Total Number of Colonies, MD-Mean Density Post monsoon – (January-March), Summer (April-June), Pre monsoon (July-September) and Monsoon (October-December)

Table-5 Total number of colonies, mean density and percentage contribution of fungi recorded during different season from Pudukkottai District (Jan 2012 – Dec 2012) Station 4 (Manja pettai)

S. No.	Name of the organisms	Post monsoon		Summer		Pre monsoon		Monsoon		Total Number of colonies	% of contribution
		TNC	MD	TNC	MD	TNC	MD	TNC	MD		
1.	Acrocylindrium oryzae	1	0.33	1	0.33	2	0.66	1	0.33	5	2.1008
2.	Acrostalagmus sp.	2	0.66	-	-	-	-	1	0.33	3	1.2605
3.	Aspergillus awamori	5	1.66	3	1	3	1	2	0.66	13	5.4621
4.	A. conicus	4	1.33	2	0.66	3	1	3	1	12	5.0420
5.	A.flavus	7	2.33	4	1.33	2	0.66	2	0.66	15	6.3025
6.	A.funiculosus	3	1	2	0.66	2	0.66	1	0.33	8	3.3613
7.	A.granulosus	1	0.33	2	0.66	1	0.33	2	0.66	6	2.5210
8.	A.humicola	1	0.33	-	-	1	0.33	2	0.66	4	1.6806
9.	A.luchuensis	4	1.33	2	0.66	3	1	2	0.66	11	4.6218
10.	A.niger	6	2	4	1.33	3	1	5	1.66	18	7.5630

11.	A.oryzae	-	-	-	-	1	0.33	2	0.66	3	1.2605
12.	A.ruber	-	-	-	-	1	0.33	2	0.66	3	1.2605
13.	A.sulphureus	1	0.33	1	0.33	-	-	1	0.33	3	1.2605
14.	A.sydowi	4	1.33	1	0.33	2	0.66	3	1	10	4.2016
15.	A.terricola	-	-	2	0.66	1	0.33	1	0.33	4	1.6806
16.	A.tomarii	1	0.33	-	-	-	-	-	-	1	0.4201
17.	A.ustus	2	0.66	1	0.33	1	0.33	-	-	4	1.6806
18.	A.versicolor	4	1.33	1	0.33	2	0.66	2	0.66	9	3.7815
19.	A.wentii	3	1	2	0.66	1	0.33	1	0.33	7	2.9411
20.	Beauveria bassiana	1	0.33	1	0.33	-	-	1	0.33	3	1.2605
21.	Curvularia senegalensis	-	-	-	-	1	0.33	2	0.66	3	1.2605
22.	C.lunata	2	0.66	1	0.33	-	-	-	-	3	1.2605
23.	Helminthosporium sp.	1	0.33	2	0.66	-	-	2	0.66	5	2.1008
24.	Mucor sp.	3	1	1	0.33	1	0.33	2	0.66	7	2.9411
25.	Penicillium chrysogenum	2	0.66	2	0.66	1	0.33	3	1	8	3.3613
26.	P.citrinum	1	0.33	4	1.33	2	0.66	1	0.33	8	3.3613
27.	P.japonicum	-	-	3	1	4	1.33	1	0.33	8	3.3613
28.	P.lanosum	2	0.66	1	0.33	-	-	3	1	6	2.5210
29.	P.notatum	1	0.33	2	0.66	-	-	-	-	3	1.2605
30.	P.purpurescens	-	-	-	-	3	1	1	0.33	4	1.6806
31.	Pythium aphanidermatum	1	0.33	2	0.66	1	0.33	1	0.33	5	2.1008
32.	Pythium sp.	2	0.66	1	0.33	4	1.33	2	0.33	9	3.7815
33.	Rhizopus sp.	2	0.66	1	0.33	-	-	-	-	3	1.2605
34.	Trichoderma glaucum	3	1	1	0.33	1	0.33	3	1	8	3.3613
35.	T.pseudokoningii	-	-	1	0.33	2	0.66	1	0.33	4	1.6806
36.	T.viride	1	0.33	2	0.66	1	0.33	1	0.33	5	2.1008
37.	Verticillium lecanii	-	-	2	0.66	2	0.66	-	-	4	1.6806
38.	Verticillium sp.	2	0.66	1	0.33	-	-	-	-	3	1.2605
	Total	73	24.22	56	18.53	52	17.23	57	18.54	238	

38 species belonging to 12 genera; TNC-Total Number of Colonies, MD-Mean Density

Post monsoon – (January-March), Summer (April-June), Pre monsoon (July-September) and Monsoon (October-December)

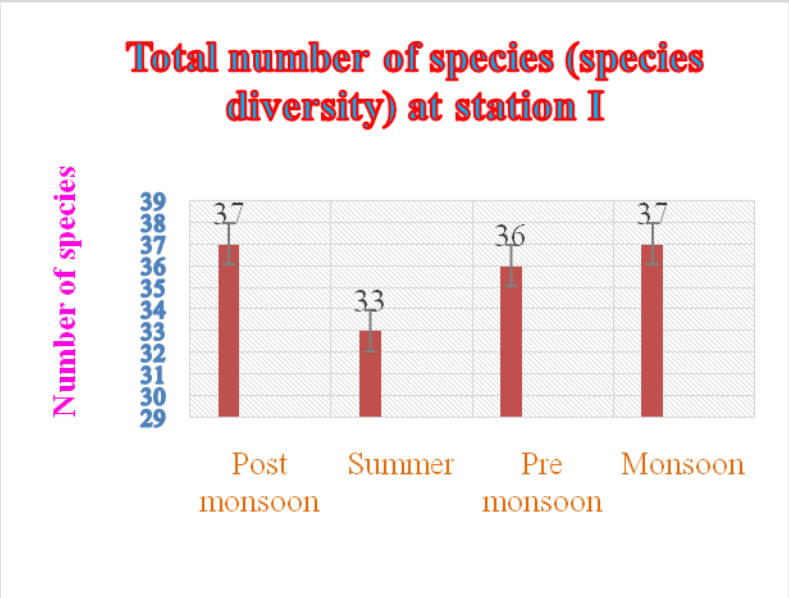
Table-6 Total number of colonies, mean density and percentage contribution of fungi recorded during different season from Pudukkottai District (Jan 2012 – Dec 2012) Station 5 (Thethuvasal patti)

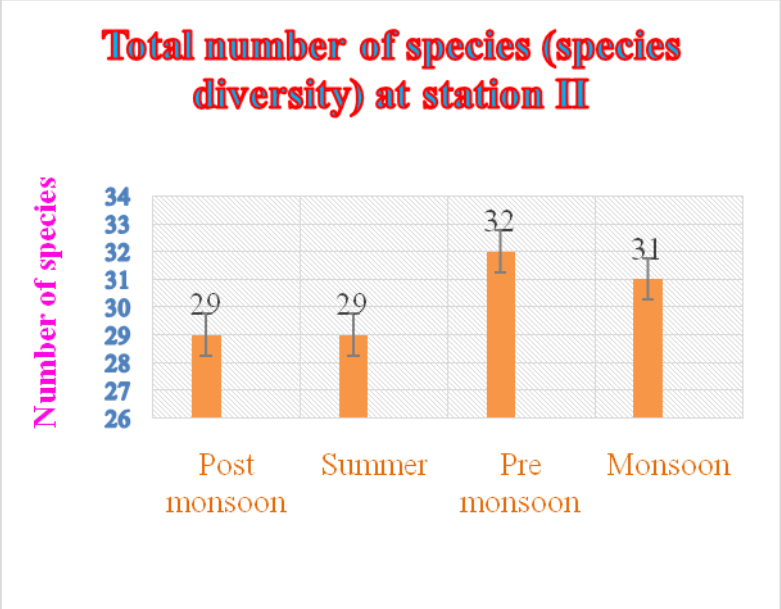
S. No	Name of the organisms	Post monsoon		Summer		Pre monsoon		Monsoon		Total Number of colonies	% of contribution
		TNC	MD	TNC	MD	TNC	MD	TNC	MD		
1.	Acrostalagmus sp.	1	0.33	1	0.33	2	0.66	1	0.33	5	1.7006
2.	Aspergillus awamori	4	1.33	2	0.66	2	0.66	1	0.33	9	3.0612
3.	A. conicus	3	1	6	2	2	0.66	2	0.66	13	4.4217
4.	A.flavus	5	1.66	2	0.66	2	0.66	3	1	12	4.0816
5.	A.granulosus	2	0.66	1	0.33	1	0.33	2	0.66	6	2.0408
6.	A.humicola	-	-	-	-	2	0.66	1	0.33	3	1.0204
7.	A.luchuensis	4	1.33	-	-	3	1	3	1	10	3.4013
8.	A.nidulans	1	0.33	3	1	3	1	1	0.33	8	2.7210
9.	A.niger	5	1.66	2	0.66	4	1.33	-	-	11	3.7414
10.	A.oryzae	2	0.66	1	0.33	-	-	1	0.33	4	1.3605
11.	A.ruber	3	1	-	-	1	0.33	1	0.33	5	1.7006
12.	A.sydowi	-	-	2	0.66	1	0.33	-	-	3	1.0204
13.	A.terreus	1	0.33	4	1.33	5	1.66	3	1	13	4.4217
14.	A.terricola	3	1	1	0.33	1	0.33	2	0.66	7	2.3809
15.	A.tamarii	2	0.66	4	1.33	1	0.33	-	-	7	2.3809
16.	A.ustus	1	0.33	1	0.33	2	0.66	-	-	4	1.3605
17.	A.versicolor	2	0.66	1	0.33	1	0.33	3	1	7	2.3809
18.	A.wentii	-	-	3	1	2	0.66	1	0.33	6	2.0408
19.	Beauveria bassiana	2	0.66	1	0.33	-	-	-	-	3	1.0204
20.	Curvularia lunata	1	0.33	2	0.66	2	0.66	1	0.33	6	2.0408
21.	C. senegalensis	-	-	1	0.33	1	0.33	-	-	2	0.6802
22.	Fusarium semitectum	2	0.66	-	-	1	0.33	1	0.33	4	1.3605
23.	F.oxysporium	1	0.33	1	0.33	2	0.66	1	0.33	5	1.7006
24.	Helminthosporium sp.	-	-	2	0.66	3	1	-	-	5	1.7006
25.	Hyalopus ater	-	-	-	-	2	0.66	1	0.33	3	1.0204
26.	Mucor zygospora	3	1	2	0.66	1	0.33	-	-	6	2.0408
27.	Penicillium chrysogenum	4	1.33	1	0.33	2	0.66	2	0.66	9	3.0612
28.	P.citrinum	3	1	2	0.66	1	0.33	1	0.33	7	2.3809
29.	P.expansum	2	0.66	2	0.66	1	0.33	2	0.66	7	2.3809
30.	P.janthinellum	3	1	2	0.66	1	0.33	1	0.33	7	2.3809
31.	P.japonicum	-	-	-	-	2	0.66	2	0.66	4	1.3605
32.	P.lanosum	1	0.33	1	0.33	-	-	3	1	5	1.7006
33.	P.notatum	-	-	-	-	3	1	2	0.66	5	1.7006
34.	Pythium sp.	3	1	3	1	2	0.66	2	0.66	10	3.4013
35.	P.aphanidermatum	2	0.66	1	0.33	1	0.33	4	1.33	8	2.7210
36.	Trichoderma	4	1.33	3	1	4	1.33	1	0.33	12	4.0816

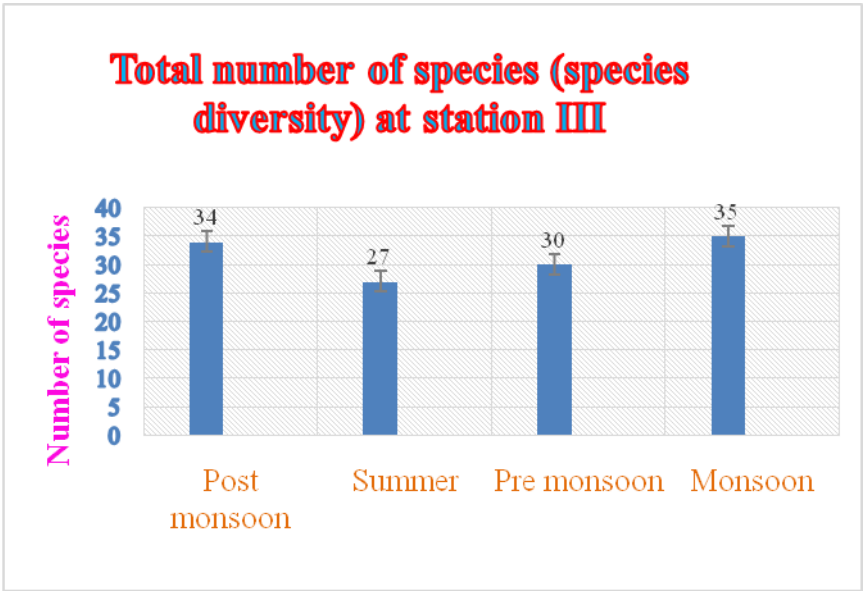
	glaucum										
37.	T.harzianum	3	1	5	1.66	2	0.66	3	1	13	4.4217
38.	T.koeningi	1	0.33	2	0.66	1	0.33	4	1.33	8	2.7210
39.	T.lignorum	1	0.33	1	0.33	2	0.66	2	0.66	6	2.0408
40.	T. viride	5	1.66	3	1	4	1.33	2	0.66	14	4.7619
41.	Verticillium lecanii	2	0.66	1	0.33	1	0.33	1	0.33	5	1.7006
42.	Verticillium sp.	-	-	-	-	3	1	4	1.33	7	2.3809
	Total	82	27.21	70	23.2	77	25.5	65	21.54	294	

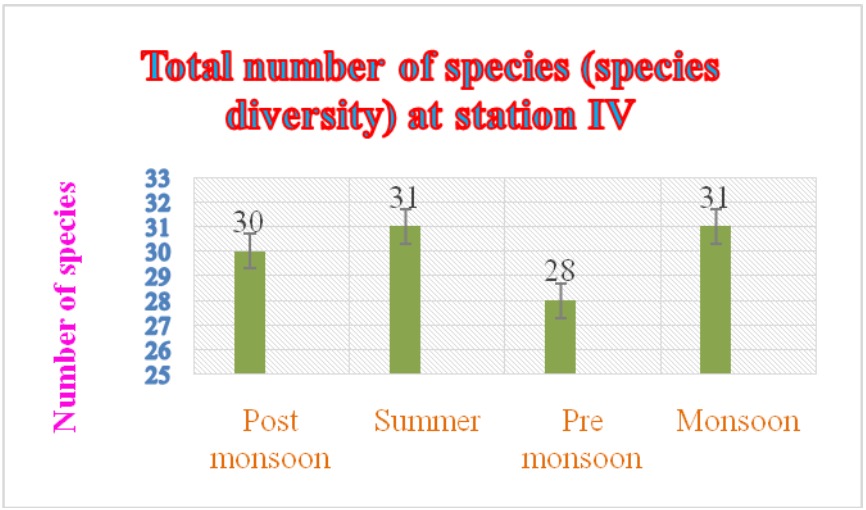
42 species belonging to 12 genera; TNC-Total Number of Colonies, MD-Mean Density

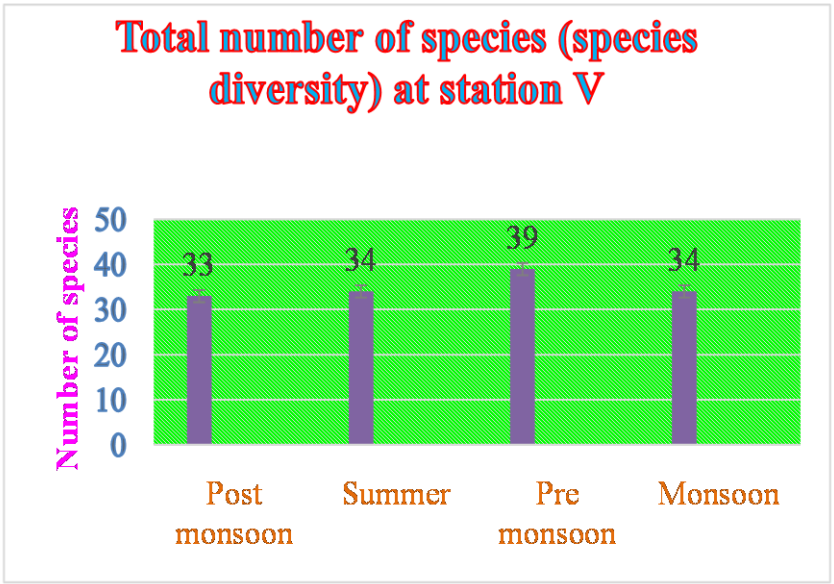
Post monsoon – (January-March), Summer (April-June), Pre monsoon (July-September) and Monsoon (October-December)






Total number of species (species diversity) at station III
Number of species
40
35
30
25
20
15
10
5
0
34
27
30
35
Post monsoon
Summer
Pre monsoon
Monsoon


Total number of species (species diversity) at station IV
Number of species
33
32
31
30
29
28
27
26
25
30
31
28
31
Post monsoon
Summer
Pre monsoon
Monsoon


Total number of species (species diversity) at station V
Number of species
50
40
30
20
10
0
33
34
39
34
Post monsoon
Summer
Pre monsoon
Monsoon

DISCUSSION

In the present investigation the survey was conduct to find out the fungal diversity in 5 different stations such as Ganapathipuram, Adhanakkottai, Pudunagar, Manjapettai and Thethuvasalpatti totally 66 species isolated belonging 20 genera from the soil of turmeric field. Number of Deuteromycetes were representing by 58 species, 7 species are Phycomycetes, remaining 1 species are Ascomycetes. The predominant species were Aspergillus flavus, Pythium aphanidermatum, Penicillium chrysogenum, P.citrinum followed by Trichoderma viride, and T.glaucum from the turmeric field soils of Ganapathipuram in various seasons whereas, in Adhanakkottai soils the predominant species were Pythium aphanidermatum, Aspergillus niger, Fusarium solani, Penicillium citrinum, Mucor sp. and Trichoderma viride from the turmeric field soils in various seasons whereas, in Pudunagar soils the predominant species were Verticillium species, Pythiumaphanidermatum, Penicillium chrysogenum,P.lanosum, A.flavus, Mucor sp. and T.harzianum from the turmeric field soils in various seasons.Whereas, Manjapettai soils the dominant species wereA.niger, A.flavus, A.awamori, Pythium aphanidermatum, P.japanicum, P.citrinum and Trichoderma viridefrom the turmeric field soils in various seasons. Whereas, Thethuvasalpatti soils the dominant species were A.conicus, Pythium aphanidermatum, A.terreus followed by A.flavus, P.chrysogenum, T.harzianum, T.glaucum and Verticillium species respectively.

Recently Kalaiselvi and Panneerselvam (2011) reported that seasonal and depthwise variation of soil fungal population in Thanjavur District, Tamil Nadu viz., Nadur, Orathanadu, Punnainallur and Tholkappiyar square totally 30 different species belonging to Ascomycetes and Phycomycetes were isolated by using PDA medium. The dominant species were A.niger, Cunninghamella sp.followed by T.viride. During rainy season maximum fungal count was recorded in sub soil layer.

Evidently Madhanraj etal., (2010) reported that 45 soil samples were collected from 8 different station along the entire Tamil Nadu coast and examined by dilution plating method to access the fungal diversity and their population density. Totally 24 fungal species representing 12 genera recorded Aspergillus was constituted by more number of (9 species) followed by Penicillium (3 species) Fusarium and Mondictys (2 species each).

CONCLUSION

Soil can be managed to optimize its fertility and health under natural and agricultural land uses, so as to benefit fungal diversity. Due to the dispersed nature of the soil asset, a broad but consistent and economically appealing approach to its protection is needed.

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