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DISTINCTIVE FUNGAL AND BACTERIAL COMMUNITIES ARE ASSOCIATED WITH THE SOIL SAMPLE FROM PATTUKKOTAI TALUK, THANJAVUR DISTRICT. TAMILNADU, INDIA

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ABSTRACT

Microbes in diverse communities interact with other organisms and its environment, making their impact difficult to predict. In the present study, the soil sample was collected from Pattukkotai Taluk, Thanjavur District at four different seasons viz., post monsoon, summer, pre monsoon and monsoon, and investigation were carried out. The soil samples were subjected to physico-chemical analysis. Seasonal variations of different parameters investigated were as follows: physical parameters of P^H (7.14-7.87), Moisture content (30.7-45.5 %), and temperature (24-47°C). The chemical and other soil parameters such as available Organic carbon (0.12-0.97 kg/ac), Nitrogen contain (72.8-91.12 kg/ac), Phosphorus (3.13-3.65kg/ac), potassium (125-145kg/ac), Magnesium (8.3-9.6kg/ac) and Calcium (10.3-12.3kg/ac), available micronutrients (ppm) such as Zinc, Copper, Iron, Manganese (0.63-0.89, 0.73-0.99, 4.57-8.62, 3.15-3.49) respectively. Spatial and seasonal fluctuations of 19 important groups of bacterial and 28 fungal group's isolates were evaluated from the soil sample during different seasons, along with soil physico- chemical parameters. Determination of bacterial and fungal diversity in the pattukottai taluk soil by culture method showed the predominance of bacterial genera such as *E.coli, Streptococcus sp, Staphylococcus sp, Shigella sp, Brucella sp, Bacillus sp, Pseudomonas sp*. The predominance of fungal genera such as *Aspergillus sp, Tricoderma sp, Fusarium sp, Pencillium sp, Rhizopus sp.*

INTRODUCTION

Pattukkottai is a town in Thanjavur district in the Indian state of Tamil Nadu. The town Came to prominence after the construsction of the fort by Vanaji Pandithar, a feudatory of the Thanjavur Maratha ruler Shahuji I in 1686-87. The recorded history of pattukkotai is known from the 17th century and has been ruled, at different times, by the Thanjavur Marathasand the British. It is the headquarters of the Pattukkotai taluk of Thanjavur district and is one of the three municipalities in the district. Pattukkottai 10.43°N 79.32°E is located along the southeast coast of India in the East-central region of Tamil Nadu. Pattukkottai Municipality covers an area of 21.83km^2, and has an average elevation of 5 meters (16 feet). Pattukkotai is 48 km from the city of Thanjavur. The coast of the Bay of Bengal is just 12km away, with Manora fort 15 km away from this town.Pattukkottai lies on an extremely dry, rugged plateau. The Pattukkottai division is the only division of thanjavur district which is not watered either by the kaveri River or any of its tributaries. Pattukkottai comes under the "As" region of the koppen climate classification, as it is situated in tropical region and and receive its maximum rainfall during the winter months form October, November and December. Due to its geographical position, pattukkottai experiences Hot and Humid climate and there is no extreme variation in seasonal temperature. As it is nearer to equator, the summer season starts from April and extends till early June. This period observes the hottest part of the year; locally know as "Agni and Nakshatram" or "Khatri".

Microbial diversity is a general term used to include genetic diversity, that is, the amount and distribution of genetic information, within microbial; diversity of bacterial and fungal species in microbial communities; and ecological diversity, that is variation in community structure, complexity of interactions. Number of trophic levels, and number of guilds here we consider microbial diversity simply to include the number of different fungal bacterial species (richness) and there relative abundance (evenness) in soil microflora. (Equations used to calculate species richness and evenness and diversity indices,

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which combine both richness and evenness, have been discussed by kennedy and smith 1998).

Soil is a most precious natural resource and contains the most diverse assemblages of living organisms. Indigenous microbial population in soil are of fundamental importance for ecosystem functioning in both natural and managed agricultural soils (O'Donnell *et al.* 1994; Doran and zeiss 2000) because of their involvement in such key processes as soil structure formation, organic matter decomposition, nutrient cycling and toxic removal (Van Elsas, 1997; Doran and zeiss 2000). The community of soil flora and fauna is influenced directly or indirectly by management practice, e.g. cultivation and the use and application of organic and inorganic fertilizers (Bloem *et al* 1994; Matson *et al*., 1997). A growing number of studies show that organic farming leads to higher soil quality and more biological activity (microbial populations and Girvan *et al*., 2004). Microbial population size and community structure are sensitive to changes in chemical properties of the surrounding soil (Pansombat *et al*., 1997; Tokuda and Hayatsu, 2002). Further, considerable evidence indicate that changes in the composition of a microbial community can be used to predict and dictate alteration in soil quality (Van Brugen and Semenov, 2000; Breure, 2005). Microbial communities, particularly bacteria and fungi constitute an essential component of biological characteristics in soil ecosystems. It has been estimated that 1.5 million fungal species and 170 million bacterial species are present in natural ecosystems, but only 5-10% have been described formally (Hawksworth 2001). Schmith and Mueller (2007) estimated that there is a minimum of 7,12,000 fungal species worldwide. The actual number of fungi is still unknown; however, only 5-13% of the total estimated global fungal species have been described (Wang *et al*. 2008). Research on fungal diversity provides a basis for estimating the functional role of fungi in ecosystems. Soil fungal population is favored largely by organic forming systems (Drinkwater *et al*., 1995; Girvan *et al*., 2004) but not much has been published about its population and diversity in these systems especially in the agricultural lands of Pattukkotai Taluk, Thanjavur District, Tamil Nadu. A better understanding of the fungal and bacterial diversity in soil with different organic amendments may prove crucial in predicting which the best for application is. Especially bacteria play a crucial role in biogeochemical cycles and in sustainable development of the biosphere (Diaz, 2004) so this present study aimed to investigation how the seasonal variations influence the physiochemical parameters of soil and fungal and bacterial population.

MATERIALS AND METHODS

Collection of soil sample and sampling schedule

Soil samples were collected seasonally from the villages Atthivetti, Vikramam, vattakudi from Pattukottai Taluk, Thanjavur District, Tamil Nadu, India for a period of one year from January 2015 –December 2015. The climate is monsoonic and the calendar year has been divided into 4 season viz., post monsoon (January-March), summer (April-June), pre monsoon (July-September) and monsoon (October-December).

Soil Physico Chemical Properties

The soil samples were collected in zip-lock polythene bags from selected study site at the monthly interval for the period of 1 year from September 2015- January 2016. The collected soil samples were first air dried at room temperature, then crushed using a porcelain mortar and pestle and then sieved for further analysis. The pH of the suspension was read using pH meter (Systronics, India), to find out the soil pH. The moisture content of the soil sample was analyzed by weightless after drying 10g of soil at 105°C for 24 hrs and expressed as percentage dry weight (Griffin 1970). Soil pH was measured in a 1:5 water suspension using a portable digital pH meter. The macro nutrient such as organic carbon content was determined by adopting chromic acid wet digestion method described by Walkely and Black (1934), available nitrogen was estimated by alkaline permanganate method as described by (Subbiah and Asija, 1956) and available phosphorus by Brayl method as described by (Bray and Kutz, 1945). Available potassium was extract from soil with neutral 1N ammonium acetate (1:5) and the potassium content in the extract was determined by using flame photometer, Calcium (Neutral 1N NH4 OAC extractable 1:5) was extracted with neutral 1N ammonium acetate and the available calcium in the extract was determined by versenate method (Jackson, 1973). The available micro nutrient such as Zn, Cu and Mn, Iron were determined in the diethylene triamine penta acetic extract of soil using Perkin- Elmer model 2280 Atomic Absorption Spectrophotometer (Lindsay and Norvell, 1978). The analyzed physico chemical parameters for 4 different seasons were represented in Table-1.

Isolation and identification of fungi

The fungal population analysis, serial dilution plate method by (Warcup 1950) was followed using Rose bengal agar medium (Martin, 1950). Supplemented with streptomycin solution. The inoculated petriplates were incubated in a sterile culture room at 25°± 1°C. Colony forming units (CFU) were estimated by counting the number of colonies after days. Fungal colonies formed were calculated on per gram dry soil basis fungi were identified according to their macroscopic and microscopic features. Identification at the species level was carried out according to the morphological characters found principally in publications by (Gillman, 1957). Barnett and Hunter (1972), Domsch *et al* .,(1980), Subramanian (1983), Ellis(1993) and watanabe (1994), pure cultures of fungi were maintained in test tubes slants containing Czapex Dox agar medium (Raper and Thom, 1949) and preserved in deep freezer at 20°C. (Table-3).

Isolation and Identification of Bacteria

The soil samples were passed through a sieve (1.7mm mesh) to remove large pieces of debris and vegetation. The bacteria were originally isolated by plating dilutions of soils in saline solution (0.9%Nacl). On nutrient agar, was incubated at 37°C for 48 hrs. The developed colonies were counted in the plates was determined. The number of total bacteria (CFU) per gram dry weight soil was determined. Individual colonies of bacteria which vary in shape and color were picked up and purified by streaking on nutrient agar. The bacterial isolates were identified on the basis of classification schemes published in Bergey's manual of systematic Bacteriology (Krieg and Holt,1984) based on the characters such as morphology, physiology and nutrition, cultural characteristics and biochemical tests were presented(table 5). resulted in elevated content of organic carbon in soil, sediment and streams.

Table 1 Analysis of physicochemical parameter of soil sample.

Site	pH	moisture (%)	Temprepture (°C)	O.C (kg/ac)	N (kg/ac)	P (kg/ac)	K (kg/ac)	Mg (kg/ac)	Ca (kg/ac)	Zn (ppm)	Fe+ (ppm)	Cu (ppm)	Mn (ppm)
Monsoon													
S_1	7.38	39.40	28	0.89	88.6	3.14	135	9.6	10.8	0.85	4.85	0.98	3.26
S_2	7.85	40.5	27	0.96	85.2	3.65	125	8.3	11.2	0.83	4.83	0.99	3.45
S_3	7.14	38.9	24	0.14	89.2	3.56	135	9.4	12.3	0.87	7.90	0.99	3.27
post monsoon													
S_1	7.28	40.5	35	0.74	91.12	3.15	145	9.3	10.7	0.63	7.36	0.76	3.15
S_2	7.69	37.4	36	0.97	81.2	3.14	143	8.5	10.3	0.75	8.25	0.73	3.33
S_3	7.87	41.1	37	0,21	72.8	3.32	125	8.7	11.2	0.86	4.75	0.75	3.45
Summer													
S_1	7.74	30.7	47	0.78	90.15	3.13	125	9.2	10.5	0.89	4.96	0.97	3.48
S_2	7.14	37.4	47	0.14	81.6	3.54	140	8.4	11.4	0.85	4.57	0.85	3.49
S_3	7.17	40.8	45	0.12	80.9	3.24	140	8.9	10.8	0.73	8.23	0.89	3.15
pre monsoon													
S_1	7.85	45.5	35	0.23	87.4	3.25	140	8.7	10.3	0.84	8.23	0.89	3.69
S_2	7.18	38.9	36	0.32	87.2	3.24	145	9.7	11.3	0.83	8.33	0.76	3.25
S_3	7.18	33.2	36	0.34	85.2	3.35	145	8.9	11.2	0.85	8.62	0.75	3.26

Table 2 Morphological characters of isolated fungi species

S.No	*Organisms*	Colony morphology	Microscopic observation
1	Aspergillus niger	Blackish brown	Hyphae septate with conidio spore
2	A.flavus	Conidial head yellow to green	Hyphae septate with conidio spore
3	A.nidulans	Dark green colour	Hyphae septate with conidio spore
4	A.ruber	Ferruginous to morocco red	Hyphae septate with conidio spore
5	F.oxysporum	Brownish white to violet	Oval to reniform chlamydo spores
6	P.citrinum	Bluish green to clear green	
7	A.oryzea	Greenish blue	Hyphae septate with conidio spore
8	Alternaria	velvety to cottony light to dark oil vacious gray	Hyphae conidio spore
9	R.oryzea	White colour	Non septate mycelium
10	Verticillium	Blue green, pale green	Hyphae septate with conidio spore
11	A.fumigates	Black or green	Hyphae septate with conidio spore
12	R.stolnifer	White or dark gray	Non septate mycilium
13	P.conidiospore	Greenish colonies	Conidia long chain
14	T.viridea	White to pink	Two celled conidia
15	Absidia	Yellow to brown	Hyphae and septate
16	Cladosporium	Greenish black	Branched conidio spore

RESULTS AND DISCUSSION

The fluctuation in soil temperature usually depends on the season, geographic location, sampling time and temperature of effluent entering the stream (Ahipathy, 2006). Present investigation reveals that there was no great difference found in pH values in seasonal analysis which indicate the temperature which causes reduction in solubility of CO_2 (Mahananda *et al.*, 2010). While soil acidification is beneficial in the case of alkaline soils, it degrades land when it lowers crop productivity and increases soil vulnerability to contamination and erosion. Soils are often initially acid because there parent materials were acid and low in the basic cations (Calcium,Megnesium and Pottasium).The pH of soil is one of most important physico chemical parameter. It affects mineral nutrient soil quality and much microorganism activity. The pH was observed in the ranges from (7.14 to 7.87).The moisture content range from (30.7 to 45.5%). The temperature range from (24 to 47°C).(Table 1). It depends on the seasonal variations. The organic carbon content soil is a key component in a number of chemical, physical and biological processes and contributes significantly to acidity through the formation of organic acids. The highest value of organic matter was record in the post monsoon season as natural processes and human activities have

This is supported (Kamaruzzaman *et al.*, 2009) and (Adeyemo *et al* 2008). They reported that input from inappropriate animal waste disposals, forest clear cuttings, agricultural practices and changes in land usage rise the organic carbon content the organic carbon content was (0.14- 0.97kg/ac) the fertility and biodiversity in an aquatic system are greatly influence by nitrogen concentration of the soil sediment. The concentration of total nitrogen was the highest during summer season (90.15 kg/ac) which is due to the oxidation of organic matter that has settled on the top layer of sediment (Saravanakumar *et al.*, 2008). The phosphate content at study area varied between (3.54 kg/ac) and showed higher values in monsoon followed by post monsoon and pre monsoon. It might be due to the addition of fertilizer from agricultural runoff, sewage contaminated storm water out falls and other anthropogenic activities such as use of detergents, bathing; cattle wading etc. Among the months studied higher calcium content were observed in monsoon seasons. Variation in magnesium contents showed that increased mg contents range in from (8.4-9.7 mg/kg) soil was recorded. The excess mg may be derived from the decomposition of liter accumulated for longer period in sediment favored increase microbial activity. The lower concentration of magnesium and calcium during the monsoon season may be attributed to dilution by rain water. The available micronutrient are Zinc showed higher concentrations in the pre monsoon season followed by monsoon and post monsoon season, the higher concentration of Zinc in sediment may be due to the presence of unused reminds of Zinc sulphate in fertilizers (Reza and Singh, 2010).(Table 1).

Table 3 Presence of predominant fungal species in pattukkotai taluk

S.No	Fungal species	Sample details			S.No	Fungal species	Sample details		
		S_1	S_2	S_3			S_1	S_2	S_3
1	*Aspergillus flavus*	+	+	+	15	*F.solani*	+	+	+
2	*A.niger*	+	+	+	16	*Penicillium citrinum*	–	–	+
3	*A.terreus*	+	+	+	17	*P. tubatum*	+	+	+
4	*A.granulosis*	+	_	_	18	*P. jethinellum*	+	+	–
5	*A.itaconicus*	+	–	+	19	*P.condia*	+	+	+
6	*A.nidulans*	–	+	+	20	*P.levitum*	+	+	–
7	*A.temicola*	–	+	–	21	*Rhizopus stolnifer*	+	+	+
8	*A.ruber*	–	+	–	22	*R.oryzae*	+	+	+
9	*A.repens*	+	+	–	23	*R.nigricans*	+	+	–
10	*A.fumigates*	+	+	+	24	*Tourla alli*	–	+	–
11	*Trichoderma viridae*	+	+	+	25	*Alternaria Spp*	+	+	_
12	*T.horizonum*	+	+	+	26	*Cladosporium*	+	–	–
13	*.lignorum*	+	+	+	27	*Verticellium Spp*	+	+	–
14	*Fusarium oxysporum*	+	+	+	28	*Helminthosporium Spp*	–	+	+

and this resulted in insufficient or depletion of nutrient availability for the fungi.

As such, fungal population decreases and when the crop growth is at its peak. In our study, cultivation was done from April to October and the field is left fallow during the winter season. Lower fungal population in the pre-harvest is attributed to lack of vegetation and organic amendment input during the winter months.

Even though the treatments were done in the same site during the study period, the rows were not established in exactly the same location distribution of soil nutrients and hence, inconsistent monthly variation in fungal population and diversity. Song *et al*., (2007) indicated that difference in establishment of rows during the field preparation leads to alteration of microbial communities.

Table 5 Presence of predominant bacterial species in pattukkotai taluk

Name Of The Organism	S1	S2	S3
E.coli	+	+	+
Bacillus licheniformis	+	+	+
Streptococcus spp	+	+	+
Vibrio spp	_	_	+
Nesseria spp	+	_	_
Pseudomonas aerogens	+	+	+
Brucella spp	+	+	+
Bacillus cerues	+	+	+
Shigella spp	+	+	+
P.alkaligens	+	+	+
Aerobacter	+	_	+
Agrobacterium spp	_	+	+
Staphylococcus	+	+	+
Bacillus subtilis	+	+	+
Melissococcus	_	_	+
Brevebacterium	+	+	_
Micrococcus spp	+	_	+
Flavobacterium	_	+	+
Enterococcus aerogens	+	+	+

Table 4 Morphological and biochemical character of bacteria

S.No.	*Organisms Name*	Gram staining	Motility	Indole	MR	VP	Citrate	Catalase	Urease	Oxidase	TS1
1	B.subtilis	+ve rod	Motile	+	-	-	+	+	-	+	Alkaline production
2	B.cereus	+ve rod	Motile	+	+	+	+	-	-	-	Alkaline production
3	B.licheniformis	+ve rod	Motile	-	+	+	+	+	-	+	Alkaline
4	Micrococcus sp	+ve cocci	Non motile	+	-	-	+	+	+	-	Alkaline production
5	E.coli	+ve rod	motile	+	+	-	-	+	-	-	Alkaline production
6	Staphylocccus sp	+ ve cocci	Non motile	+	-	+	+	+	+	-	acid gas production
7	Streptococcus sp	+ ve cocci	Non motile	+	+	-	-	+	-	-	acid gas production
8	Preudomonas sp	- ve rod	motile	-	+	-	-	+	-	+	acid
9	Veillonella sp	- ve rod	Non motile	-	-	+	-	-	+	-	acid production
10	Rahella sp	- ve rod	Non motile	-	+	+	+	+	-	+	acid production
11	Sarcina sp	+ ve cocci	Non motile	-	-	+	-	-	+	+	acid gas production
12	Brucella sp	- ve cocci	Non motile	-	+	-	+	+	+	+	Alkaline production
13	Aecococcus sp	+ ve cocci	Non motile	+	+	-	+	+	+	+	Alkaline production
14	Shigella sp	- ve rod	Non motile	-	+	-	-	+	-	-	H_2S not production
15	Oscillospira sp	- ve rod	Non motile	+	+	-	+	+	-	+	Alkaline production
16	Milissococcus sp	+ ve cocci	Non motile	-	+	-	+	+	-	+	Alkaline production
17	Megasphacera sp	+ ve cocci	Non motile	+	+	-	-	+	+	-	acid gas production
18	Brevibacterium sp	+ ve cocci	Non motile	-	+	-	+	+	+	+	Alkaline production
19	Saccharococcus sp	+ ve cocci	Non motile	-	+	-	+	+	+	+	Alkaline production

Inconsistent monthly variation in fungal population in all the sites could be due to the different stages of the crop growth, the type and amount of organic amendment supplemented and the Degree of decompositions of the organic amendment. During the crop growing stages nutrient uptake by the plants increases

Diversity in soil sample at four different seasons

The soil samples from 4 different seasons representing the pattukkotai Taluk, Thanjavur District were examined for fungal and bacterial diversity. The study revealed the presences of 28 species of bacteria, among them 5species were found in all the seasons (Table 4).

Table 6 Morphological and biochemical character of bacteria.

S.No.	Organisms Name	Gram staining	Motility	Indole	MR	VP	Citrate	Catalase	Urease	Oxidase	TS1
1	*B.subtilis*	+ve rod	Motile	+	-	-	+	+	-	+	Alkaline production
2	*B.cereus*	+ve rod	Motile	+	+	+	+	-	-	-	Alkaline production
3	*B.licheniformis*	+ve rod	Motile	-	+	+	+	+	-	+	Alkaline
4	*Micrococcus sp*	+ve cocci	non motile	+	-	-	+	+	+	-	Alkaline production
5	*E.coli*	+ve rod	motile	+	+	-	-	+	-	-	Alkaline production
6	*Staphylocccus sp*	+ ve cocci	non motile	+	-	+	+	+	+	-	acid gas production
7	*Streptococcus sp*	+ ve cocci	non motile	+	+	-	-	+	-	-	acid gas production
8	*Preudomonas sp*	- ve rod	motile	-	+	-	-	+	-	+	acid
9	*Veillonella sp*	- ve rod	non motile	-	-	+	-	-	+	-	acid production
10	*Rahella sp*	- ve rod	non motile	-	+	+	+	+	-	+	acid production
11	*Sarcina sp*	+ ve cocci	non motile	-	-	+	-	-	+	+	acid gas production
12	*Brucella sp*	- ve cocci	non motile	-	+	-	+	+	+	+	Alkaline production
13	*Aecococcus sp*	+ ve cocci	non motile	+	+	-	+	+	+	+	Alkaline production
14	*Shigella sp*	- ve rod	non motile	-	+	-	-	+	-	-	H_2S not production
15	*Oscillospira sp*	- ve rod	non motile	+	+	-	+	+	-	+	Alkaline production
16	*Milissococcus sp*	+ ve cocci	non motile	-	+	-	+	+	-	+	Alkaline production
17	*Megasphacera sp*	+ ve cocci	non motile	+	+	-	-	+	+	-	acid gas production
18	*Brevibacterium sp*	+ ve cocci	non motile	-	+	-	+	+	+	+	Alkaline production
19	*Saccharococcus sp*	+ ve cocci	non motile	-	+	-	+	+	+	+	Alkaline production

Several studies suggested that soil microbial diversity had seasonal fluctuations (Lipson and Schmidt, 2004 and Smit *et al*., 2001). In regards to its microbial diversity, this ecosystem is largely dominated by *Bacillus spp E.coli, Pseudomonas spp, Shigella spp, Brucella spp, Streptococcus spp, Staphylococcus spp* which is the characteristic of neutral soil. Presence or absence of particular bacteria genera may depend on soil parameters, as observed (Alexandar, 1971) (Table 4).

A total of 28 fungal species and two sterile mycelia were isolated from all the site. The list of fungal species isolated from the different site is depicted in Table 3. The fungal species isolated belonged mostly to *Deuteromycetes*(27 species) followed by level of the genera *Penicillium* (5 species) , *Aspergillus* (10 species) , *Trichoderma* (3 species),

Fusarium (2 species) and *Rhizopus* (3 species) were found to be among the most common at the species level, te dominant species of mainly the cellulose degrading fungi belonging to *Deuteromycetes* except *pythium*. The predominant fungal species are includes *Aspergillus spp*, *Fusarium oxysporum spp*, *Trichoderma spp*, *Penicillium spp*, and *Rhizopus spp*, (Table 2).

CONCLUSION

It is getting established that research in soil sample and organisms is ultimately aimed to focus on new bioactive compounds to improve the quality of our life and save our cells from savior diseases. The soils of Atthivetti, Vikramam, Vattakudi located in Pattukottai Taluk of Thanjavur District have been investigated to study the monthly changes in soil Moisture, soil pH, temperature, Organic carbon, available Nitrogen and macronutrient like Potassium. Calcium, phosphorus and magnesium during the period of one year (2015- 2016). At 4 different season viz, post monsoon, summer. Pre monsoon and monsoon. Physico chemical analyses were performed to study the soil characteristics related to fertility and chemical nature. By monitoring the changes with respect to all soil physico chemical parameter studied, it clearly indicates that, the soil collected at monsoon and post monsoon seasons showed higher values compared to pre monsoon and summer season with very few exceptions. It was noticed that the regular addition of fertilizer from agricultural runoff, sewage contaminated water out falls, rain water and other anthropogenic activities contribute major changes in soil physico chemical properties that in turn significantly manifest the microbial populations. Different groups of bacterial and fungal populations observed in this study are uncommon and they were fewer in summer. Because there is a limitation in moisture during summer. So drought might be constituting a stress in microbial communities. Determination of bacterial and fungal diversity by culture method showed the predominance of bacterial genera such as *Bacillu sps, Streptococcus sp, Staphlococcus sp, Pseudomonas sp, Shigella sp, Brucella sp*. The predominance of fungal genera such as *Aspergillus sp, Rhizopus sp, Pencillium sp, Trichoderma sp, Fusarium sp*. were stated that the healthy aquatic ecosystem is depended on the biological diversity and physico chemical characteristics of water as well as its soil.

The present study could be concluded that there is no uniformity in the diversity of bacterial and fungal populations and their distribution pattern in different geographical regions. Several factors of salinity, origin, nature of substrate, pH and oceanic region affect the occurrence and diversity of soil 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.

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