

International Journal Of

Recent Scientific Research

ISSN: 0976-3031 Volume: 7(6) June -2016

STUDIES ON BACTERIAL, FUNGAL DIVERSITY OF KUMBAKONAM TALUK THANJAVUR DISTRICT, TAMIL NADU, INDIA

Uma Maheswari N., Malathi M and Dhivaharan V



THE OFFICIAL PUBLICATION OF INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR) http://www.recentscientific.com/ recentscientific@gmail.com



Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research Vol. 7, Issue, 6, pp. 12207-12212, June, 2016 International Journal of Recent Scientific Re*s*earch

Research Article

STUDIES ON BACTERIAL, FUNGAL DIVERSITY OF KUMBAKONAM TALUK THANJAVUR DISTRICT, TAMIL NADU, INDIA

Uma Maheswari N*., Malathi M and Dhivaharan V

Department of Microbiology S.T.E.T Women's College, Mannargudi, Thiruvarur (DT), Tamil Nadu, India

ARTICLE INFO

ABSTRACT

Article History: Received 05th March, 2016 Received in revised form 21st April, 2016 Accepted 06th May, 2016 Published online 28th June, 2016

Key Words:

Soil, Monsoon., Postmonsoon, Summer, Premonsoon, Aspergillus sp. Bacillus sp.

Soil are highly complex system, with many component playing diverse functions mainly due to the activity of soil organism. Soil flora plays a pivotal role in evaluation of soil condition and in stimulating plant growth. Microorganism are beneficial in increasing the soil fertility and plant growth as they are involved in several biochemical transformation and mineralization the activites in soils. The present study was aimed to, deals with the diversity at sites in Kumbakonam Taluk, Thanjavur District, TamilNadu. The study period was covering all the four seasons viz, Monsoon (October-December), Postmonsoon (January- March) Summer (April - June) Premonsoon (July -September) and distribution of bacterial and fungal population in around soil. The physico-chemical parameters of such soil were identified the includes pH and moisture content of the soil. macronutrient (Nitrogen, Phosphorus, Magnesium, Calcium) and micronutrient (Iron, Copper, Zinc, Manganese) were analyzed. Totally 50 species of soil bacteria and fungi were observed form the soil samples, they were collected from Kumbakonam, Krishnapuram and Cholapuram. About 30 different species belonging to Ascomycetes and Phycomycetes and most of them were isolated by using PDA medium and Nutrient Agar Medium identified with standard manuals. The dominant bacterial species are Pseudomonas sp, Clostridium sp, Bacillus sp, Staphylococcus sp and Escherichia sp and fungal species Aspergillus sp, Rhizopus sp, Pencillium sp, and Fusarium sp were recorded. Isolation of microorganisms were correlated to percentage frequency and heavy metal content were recorded. The physic -chemical parameters are rich in Kumbakonam as Silty Clay to Silty Clay Loam soil type.

Copyright © Uma Maheswari N., Malathi M and Dhivaharan V., 2016, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Soil is a complex ecosystem, delimited by physiochemical parameters that hold enormous number of living organism. Nevertheless, microbes are the least understand 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 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 reaction 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). Biodiversity refers to the variability of life on Earth, all the living species of animal, plant and microorganism. According to Hawksworth (2001), fungi are a major component of biodiversity, essential for the survival of other organisms and are crucial in global ecological processes. Biodiversity in not evenly distributed rather it varies greatly across the globe as well as within region. Among other factor, the diversity of all living thing (biota) depends on temperature, precipitation, altitude, soils, geography and the presence of other species.

Soil biodiversity reflects the mix of living organism in the soil. These organism interact with one another and with plants and animals forming a web of biological activity. Soil is by far the most biologically diverse part of earth. The soil food web includes beetles, springtails, mites, worms, spiders, ants, nematodes, fungi, bacteria, and other organisms. These organisms improve the entry and storage of water, resistance to erosion, plant nutrition, and break down of organic matter. A wide variety of organisms provides check and balances to the soil food web through population control, mobility, and survival from to season. Climate change affect Biodiversity (2014). Hence, the present study was isolate and identify bacteria and fungi in Thanjavur Dt, Tamilnadu during four different seasons.

^{*}Corresponding author: **Uma Maheswari N**

Department of Microbiology S.T.E.T Women's College, Mannargudi, Thiruvarur (DT), Tamil Nadu, India

MATERIALS AND METHODS

Soil Sample Collection

The soil samples were collected from Kumbakonam taluk. Thanjavur District, Tamil Nadu, India during Monsoon (October-December), Post monsoon (January-March) Summer (April - June) Premonsoon (July - September (2014-2015) season. In the present case, each sample was collected agricultural field, and from taluk namely Kumbakonam (S1), Krishnapuram (S2) and Cholapuram (S3). Collect the soil sample before remove the surface litter at the sampling spot. Collect at least 4 to 6samples from each sampling unit and place. If make a 'V' shaped cut to a depth of 15 cm in the sampling spot using spade.

Mix the sample thoroughly and remove foreign material like roots, stones and gravels. Silty clay to. Silty clay loam the method used for taking soil sample was a slight modification as that used by (Goddard 1913). Collect the in sample clean sterile polythene bags. All four random samples of each zone were put together to make a single sample from each place. A total of three samples was prepared to investigate the diversity of the bacteria and fungi.

Isolation of Bacteria and Fungi

Isolation was done by serial dilution and dilution plating (Gram's Staining, Motility) using and standard manuals (Bergy's manual of determinative bacteriology) and Identification in terms of biochemical test such as Indole, Methyl – Red and Voges- Proskauert, Citrate Utilization, Catalase, and Oxidase Test. The bactertial and fungal colonies were counted as cfu/ ml.

Physico chemical properties (Griffin, 1970)

The pH, moisture, organic carbon Macronutrients (Nitrogen, phosphorus, Manganesium, Calcium) and micronutrients (Iron, Zinc, Manganese) were analysed and compared with seasonal variations of per standard method. (Table 4)

Estimation of Trace Elements (Piper, 1944)

Copper, Iron, Manganese and Zinc heavy were analyzed by using Atomic Adsorption Spectrophotometer. (AAS Elico 196).

Procedure

Filter the samples and acidified with concentrated HNO₃ to a pH less then immediately after collection of soil.

Take 1.5 liter of filtrated sample was taken in a beaker with 5ml concentrated HNO_3 . Evaporated the sample was dried on a hot plate to prevented the boiling process. Add another 5 ml of the concentrated HNO_3 in the sample. Then it allow to cooled and heated by adding some additional HNO_3 light colored residue were formed. Dissolve the residues by added 0.5N HCL and filtered the contents. Makeup the filtered content upto 50 ml with 0.5N HCL. After pretreatment the minerals can be analyzed by Atomic Adsorption Spectrophotometer.

Statistical Analysis (Salil bose 1982)

The results obtained in the present investigation were submerged to statistical analysis like mean (X) and Standard Deviation (SD).

RESULTS AND DISCUSSIONS

The present study was aimed to investigated for the bacterial and fungal diversity from Kumbakonam taluk of Thanjavur district, sites such as, Kumbakonam, (S_1) Krishnapuram (S_2) and Cholapuram (S_3) . Tamilnadu in monsoon, postmonsoon, summer, and premonsoon seasons.

Physico- chemical parameters

The pH, moisture, organic carbon Macronutrients (Nitrogen, phosphorus, Manganesium, Calcium) and micronutrients (Iron, Zinc, Manganese) were analysed and compared with seasonal variation of Kumbakonamtaluk of Thanjavur District. (Table 4)

The bacterial and fungal organisms are isolated and identified as morphological and cultural characteristics (Table 9, 10). Nearly 32 species (bacteria 12 and fungi 20) were recorded in monsoon, 48 species (bacteria 14 and fungi 21) were recorded in post monsoon, 31 species (bacteria 16 and fungi 15) were recorded in summer and 47 species (bacteria 18 and fungi 29) were recorded in Premonsoon season. (Table 1). Bacterial and fungal colonies were counted and recorded as cfu/ml (Table 5,6).

 Table – 1 Isolation of bacteria and fungi from soil during four season

Seasons									
S.No	Species	Monsoon	Postmonsoon	Summer	Premonsoon				
1	Bacteria	12	14	16	18				
2	Fungi	20	21	15	29				

In monsoon season, in the area of Kumbakonam (S1) site, fungal organisms are Aspergillus niger, A. flavus, A.nidulans A. sulphureus, Pencillium sp, p. chrysogenum, P.bovis, R.oryzae, C. herbarum, Mucor sp, Alternaria sp, Fusarium solani, Phythium sp Verticillum sp R.nigricans and bacterial species such as Bacillus sp, Enterobacter sp, P.vulgaris, Streptococcus sp, E. aerogenes S.lactis, Azospirillum sp. In Krishnapuram (S2) fungal organisms are Rhizopus oryzae, Candida albicans, A. luchuensis Aspergillus flavus, C. herbarum, P. bovis, Fusarium solani F. semitectum and bacterial species such as Bacillus cerus, B. subtilis, Enterobacter sp, E. aerogenes, Pseudomonas sp, P.aeruginosa. Next sites Cholapuram (S3) fungal organisms are *R.oryzae Aspergillus flavus*, *A.itaconicus*, A.nidulans, A.sulphureus, Candida albicans, Pencillium chrysogenum, Mucor, Alternaria sp and bacterial species Micrococcus sp, P.vulgaris, Azotobacter, Pseudomonas sp P.aeruginosa and Staphylococcus sp are dominants.

A review on post monsoon season S1 site species are fungal R.orvzae Aspergillus flavus, A.itaconicus, A.nidulans, A.sulphureus, Candida albicans, Pencillium chrysogenum, Mucor, Alternaria sp and bacterial species Micrococcus sp, Azotobacter, Pseudomonas sp P.aeruginosa P.vulgaris, staphylococcus sp. In S2 site fungal organisms are A.flavus, A.fumigatus, A.itaconicus, Rhizopus sp R.oryzae, C. herbarum, Fusarium sp, F.solani, Mucor sp R.nigricans and bacterial species Enterobacter sp, E. aerogenes, P.vulgaris, Psedomonas sp, P.aeruginosa, Lactobacilli sp. In S3 site fungal organisms A.nidulans A.fumigatus, A. luchuensis, Pencillium sp P.chrysogenum Mucor sp, Candida albicans, R.oryzae, Fusarium sp F.oxysporm and bacterial species E.coli,

Micrococcus sp, Staphylococcus sp B. subtilis P.aeruginosa, Azospirillum are dominants

Next Summer season S1 site fungal organisms A.niger, A.fumigatus, A.itaconicus, Rhizopus sp Candida albicans R.stolonifer, Verticillum spR.nigaricans, Fusarium oxysporium, F. semitectum, T. viridae, and bacterial species are E.coli, S.lactis, E. aerogenes, Micrococcus sp, Aerococcus sp Azotobacter P.aeruginosa. In S2 site species of fungal are A.niger, A.flavus, A. sulphurous, A. luchuensis, Rhizopus sp R.oryzae R.nigricans Fusarium sp, F.oxysporum F.solani, T,viridae and Enterobacter sp, Pseudomonas sp, P.vulgaris, Lactobacillus sp B. subtilis. P.aeruginosa and S3 site A.niger, A.flavus, C. herbarum, A.nidulans A.itaconicus, Candida albicans, Pencillium bovis, Verticillum sp, P.chrysogenum, Mucor sp, Fusarium solani, F.oxysporum, bacterial species are E. aerogenes, E.coli, Micrococcus sp, Staphylococcus sp S.lactis are dominants.

In Premonsoon season S1 site fungal species are Aspergillus A. flavus A. sulphureus, A. luchuensis, Candida albicans F.solani , Phythium sp Rhizopus sp, R.oryzae and bacterial species are S.lactis , Enterobacter sp, E. aerogenes and Pseudomonas sp, P.vulgaris, B. subtilis Staphylococcus sp. In S2 site fungal organisms are Aspergillus niger, A. itaconicus A.nidulans A.oryzae ,Mucor sp, Fusarium oxysporium, Verticillum sp, Pythium, Helmithosporium and bacterial species are Micrococcus sp, Micrococcus sp Bacillus sp, and In S3 site fungal organisms are Micrococcus sp A.itaconicus, pencillium chrysogenum, , R.nigricans, Candida albicans, Fusarium oxysporium Trichoderma viridae, R.oryzae Helmithosporium, and bacterial species are Azotobacter Bacillus sp, B. subtilis, Enterobacter sp, E. aerogenes E.coli , S.lactis P.aeruginosa are dominants (Table 2,3).

 Table - 2
 Details of the bacteria isolated from soil
 n 4

~

-

...

C N	Bactreial	Mo	nsoo	Monsoon			Postmonsoon			Summer			Premonsoon		
S.No	Species	S1	S2	S 3	S 1	S2	S 3	S 1	S2	S 3	SI	S2	S 3		
1	B. cerus	_	+	+	_	_	+	+			+	_	+		
2	B. subtilis	_		$^+$	+	_	+	+	_	+	+	+			
3	B. circulans	_	+		+	_		$^+$	_	$^+$	+		_		
4	B. megaterium	+	+	_		+	_	+	_			+	_		
5	B. coagulans	+	+	+	_		+		+	+	+		+		
6	B.mucoids		+		+	_	+	+	+		+	_	+		
7	B. licheniformis	_	+		+	+			$^+$		+	+			
8	S. aureus	+	+	_	+		_	+	+	+		$^+$	_		
9	S. lactis	+			+	_	+		$^+$		+		+		
10	S. phyogens	+	_	+		+	+	_		_	+	+			
11	E. aerogenes		_	+	_		+	+	_	+		+	_		
12	E.coli	+	_		_	_	+		-		_	+	+		
13	C.pyogens	+	+	-	+	+		+	-	+	_	+			
14	P.aeruginosa	+	+	-			+	+	-	+	_	+	_		
15	p.vulgaris	+	+	_	+	_	+	+	+		+		+		
16	M.luteus		+	+		+	+	+	+	_		+			
17	Azotobacter	_	+		+			+		+	+		_		
18	Azospirillum	+	+	_	+	-	+	+	+		+	_	+		
19	S. areus	+	+	_	+	-		+		+		+	+		
20	Enterococcus		+	_	+	-	+	+	+		+		+		
21	Vibrio sp	_		+		-	+	+		+		+			

S1-Kumbakonam, S2-Krisnapuram, S3- Cholapuram (+ Present, - Absent)

Maximum number of fungi and bacteria were isolated from monsoon season, minimum number of fungi and bacteria isolated in postmonsoon season. Majority of soil fungi belongs to Ascomycota and Deutromycota.

Table - 3 Details of the fungi isolated from soil	Table - 3	Details	of the	fungi	isolated	from	soil
---	-----------	---------	--------	-------	----------	------	------

Species spergillus flavus	S 1	S2					Summer premonsoon					
		52	S 3	S1	S2	S 3	S1	S2	S 3	SI	S2	S 3
	+	_	+	+	+	+	_	+	+	+	_	+
A .oryzae	_	+	+	_	+	_	_	$^+$	_	+	+	+
A.niger	+	+	+	+	+	$^{-}_{+}$	+	+	+	+	+	+
A.fumigatus	$^+$	_	_	_	+	+	+	_	+	_	+	+
A.terrus	$^+$	$^+$	_	+	_	_	_	+	+	_	_	+
A.nidulans	$^+$	_	+	_	+	+	_	_	_	+	+	_
A.vesicolar	_	+	+	_	_	+	+	_	_	+	_	+
A.itaconicus	_	_	+	+	_	+	+	_	+	+	+	_
	_		_	+	_	_	+	_	+	+	_	_
A. sulphurous	$^+$	$^+$	_	_	+	_	+	_	_	_	+	_
Cladosporium sp	$^+$	_	+	_	_	+	_	_	_	+	_	_
C. herbarum	_	$^+$	_	_	_	+	+	_	_	+	_	+
	_	$^+$	_	+	+	_	_	+	_	+	+	_
'andida albicans	$^+$	$^+$	_	+	_	_	+	+	+	_	+	_
Fusarium												+
oxysporium	Ŧ	-	-	т	-	т	-	Τ.	-	-	-	Ŧ
F. solani	+		+		+	+				+	+	
F. semitectum		_	+	_		+	+	_	+		$^+$	_
Ielmithosporium	+	_		_	_	+		_		_	$^+$	+
Mucor sp	$^+$	+	_	+	+		+	_	+	_	$^+$	
nizopus stolonifer	$^+$	$^+$				+	$^+$		$^+$		$^+$	
R.oryzae	$^+$	+	_	+	_	+	+	+	_	+	_	+
R.nigricans	_	+	+	_	+	+	+	+	_	_	+	_
Trichoderma	+	+		+			+		+	+		
viridae	т	Ŧ	-	Ŧ	-	-	т	-	Ŧ	т	-	-
Penicillum	+	+		+		+		+		+		+
chrysogenum	т	Ŧ	-	Ŧ	-	Ŧ	-	т	-	т	-	Ŧ
P.bovis	+	+	_	+	_	+	_	_	+	+	_	_
Phythium sp	$^+$	_	_	_	+	+	_	_	_	_	_	+
Verticillum sp	_	_	+	_	_	_	+	_	+	_	+	_
	A. luchuensis A. sulphurous 'ladosporium sp C. herbarum nninghamella sp andida albicans Fusarium oxysporium F. solani F. senitectum felmithosporium Mucor sp tizopus stolonifer R.oryzae R.nigricans Trichoderma viridae Penicillum chrysogenum P.bovis Phythium sp	A. luchuensis A. sulphurous + ladosporium sp + C. herbarum - unninghamella sp - andida albicans + Fusarium - Fusarium + oxysporium + F. solani + F. solani + f. semitectum - lelmithosporium + Mucor sp + R.oryzae + R.nigricans - Trichoderma + viridae Penicillum + P.bovis + Phythium sp - - Verticillum sp - - - - - - - - - - - - -	A. luchuensis	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	A. luchuensis $ +$ $+$ A. luchuensis $+$ $-$ A. sulphurous $+$ $-$ C. herbarum $+$ $-$ C. herbarum $+$ $-$ mninghamella sp $+$ $-$ andida albicans $+$ $-$ Fusarium $ -$ oxysporium $ -$ F. solani $+$ $+$ F. semitectum $ -$ Mucor sp $+$ $-$ Anicops stolonifer $+$ $-$ R.nigricans $ +$ Trichoderma $+$ $-$ Viridae $+$ $-$ Penicillum $+$ $-$ P.bovis $+$ $-$ Phythium sp $ -$ Verticillum sp $ -$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	A. luchuensis $ +$ $-$ A. luchuensis $+$ $+$ $-$ A. sulphurous $+$ $ +$ A. sulphurous $+$ $ +$ C. herbarum $+$ $ +$ $C. herbarum+ + + +andida albicans+ + ++ ++ ++ ++ ++ ++ + -<$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

S1 -Kumbakonam, S2-Krisnapuram, S3- Cholapuram (+ Present, - Absent)

Diversity was found to be higer in postmonsoon season than summer. The season variation and (%) frequency of the bacterial and fungal flora were statistically analyzed (Table 7,8)

Our finding similar to this, Senthil kumar et al., 2009 collected 15 soil samples from three different stations namely Koraiyar river head, Saradi, and Xavier munai along the Muthupet Mangroves in Tamilnadu and examined by dilution plating method of PDA medium to access fungal diversity and the population diversity. Out of 22 species screened the Aspergillus and Penicillium were represented as dominant one of each. In the present study also species like Aspergillus and Penicillium were common to all sites.

Our work is supported by V. Manimegalai 2011, population density during Monsoon season, maximum, fungal species was recorded in 2009-2010. In our study report also highlighted that fungal population also high in monsoon season and similar that dominant species are Aspergillus, penicilliumwere also the same to that study.

Our finding similar to that Kalaiselvi and Panneerselvam, 2011, seasonal variation of soil fungal population in Thanjavurdist, Tamilnadu 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 Aspergillusniger, Cunninghamella sp. followed by Trichodermaviride. During rainy season maximum fungal count was recorded in sub soil layer.

	Name of the		Monsoon		P	ostmonso	on	Summer			premonsoon		
S.No	parameters	S_1	S_2	S ₃	S_1	S_2	S_3	S ₁	S_2	S_3	S_1	S_2	S ₃
1	PH	8.21	7.57	7.31	7.96	7.06	7.91	7.82	7.72	7.72	7.76	7.28	7.41
2	Moisture (%)	60	59	63	56	67	72	34	39	36	48	57	55
3	Temperature(°C)	38	36	39	42	45	47	59	62	67	35	36	29
4	carbon(%)	0.42	0.92	0.49	0.46	0.25	0.74	0.28	0.48	0.14	0.45	1.85	0.82
5	Nitrogen(Kg/ac)	87.6	89.3	81.1	90.28	89.5	73.2	87.5	87.9	90.6	91.6	84.6	90.2
6	Potassium(kg/ac)	81	73.6	72.4	68.9	69.1	66.7	74.6	71.2	71.5	72.3	78.8	70
7	Phosphorus(kg/ac)	4.12	5.15	3.11	2.15	4.31	4.2	3.19	2.57	1.24	1.54	4.35	3.24
8	Magnesium(ppm)	10.5	10.1	8.7	8	8.2	8.5	9.5	8.8	10	7.5	9.7	9.3
9	Calcium(ppm)	8.4	9.9	8.1	7.6	7.1	7.3	8.8	8.6	9.5	9.4	9.5	9.6
10	Copper(ppm)	0.78	0.79	0.84	1.9	1.4	1.8	0.96	0.88	0.92	1.8	1.6	1.9
11	Iron(ppm)	2.34	2.55	2.65	3.3	3.6	2.25	4.7	4.6	4.9	2.5	2.8	2.6
12	Zinc(ppm)	0.87	0.78	1.51	0.67	0.81	0.74	1.8	2.7	2.5	0.7	1.5	2.3
13	Manganese(ppm)	2.31	3.5	2.8	2.1	1.9	2.4	3.5	3.8	3.5	2.2	1.7	2.8

Table -4 Physico-chemical Parameters of the soil

S1 -Kumbakonam, S2-Krisnapuram, S3- Cholapuram

Our work similar to that, seasonal variation of soil fungal population in Thanjavurdist, Tamilnadu viz., Kumbakonam, Krishnapuram and Cholapuram surrounding totally 29 different species belonging to Ascomycetes. Our study monsoon season higher amount of fungal population recorded.

The present study was correlated to that Prince, (2012) that studies on soil mycoflora from the sugarcane field in Thanjavur District, Tamilnadu. About 50 different species belongs to Phycomycetes and Deuteromycetes were isolated. In our report highlighted that Ascomycetes and Deutromycetes were isolated. and temporal regions that form colonization. Here our study revealed that totally 18 different bacterial, and 29 fungi were isolated and identified from Kumbakonam Taluks of Thanjavur Districts.

The contribution of soil organisms was very significant in many soil functions such as supporting the growth of plants, absorbing, neutralizing and transforming compounds that might otherwise become pollutants in the environment. Some studies dealt with the influence of plant community and other attempted to examine seasonal trends on soil microorganisms.

Table- 6 Details of the fungal Colony forming units (CFU)

_

Table – 5 Details of the bacterial Colony forming units
(CFU)S.NoSpeciesMonsoonPost
monsoonPre
monsoon1B. cereus34423436

5.110	Species	wionsoon	monsoon	Summer	monsoon
1	B. cereus	34	42	34	36
2	B. subtilis	46	38	27	44
3	B. circulans	42	36	23	39
4	B. megaterium	43	44	21	29
5	B. coagulans	55	39	32	32
6	B.mucoids	40	29	37	45
7	B. licheniformis	34	32	25	48
8	S. aureus	55	45	23	52
9	S. lactis	57	49	33	68
10	S. pyogens	48	38	28	64
11	E. aerogenes	52	48	39	68
12	E.coli	68	61	42	59
13	C.pyogens	64	57	28	57
14	P.aeruginosa	68	55	29	68
15	p.vulgaris	59	61	25	34
16	M.luteus	57	45	33	27
17	Azotobacter	68	66	27	23
18	Azospirillum	65	69	29	21
19	S. aureus	60	47	33	32
20	Enterococcus	56	48	27	37
21	Vibrio sp	53	51	24	35

Similar to that Sukumaran, (2013) reported by characterization of bacterial diversity in marine sediment at different season in karankadu, bacterial diversity incidence was quite comman in special and season fluctuation. The present study revealed that totally 18 bacterial species were recorded during Premonsoon season.

Our study was correlated to Uma maheshwari *et al.*, 2013, from that totally 36 different species were isolated from seven taluks of Thiruvarur Dt. They are dependent on the nature of substrate

S.No	Species	Monsoon	Post monsoon	Summer	Pre Monsoon
1	A. niger	56	42	34	39
2	A. flavus	54	39	27	33
3	A. terrus	45	36	23	31
4	A. Fumigatus	38	44	21	41
5	A. oryzae	58	42	32	33
6	A. nidulans	48	29	37	34
7	A. Vesicular	34	41	25	21
8	A. itaconicus	35	45	23	28
9	A. sulphurous	48	49	33	40
10	A. lughuensis	32	38	28	64
11	Cladosporium sp	68	61	42	59
12	C. herbarum	64	57	28	57
13	F. solani	59	61	25	34
14	F.oxysporium	57	45	33	27
15	F. semiectum	68	66	27	23
16	R. stolonifer	60	47	33	32
17	R. oryzae	56	48	27	37
18	R. nigricans	53	51	24	35
19	P. chrysogenum	32	23	68	34
20	P. bovis	33	33	64	35
21	P.expansum	25	28	59	48
22	C. albicans	21	42	57	32
23	T. viridae	30	38	34	68
24	T. harizonum	27	36	27	64
25	Phythium sp	31	44	23	37
26	Verticillum sp	21	39	32	25
27	Helmithosporiumsp	20	29	37	23
29	A.alternata	22	32	35	33

Access 34 9 1 3 4 B. solitis 46 8 10 9 27 B. reculans 42 6 9 8 23 B. megatize 55 11 8 13 32 B. megatize 55 12 0 11 8 13 32 B. megatize 55 12 0 11 8 25 0 11 8 28 Supplaceceus sp S. progens 44 7 8 6 21 5 12 11 8 28 21 5 5 12 11 8 28 10 12 7 29 8 11 6 25 5 6 Pecionas sp Paeringtons 66 11 0 13 33 34 4000000000000000000000000000000000000	S.No	Genus	Species Ave	erage	S1	S2	S3	Total	Frequency
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$								34	11.5
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$				46	8	10	9	27	9.18
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$			B. circulans	42	6	9	8		7.82
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$									7.14
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	1	Bacillus sp	0						10.8
			0						6.80
									8.501
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					8	8	9	25	8.501
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					10	10		22	20. (2
2 S. phyogens 48 7 8 6 21 3 Enterobacter sp E. aerogenes 72 9 8 11 28 4 Excherichia sp F. coli 78 10 12 7 29 5 Clastridium sp C.grogens 64 8 11 6 25 6 Psedononas sp Paraginicas 59 8 10 9 3 33 7 Protute sp p.vulgaris 59 8 10 9 27 8 Microoccus sp M.luteus 57 5 7 6 18 9 Azoobacter sp M.atous 5 8 11 8 27 11 3 Table - 8 Details of frequency of mycoflora in the isolated sites 2 1 10 10 32 1 10 10 10 10 10 10 10 10 10 10 10 10 10									20.62
S. physgens 140 7 8 6 21 3 Enterobacter sp E. aerogeness 72 9 8 11 28 4 Excherichia sp E.coli 78 10 12 7 29 5 Clostridum sp P.argenesa 68 11 9 13 33 6 Psedomons sp P.argenesa 68 10 9 2 1 33 7 Proteas sp M.latus 57 5 7 6 18 9 Acoobacter sp M.latus 57 5 7 6 21 11 Steptococcus sp E.areas 60 10 7 6 23 12 Enterococcus sp Enterococcus sp Enterococcus sp 5 8 6 7 21 12 Table - S Details of frequency of mycolorai in the isolated sites 5 7 9 21 13 Horis sp A. ingree 56 9 13 10 13 10 12 13	2	Stanhylococcus sn			9	11	8	28	17.54
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	-	~	S nhuogans		7	8	6	21	13.12
4 Excharting progens Excharting progens 64 8 11 6 25 6 Psedomonas sp Parenginosa 68 11 9 13 33 7 Protess sp p-sulgaris 59 8 10 9 27 8 Microaccus sp p-sulgaris 59 8 10 12 11 33 9 Actobacter 68 10 12 11 33 10 Actobacter 68 10 10 32 3 Total Fit 11 Streptococcus sp Sareus 60 10 7 6 23 2 Enterosccus sp Species Average 81 7 91 10 32 30 Genus Species Average 81 8 9 25 50 Genus Species Average 81 9 10 32 4 Igeneris			1				0		
5 Clostridium sp Cprogens 64 8 11 6 25 6 Predomons sp Paramignosa 68 11 9 13 33 7 Proteas sp p.vulgaris 59 8 10 12 11 33 8 Microsces sp M.Inteus 57 5 7 6 18 9 Azopirillium sp	3	Enterobacter sp	E. aerogenes			8	11		38.88
6 Pseudomonas sp Pairuginsa 68 11 9 13 33 7 Proteus sp p-vulgaris 59 8 10 9 27 8 Microsoccus sp Miluteus 57 5 7 6 13 33 9 Astrobacter 68 10 12 11 33 9 8 60 10 7 6 23 11 Stroptococcus sp S. areas 60 10 7 6 23 11 Stroptococcus sp S. areas 60 9 13 10 32 13 Vibrio sp Stres Nor Stroptococcus 56 9 13 10 32 14 A. figer 56 9 13 10 32 10 33 15 A. figer 56 9 13 10 33 10 33 16 A. figer 56	4	Escherichia sp	E.coli	78	10	12	7		37.17
7 Proteets sp p.vulgeris 59 8 10 9 27 8 Micrococcus sp M.Intensis 57 5 7 6 18 9 Actobacter sp Actobacter 68 10 12 11 33 10 Accoparillium sp Accoparillium sp 65 8 10 7 6 18 11 Streptococcus sp Enterosoccus sp Enterosoccus sp Enterosoccus sp 6 23 13 Vibrio sp 53 9 8 6 23 13 Vibrio sp 54 7 10 16 32 4. Altrus 54 7 10 16 33 4. Altrus 54 8 8 12 7 27 4. Altrus 54 7 9 21 4 4 10 14 7 31 5 Cenus 4. Indukans 48 6 8 <	5	Clostridium sp	C.pyogens	64	8	11	6	25	39.06
7 Proteets sp p.vulgeris 59 8 10 9 27 8 Micrococcus sp M.Intensis 57 5 7 6 18 9 Actobacter sp Actobacter 68 10 12 11 33 10 Accoparillium sp Accoparillium sp 65 8 10 7 6 18 11 Streptococcus sp Enterosoccus sp Enterosoccus sp Enterosoccus sp 6 23 13 Vibrio sp 53 9 8 6 23 13 Vibrio sp 54 7 10 16 32 4. Altrus 54 7 10 16 33 4. Altrus 54 8 8 12 7 27 4. Altrus 54 7 9 21 4 4 10 14 7 31 5 Cenus 4. Indukans 48 6 8 <	6	Psedomonas sp	P.aeruginosa	68	11	9	13	33	48.52
8 Micrococcis sp Milians 57 5 7 6 18 9 Aconbacter sp Aconbacter sp 60 10 12 11 33 10 Acospirillum sp Aconpirillum sp Aconpirillum sp 60 10 7 6 23 11 Streptococcus sp Entersoccus sp Entersoccus sp 8 6 23 13 Vibrio sp Yibrio sp 7 10 16 33 13 Vibrio sp Aniger 56 9 13 10 32 14 Aniger 56 9 13 10 32 3 1 Aniger 56 9 13 10 32 3 1 Aniger 56 9 13 10 30 3 1 Aniger 56 9 13 10 30 3 1 Aniger 5 5 5 3 <td< td=""><td></td><td></td><td></td><td></td><td>8</td><td>10</td><td></td><td></td><td>45.76</td></td<>					8	10			45.76
9 Azospirilum sp. Azospirilum sp.			1 0						31.56
10 Accognition op Streptococcus sp Accognition op Enterseccus sp Enterseccus sp 11 8 27 13 Vibrio op Table - 8 Details of frequency of mycoflora in the isolated site Streptococcus sp Action of mycoflora Iter of mycoflora Iter of mycoflora Streptococcus sp Action of mycoflora Action of mycoflora Iter of mycoflora Action of mycoflora Iter of mycoflora Action of mycoflora Action of mycoflora Iter of mycoflora Action of mycoflora Action of mycoflora Iter of mycoflora Actinduas Iter of mycoflora<		1							48.52
11 Streptococcus op Finteronoccus op Vibrio sp S. areas Si enteronoccus op Vibrio sp 60 10 7 6 23 Table - 8 Details of frequency of mycoflor-rain the isolated sites State - 8 Details of frequency of mycoflor-rain the isolated sites State - 8 Details of frequency of mycoflor-rain the isolated sites State - 8 Details of frequency of mycoflor-rain the isolated sites State - 8 Details of frequency of mycoflor-rain the isolated sites State - 8 Details of frequency of mycoflor-rain the isolated sites State - 8 Details of frequency of mycoflor-rain the isolated sites A night colspan="4">A night colspan="4">State - 8 A night colspan="4">A remus 45 8 8 12 A night colspan="4">A night colspan= 3 A night colspan= 3 A night colspan= 3 S S S S S S S S S A night colspan= 4 S S S S S									41.53
12 Enterococcus sp Vibrio sp Enterococcus sp Vibrio sp Enterococcus sp Vibrio sp 53 9 8 6 23 Table - 8 Details of frequency of mycoflora in the isolated sites S.No Genus Specie A niger S6 9 IS S3 S1 S2 S3 Total F1 Specie A niger S6 9 IS S3 Total F1 S1 S2 S3 A nordal sa A niger S6 9 IS IS S3 Total F3 A nigitans S8 IS S3 S3 S1 A Nation S3 S3 S3 S1 A A niduitans S4 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
13 Vibrio sp Vibrio sp 53 9 8 6 23 Table - 8 Details of frequency of mycoflora in the isolated sites Site - 8 Details of frequency of mycoflora in the isolated sites S.No Genus Species Average S1 S2 83 Total Fi A. nigura 56 9 13 10 32 3 Total Fi A. nigura 48 8 12 7 27 7 27 A. suppressible sp A. nicularins 48 8 12 7 27 3 4. itaconicus 35 5 7 9 21 4. itaconicus 32 5 5 5 3 13 4. itaconicus 32 5 5 5 3 13 5 7 2 21 4. itaconicus 48 6 8 6 20 5 5 5 3 13 10 11 10 12 23		1 1							38.35
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$									37.51
S.No Genus Species Average S1 S2 S3 Total Fr A, figure 56 9 13 10 32 3 10 32 A, figures 54 7 10 16 33 4 16 33 4 10 14 33 10 32 1 4 10 14 7 31 10 30 1 36 6 6 21 1 1 10 14 7 31 1 10 30 14 14 7 31 1 10 14 7 31 1 1 10 12 13 13 10 13 32 5 5 5 3 13 10 11 10 12 23 16 15 11 10 12 23 16 15 11 10 12 23 16 11 10 12	13		1		-			23	43.39
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $,	Table – 8 Details of frequence	cy of myco	flora in t	he isolate	ed sites		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	S.No	Genus							Frequency (%
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $									17.14
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			A. flavus	54	7	10	16		17.36
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			A. terrus	45	8	8	9	25	15.58
1 Aspergillu sp A. nidulans 48 8 12 7 27 A. Vesicular 34 10 14 7 31 A. Vesicular 34 10 14 7 9 21 A. Vesicular 34 6 8 6 20 31 2 A. lughnensis 32 5 5 3 13 2 Cladosporium sp 25 5 5 3 13 2 Cladosporium sp 25 5 5 3 13 3 Fusarium sp F. solani 65 11 10 12 23 3 Fusarium sp F. solani (65 11 10 12 23 4 Rhizopus sp R. stolonifer 67 9 16 14 39 5 Penicillium sp R. oryzae 63 14 10 9 33 5 Penicillium sp T. korigaenum 68 11 9 13 33 5 Penicillium sp			A. Fumigatus	38	9	6	6	21	14.68
1 Aspergillu sp A. nidulans 48 8 12 7 27 A. Vesicular 34 10 14 7 31 A. Vesicular 34 10 14 7 9 21 A. Vesicular 34 6 8 6 20 31 2 A. lughnensis 32 5 5 3 13 2 Cladosporium sp 25 5 5 3 13 2 Cladosporium sp 25 5 5 3 13 3 Fusarium sp F. solani 65 11 10 12 23 3 Fusarium sp F. solani (65 11 10 12 23 4 Rhizopus sp R. stolonifer 67 9 16 14 39 5 Penicillium sp R. oryzae 63 14 10 9 33 5 Penicillium sp T. korigaenum 68 11 9 13 33 5 Penicillium sp			0	58	11	9	10	30	16.69
A. Vesicular 34 10 14 7 31 A. laconicus 35 5 7 9 21 A. sulphurous 32 5 7 9 21 A. lughuensis 32 5 9 8 22 Cladosporium sp 25 5 5 3 13 2 Cladosporium sp 25 5 5 3 13 2 Cladosporium sp 25 5 5 3 13 3 Fusarium sp F. solani 65 11 10 12 23 3 Fusarium sp F. solani 65 9 13 8 20 4 Rhizopus sp R. stolonifer 67 9 16 14 39 4 Rhizopus sp R. stolonifer 67 9 16 14 33 5 Pencicillium sp P. crysogenum 68 11 9 13 33 5 Pensinsum 174 8 7 6 21	1	Aspergilly sp							16.02
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		iispei ginn sp							16.91
A. sulphurous 48 6 8 6 20 A. lughuensis 32 5 9 8 22 2 Cladosporium sp 25 5 5 3 13 2 Cladosporium sp C. herbarum 44 6 3 6 15 3 Fusarium sp F. solani 65 11 10 12 23 3 Fusarium sp F. solani 65 11 10 12 23 4 Rhizopus sp R. solonifer 63 14 10 9 33 5 Penicillium sp R. nigricans 58 12 11 8 31 5 Penicillium sp P. crysogenum 68 11 9 13 33 5 Penicillium sp C. albicans 58 10 18 12 40 7 Trichoderma sp T. harzinum 85 10 7 6 23 8 Phythium sp Phythium sp 56 8 6 9 23<									14.68
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
A. lugnuensis 448 5 9 8 22 2 Cladosporium sp 25 5 5 3 13 2 Cladosporium sp 25 5 5 5 3 13 3 Fusarium sp F. solani 65 11 10 12 23 3 Fusarium sp F. solani 65 9 13 8 20 4 Riscopus sp R. stolonifer 67 9 16 14 39 4 Rhizopus sp R. stolonifer 63 14 10 9 33 5 Penicillium sp P. crysogenum 68 11 9 13 33 5 Penicillium sp C. albicans 58 10 11 34 7 Trichoderma sp C. albicans 58 10 18 12 40 7 Trichoderma sp T. harzinum 85 8 11 8 27 6 Candida sp C. albicans 58 10 7 6 23 9 Verticillum sp Phythium sp 55 9 8 11 28 10 Helmithosporium s			A. suipnurous		0	0	0	20	14.46
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			A. lughuensis		5	9	8	22	14.91
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			Ũ						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			Cladosporium sp		5	5	3	13	2.95
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2	Cladosporium sp		19	(2	(1.5	1.00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1 1	C. nerbarum	44	6	3	6	15	1.89
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			F solani		11	10	12	23	13.60
3Fusarium spF. semicrum48 16978621 144 $R. stolonifer$ 6791614394 $Rhizopus sp$ $R. oryzae$ 6314109334 $Rhizopus sp$ $R. nigricans$ 5812118315 $Penicillium sp$ $P. crysogenum$ 6811913335 $Penicillium sp$ $P. bovis$ 59131011346 $Candida sp$ $C. albicans$ 58101812407 $Trichoderma sp$ $T. harzinum$ 401076238 $Phythium sp$ $Phythium sp$ 56869239 $Verticillum sp$ $Verticillum sp$ 5398112810 $Helmithosporium sp$ $Helmithosporium sp$ 4264717Table - 9 Cultural characteristics $E. aerogens$ A Abundant thick, white, glistening growthMotile $ +$ $+$ $E. coli$ A Abundant, opaque, white waxy growthMotile $ +$ $+$ $B. cereus$ $+$ $Gray-white, convex growthMotile ++B. cereus+Gray-white, convex growthMotile ++B. cereus+Gray-white, convex growthMotile +<$									11.83
4 Rhizopus sp F. semiectum $\frac{40}{169}$ 7 8 6 21 4 Rhizopus sp R. stolonifer 67 9 16 14 39 4 Rhizopus sp R. oryzae 63 14 10 9 33 6 P. ingricans 188 12 11 8 31 5 Penicillium sp P. bovis 59 13 10 11 34 6 Candida sp C. albicans 58 10 18 12 40 7 Trichoderma sp T. harzinum 85 8 11 8 27 7 Trichoderma sp P. hythiun sp 56 8 6 9 23 8 Phythium sp Phythium sp 53 9 8 11 28 10 Helmithosporium sp Helmithosporium sp 53 9 8 11 28 10 Helmithosporium sp Helmithosporium sp 53 9 8 11 28 10 Helmithosp	3	Fusarium sp	T.Oxysportum		9	13	0	20	11.65
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1	F. semiectum		7	8	6	21	12.42
4Rhizopus spR. oryzae6314109334Rhizopus spR. nigricans5812118317Penicillium spP. bovis59131011346Candida spC. albicans58101812406Candida spC. albicans58101812407Trichoderma spT. harzinum401076238Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table - 9 Cultural characteristics of bactureMotilityIndoleMRVPCitrate UtilizationE. aerogenesAbundant thick, white, glistening growthMotile—+++B. cereus+Abundant, opaque, white waxy growthMotile—+++B. cereus+Abundant, opaque, white waxy growthMotile—++++B. cereus+Circular, entire, convex with regular edgesNon motile—+++									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									20.72
R. nigricans $\frac{38}{188}$ 12118315Penicillium spP. crysogenum 68 11913335Penicillium spP. bovis 59 131011346Candida spC. albicans 58 101812406Candida spC. albicans 58 101812407Trichoderma spT. viridae458118277Trichoderma spPhythium sp56869238Phythium spPhythium sp5398112810Helmithosporium spHelmithosporium sp4264717Table - 9 Cultural characteristicsMotile $ +$ $+$ $E. aerogenes$ Abundant thick, white, glistening growthMotile $ +$ $+$ $+$ $B. cereus$ $+$ Abundant, opaque, white waxy growthMotile $ +$ $+$ $+$ $B. cereus$ $+$ Abundant, opaque, white guard edgesNon motile $ +$ $+$ $+$ $P. aeruginosa$ $ +$ $+$ $ P. aeruginosa$ $ +$ $ -$ <	4	Phizopus sp	R. oryzae		14	10	9	33	17.55
5Penicillium spP. crysogenum P. bovis6811913335Penicillium spP. bovis59131011346Candida spC. albicans58101812407Trichoderma spT. viridae458118277Trichoderma spPhythium spS6869238Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table - 9 Cultural CharacteristicsMotile $ +$ $+$ $E. aerogenes$ Abundant thick, white, glistening growthMotile $ +$ $+$ $B. cereus$ $+$ Abundant, opaque, white waxy growthMotile $ +$ $+$ $B. cereus$ $+$ Gray- white, convex growthMotile $ +$ $+$ $M. tuteus$ $+$ Gray- white, convex with regular edgesNon motile $ +$ $+$ $P. aeruginosa$ $-$ White large wringled growthMotile $ -$	4	Knizopus sp	D · ·	58	10	11	0	21	16.40
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			к. nigricans	188	12	11	8	31	16.40
5Penicillium sp P . bovis59131011345 $P.expansum$ 47 8 7 6 21 6Candida sp $C. albicans$ 58 10 18 12 40 6Candida sp $C. albicans$ 58 10 18 12 40 7Trichoderma sp $T. harzinum$ 40 10 7 6 23 8Phythium spPhythium sp 56 8 6 9 23 9Verticillum spVerticillum sp 53 9 8 11 28 10Helmithosporium spHelmithosporium sp 42 6 4 7 17 Table - 9 Cultural characteristics of bacteristicsE. aerogenes $-$ Abundant thick, white, glistening growthMotile $ +$ $+$ $B. cereus$ $+$ Abundant, opaque, white waxy growthMotile $ +$ $+$ $B. cereus$ $+$ Abundant, opaque, white regular edgesNon motile $ +$ $+$ $P.aeruginosa$ $-$ White large wringled growthMotile $ P.aeruginosa$ $-$ White large wringled growthMotile $ -$			P. crvsogenum		11	9	13	33	18.71
SPenclifium sp 47 174 876216Candida spC. albicans T. viridae58101812407Trichoderma spT. harzinum40 85 1076238Phythium spPhythium sp56869239Verticillum spVerticillum sp5598112810Helmithosporium spHelmithosporium sp4264717Table - 9 Cultural characteristicsMotilityIndoleMRVPCitrate UtilizationE. aerogenes_Abundant thick, white, glistening growthMotile++B. cereus+Abundant, opaque, white waxy growthMotile++B. cereus+Gray- white, convex with regular edgesNon motile_+++P.aeruginosa_White large wringled growthMotile									19.54
P.expansum174876216Candida spC. albicans58101812407Trichoderma spT. harzinum40 851076238Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table – 9 Cultural characteristicsTable – 9 Cultural characteristicsMotilityIndoleMRVPCitrate UtilizationE. aerogenesAbundant thick, white, glistening growthMotile++B. cereus+Abundant, opaque, white waxy growthMotile+++B. cereus+Gray- white, convex with regular edgesNon motile+++P.aeruginosa-White large wringled growthMotile+	5	Penicillium sp	1.0010			10	11		
6Candida spC. albicans58101812407Trichoderma spT. viridae458118277Trichoderma spT. harzinum4076238Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table – 9 Cultural characteristicsIndoleMRVPCitrate UtilizationE. aerogenesAbundant thick, white, glistening growthMotile $ +$ $+$ B. cereus $+$ Abundant, opaque, white waxy growthMotile $ +$ $+$ B. cereus $+$ Gray- white, convex growthMotile $ +$ $+$ M. luteus $+$ Circular, entire, convex with regular edgesNon motile $ +$ $-$ P.aeruginosa $-$ White large wringled growthMotile $ -$		-	P.expansum		8	7	6	21	12.06
T. viridae458118277Trichoderma spT. harzinum 40 851076238Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table – 9 Cultural characteristicsbacketMotilityIndoleMRVPCitrate UtilizationE. aerogenes_Abundant thick, white, glistening growthMotile++E. coli_White, moist, glistening growthMotile_++B. cereus+Abundant, opaque, white waxy growthMotile_++M. tuteus+Gray- white, convex growthMotile_++M. tuteus+Circular, entire, convex with regular edgesNon motile++_P.aeruginosa_White large wringled growthMotile	(0 1.1	*		10	10	10		
7Trichoderma spT. harzinum $40\\85$ 1076238Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table – 9 Cultural characteristics of bacteristTo rganismGram stainCultural CharacteristcsMotilityIndoleMRVPCitrate UtilizationE. aerogenesAbundant thick, white, glistening growthMotile––++B. cereus+Abundant, opaque, white waxy growthMotile––++B. cereus+Gray- white, convex growthMotile––++M. luteus+Circular, entire, convex with regular edgesNon motile–++P.aeruginosa_White large wringled growthMotile	6	Candida sp							15.5
8Phythium spPhythium sp56869239Verticillum spVerticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table – 9 Cultural characteristics of bacteriaE. aerogenesAbundant thick, white, glistening growthMotile–++E. aerogenesAbundant thick, white, glistening growthMotile–+++B. cereus+Abundant, opaque, white waxy growthMotile–+++B. cereus+Gray- white, convex growthMotile–+++M. luteus+Circular, entire, convex with regular edgesNon motile++-–P.aeruginosa_White large wringled growthMotile	_		T. viridae		8	11	8	27	31.76
8 9Phythium sp Verticillum spPhythium sp 56869239Verticillum sp5398112810Helmithosporium spHelmithosporium sp4264717Table – 9 Cultural characteristics of bacteriaE. aerogenesAbundant thick, white, glistening growthMotileIndoleMRVPCitrate UtilizationE. aerogenesAbundant thick, white, glistening growthMotile–++B. cereus+Abundant, opaque, white waxy growthMotile–++C.pyogens+Gray- white, convex growthMotile–++M. luteus+Circular, entire, convex with regular edgesNon motile++-P.aeruginosa_White large wringled growthMotile	7	Trichoderma sp	T harzimum		10	7	6	23	23.05
9 Verticillum sp Verticillum sp 53 9 8 11 28 10 Helmithosporium sp Helmithosporium sp 42 6 4 7 17 Table – 9 Cultural characteristics of bacteria Organism Gram stain Cultural Characteristics Motility Indole MR VP Citrate Utilization E. aerogenes Abundant thick, white, glistening growth Motile – + + E. coli – White, moist, glistening growth Motile – + + B. cereus + Abundant, opaque, white waxy growth Motile – + + C.pyogens + Gray- white, convex growth Motile – + + M. luteus + Circular, entire, convex with regular edges Non motile + – – P.aeruginosa									
10 Helmithosporium sp Helmithosporium sp 42 6 4 7 17 Table – 9 Cultural characteristics of bacteria Table – 9 Cultural characteristics of bacteria Organism Gram stain Cultural Characteristics Motility Indole MR VP Citrate Utilization E. aerogenes _ Abundant thick, white, glistening growth Motile _ _ + + E. cereus _ Abundant, opaque, white waxy growth Motile _ _ + + B. cereus + Abundant, opaque, white waxy growth Motile _ _ + + C.pyogens + Gray- white, convex growth Motile _ _ + + M. luteus + Circular, entire, convex with regular edges Non motile _ +	8				8	6	9		14.01
10 Helmithosporium sp Helmithosporium sp 42 6 4 7 17 Table – 9 Cultural characteristics of bacteria Table – 9 Cultural characteristics of bacteria Organism Gram stain Cultural Characteristics Motility Indole MR VP Citrate Utilization E. aerogenes _ Abundant thick, white, glistening growth Motile _ _ + + E. cereus _ Abundant, opaque, white waxy growth Motile _ _ + + B. cereus + Abundant, opaque, white waxy growth Motile _ _ + + C.pyogens + Gray- white, convex growth Motile _ _ + + M. luteus + Circular, entire, convex with regular edges Non motile _ +	9	Verticillum sp		53	9	8	11		15.84
OrganismGram stainCultural CharacteristcsMotilityIndoleMRVPCitrate UtilizationE. aerogenes_Abundant thick, white, glistening growthMotile++E. coli_White, moist, glistening growthMotile++B. cereus+Abundant, opaque, white waxy growthMotile++C.pyogens+Gray- white, convex growthMotile++M. luteus+Circular, entire, convex with regular edgesNon motile_+P.aeruginosa_White large wringled growthMotile	10	Helmithosporium sp	1		6		7		14.04
E. aerogenes Abundant thick, white, glistening growth Motile + + E. coli White, moist, glistening growth Motile + + B. cereus + Abundant, opaque, white waxy growth Motile + + C.pyogens + Gray- white, convex growth Motile + + M. luteus + Circular, entire, convex with regular edges Non motile + - P.aeruginosa White large wringled growth Motile _ _			Table – 9 Cultural o	characterist	tics of ba	cteria			
E.coli White, moist, glistening growth Motile + + B. cereus + Abundant, opaque, white waxy growth Motile + + C.pyogens + Gray- white, convex growth Motile + + M. luteus + Circular, entire, convex with regular edges Non motile + _ P.aeruginosa White large wringled growth Motile _ _ _	0					le MR			
B. cereus + Abundant, opaque, white waxy growth Motile - + + C.pyogens + Gray- white, convex growth Motile - + + M. luteus + Circular, entire, convex with regular edges Non motile + - - P.aeruginosa						_			+
C.pyogens + Gray- white, convex growth Motile + + + M. luteus + Circular, entire, convex with regular edges Non motile + _ P.aeruginosa	E.coli					_	+	+	+
C.pyogens + Gray- white, convex growth Motile + + + M. luteus + Circular, entire, convex with regular edges Non motile + _ P.aeruginosa	B. cereu			Motile	. –	-	+	+	+
M. luteus + Circular, entire, convex with regular edges Non motile +					_	-			+
P.aeruginosa White large wringled growth Motile					_	+		-	+
							-	-	+
λ auraus \pm Smooth raised all tening with aircular growth Non-motils						- +	-	-	+ +
						+	-	-	
		<i>-</i> 1				-	-	+	+
S.lactis + Thin even growth Non motile + M.luteus + Circular, entire, with regular edges Non motile +					_		_	_	_ +

Table -7 Details of frequency	of bacteria in isolated sites
-------------------------------	-------------------------------

			Table – 9 Cultural ch	aracteristics of	of bact	eria				
11	B.megaterium	+	Abundant, opaque, white waxy growth	Motile		+	_	_	+	_
12	B. coagulase	+	White large wringled growth	Motile			+	+	+	_
13	Azotobacter		Thin blue- gray, spreading growth	Non motile	_	_			+	_
14	Azospirillum	_	gray, spreading growth		_	+	+	+		_
15	B. subtilis	+	Abundant thick growth	Motile	+			+	_	_
16	S. phyogens	+	Smooth raised growth	Non motile		_	+		+	+
17	B. circulans	_	Circular, entire, with regular edges	Motile	_	+	_	_	_	_

 Table -10 Cultural characteristics on a PDA of the isolated fungi

			Upper s	urface	Lower	
S.No	Species	Cultural Aspect	Density	Colour	surface	Observations
1	Rhizopus stolonifer	Effuse cotton	High	White at first become bluish black maturity	Idem to upper face	Rhizords rare sporangiophere
2	Aspergillus flavus	Effuse floccose	Medium		Idem to upper case	Hyphae, Septate with conidiophore
3	A .oryzae	Effuse globose	High	Orange to vinaceous or purple sclerotia	Idem to upper face	Hyphae, Septae with conidiophore
4	Pencillium bovis	Effuse floccose	Light	Grey green to brownish	Idem to upper face	Conidiophore (vertical of phialides)
5	P. chrysogenum	Effuse floccose	Light	Yellow to green	Idem to upper face	Conidiophore, compact vertical of phialides
6	Trichoderma viride	Effuse globose	Medium	Light green	Idem to upper face	Conidio elliptical and septae
7	Fusarium sp	Globose	Light	Grey colour	Idem to upper face	Conidia and septae
8	Rhizopus sp	Effuse cotton	Medium	Conidial heads yellow to green	Idem to lower face	Conidiophores
9	Verticillium sp	Thread like apperance	Light	Light to green White	Idem to lower face	Hyphae, Septae with conidiophore

CONCLUSION

The present study was planned to, Isolation and Identification of soil bacteria and fungi from Kumbakonam taluk of Thanjavur (Dt) Tamilnadu deals with diversity and distribution of bacterial and fungal population in an around soil. The physico – chemical parameters of such soils were recorded. Population of soil bacteria and fungi might also get affected by climate and resistance over extreme environmental condition.

Bacterial and fungal species are especially important components of biodiversity as major contributors to the maintenance of the earth's ecosystem, biosphere and biogeochemical cycle fungi perform unique and indispensible activities on which larger organism including human depend. The present study could be concluded that there is no uniformity in the diversity of population during season and their distribution pattern in different geographical regions. Several factors of salinity, origin, nature of substrata, pH and diversity bacteria and fungi. So it is obvious that a study based on biodiversity is a major challenging task as we try to predict the secret of nature.

Acknowledgement

Grateful acknowledge to Dr.V.Dhivaharan, correspondent of S.T.E.T women's College, Mannargudi, Yoge International Private Limited (Ltd.,), Pune for providing the financial support and constant encouragement to carryout the research work.

References

- 1. Ellis M.B. (1976). *More Dematiaceous Hyphomycetes*, Common wealth mycological institute new surrey England., 507.
- 2. Gillman J.C., (1957). Manual of soil fungi *Oxford and I.B.H Publishing company (Indian reprint)*, Calcutta, Bombay, New Delhi., 436.

3. Jackson. (1958), *Soil Chemical Analysis* prentice-Hall, India, New Delhi., 49.

- 4. Manimegalai .V. (2001) Population dynamics of soil mycoflora in the paddy field of Thanjavur District. Tamilnadu. *European Journal of Experimental Biology.* 1(3), 114-119.
- 5. Madhan Raj. P (2010). An investigation of the mycoflora in the send dune soil of Tamil nadu coast. India. *Advances in Applied Science Research* .1(3), 160-167.
- 6. Olson R.K. (2000). An ecological foundation for temperate. Agroforestry, Wisconsin. USA: *American society of Agronomy* Madison, 31-61.
- 7. Ronald M.Atlas, (1998). *Microbial Ecology*: Fundamentals and applications, Menlon park Calif: Harlow. Benjamin .694.
- 8. Salil bose, (1982). Biostastistics in elementary Biophysis. Jothi book. Madurai., 127-128.
- 9. Piper C.S. (1944) Soil and plant analysis. Univ. of Adelaide, pp1 -368
- 10. Uma Maheshwari .N and Komalavalli. R, (2013). Diversity of soil fungi from Thiruvarur District, Tamil Nadu, India, *Int. J. Curr. Microbio. App. Sci*, **2(10)**:135-141.
- 11. Warcup J.H., (1950). The Soil –Plate method for isolation of fungi. *Soil Sci* .58, 89-114.
- 12. Walkey A. and I.A. Black. (1934) An Examination of Degtjarett method for Determining soil organic and proposed modification of the chromic Acid Method *Soil Sci.* 37, 29-37.
- 13. Willams T .R. Determination of magnesium in soil extracts by atomic adsorption spectroscopy and chemical methods. *J. of the Science of Food and Agriculture*. 17(8): 344-348.

