International Standard Serial Number (ISSN): 2249-6807

International Journal of Institutional Pharmacy and Life Sciences 2(3): May-June 2012

INTERNATIONAL JOURNAL OF INSTITUTIONAL PHARMACY AND LIFE SCIENCES

Life Sciences **Research Article……!!!**

Received: 02-05-2012; Revised; Accepted: 04-05-2012

SEDIMENT MYCOFLORA OF THREE RAINFED ASTATIC PONDS OF TAMILNADU, INDIA

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Keywords:

Astatic rain fed ponds, Soil sediments, Fungal Diversity

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ABSTRACT

Today researches have clearly indicated that aquatic fungi play a key role in the productivity of streams, estuaries and oceans. Hence, in the present study, the soil sediment samples were collected from three different astatic rainfed ponds at Musiri near the city of Tiruchirappalli, Tamilnadu in South India. All of them are with in a two kilometer radius and so have almost the same climatic conditions. These ponds were named as Thambiran pond, Mangaraipettai pond and Attalapettai pond respectively. The result shows that the maximum Mesophilic species occurred in Thambiran pond (16 species) followed by Mangarai pettai pond (14 species) and Attalapettai pond (11 species).Thermophilic fungi was found in maximum diversity in Thambiran pond (10 species) followed by other two ponds (8 species each). Thus, Thambiran pond recorded the maximum diversity (26 species) followed by Mangarai pettai pond (22 species) and Attalapettai pond (19 species). *Aspergillus* was the most dominant genera found in all three ponds. In the present study, the higher fungi diversity noticed in Thambiran pond may be attributed to larger entry of sewage entering this pond when compared to the other two ponds as this pond is located closer to human settlements.

INTRODUCTION

Aquaculture is more complex than terrestrial animal husbandry because in the aquatic environment, the physical, chemical and biological changes are unpredictable and may change rapidly. Ponds in India receive a large input of organic matter and so they act as a store for a variety of substances. It also harbours a rich microbial community whose activity leads at anaerobic conditions and development of microbial flora which in turn utilizes these organic compounds (Boyd, 1995). Aquatic fungi attracted the attention of mycologists around the fourth decade of last century which resulted in the monumental works of Johnson and Sparrow in 1961 in the form of books "Fungi of oceans and estuaries' giving a comprehensive account of fresh water fungi. The Spectacular array of fungal populations adorning aquatic habitats has recently been reviewed by Wadhwani *et al.* (1992). Today researches have clearly indicated that aquatic fungi play a key role in the productivity of streams, estuaries and oceans (Johnson and Sparrow, 1961, Cooke, 1961,1963,1971, Jones, 1976, Wicklow and Carrol, 1981).Literature reveals that fungal studies particularly in aquatic habitats of India have been made only by a few workers (Ingold and Webster, 1973; Galiah and Manoharachary, 1987; Agarwal *et al.*,1990; Sridhar *et al.*,1992; Sati and Tiwari, 1997; Sati *et al.*,2002; Raj shekhar and Kaveriappa, 2003; Sati ad Belwal, 2005; Thakur, 1977; Patil and Kapadins, 1980; Talde, 1981; 1983; Borse and Patil, 2006; Borse ad Patil, 2007; Patil, 2009; Wagh *et al.*, 2009; Nemade *et al.*, 2009; Pawara *et al.*, 2009 and Patil and Borse, 2011). Hence the Present study was aimed at assessing the fungal population present in the sediments of three temporary ponds at Musiri, Tamilnadu.

MATERIALS AND METHOD

Soil sediment samples were collected from three different astatic rainfed ponds at Musiri near the city of Tiruchirappalli, Tamilnadu in South India. All of them are with in a two kilometer radius and so have almost the same climatic conditions. These ponds were named as Thambiran pond, Mangaraipettai pond and Attalapettai pond respectively. All these ponds are used for carp culture regularly. Sediment samples were taken every month from January to December 2011 and were analyzed using the dilution plate method for the isolation of mycoflora. One gram of soil from each sample was serially diluted and 1ml of 10^{-2} dilution was transferred into triplicate plates. Potato dextrose agar was used for the isolation of mesophilic fungi and the plates were maintained at room temperature of 30 ± 2^0C Emersan's Yeast Phosphate soluble Starch agar (YpSs) was used for the solution of thermophilic fungi and the plates were incubated at 47 ± 2^0C (Emerson, 1941). After 3-5 days of incubation, the colonies were isolateds, identified and enumerated using standard procedures (Cooney and Emerson, 1964, Gilman, 1967, Subramanian, 1971, Quions *et al.*, 1981 and Sivakami *et al*., 2003).

RESULTS AND DISCUSSION

Mesophilic and Thermophilic fungi that belonged to the three ponds are represented in Tables 1 and 2. As seen from the table, maximum Mesophilic species occurred in Thambiran pond (16 species) followed by Mangarai pettai pond (14 species), Attalapettai pond (11 species). Thermophilic fungi was found in maximum diversity in Thambiran pond (10 species) followed by other two ponds (8 species each). Thus, Thambiran pond recorded the maximum diversity (26 species) followed by Mangarai pettai pond(22 species), Attalapettai pond (19 species).

Table 1. Mesophilic and Thermophilic fungi isolated from three astatic ponds, Tiruchirappalli.

Sl.No	Fungi	Thambiron Pond			Mangaraipettai pond			Attalapetta pond		
	Mesohilic Fungi	**8***	**2***	**Cfu**	**8***	**2***		**8***	**2***	**Cfu**
1	*Aspergillus chevalieri*	+	-	14.6	+	-	16.4	+	-	80.6
2	*Aspergillus flavipes*	+	-	110.4	+	+	60.8	-	+	2.6
3	*Aspergillus flavus*	+	+	26.4	+	+	84.6	+	-	52.6
4	*Aspergillus nudulans*	+	-	32.4	+	-	10.4	-	-	-
5	*Aspergillus niger*	+	+	140.2	+	-	120.6	+	+	114.6
6	*Aspergillus terreus*	+	-	24.5	-	+	2.8	-	-	-
7	*Aspergillus corymbifera*	+	+	10.6	-	-	-	-	+	3.8
8	*Curvalaria lunata*	+	+	47.2	+	+	26.8	+	-	28.6
9	*Cunninghamella echinulatus*	+	-	0.28	-	+	2.8	-	-	-
10	*Drechslera australiescs*	+	-	0.09	+	-	34.6	+	+	46.2
11	*Fusarium oxysporum*	+	-	110	+	-	62.8	-	-	-
12	*Monila siophila*	+	-	14.2	-	+	0.38	+	-	12.8
13	*Pencillium funciculosum*	+	+	84.0	-	-	-	+	-	64.2
14	*Pencillium oxalicum*	+	-	28.6	+	-	19.6	+	+	142.8
15	*Paecilomyces variotii*	+	-	18.6	-	+	0.60	-	-	-
16	*Mucor racemosus*	+	-	64.0	+	-	120.6	+	-	33.6
	Non Sporulating colonies	+	-	62.4	+	-	40.6	+	+	45.6
		16			14			11		
	Thermophilic Fungi	**8***	**2***		**8***	**2***		**8***	**2***	
17	*Aspergillus fumigates*	+	+	132.4	+	-	76.2	+	-	126.6
18	*Aspergillus terreus*	+	+	72.6	+	-	42.8	-	+	27.8
19	*Cheatomium Var-coprophile*	+	-	15.8	+	+	74.2	-	-	-
20	*Cheatomium Var.dissitum*	+	-	21.4	-	-	-	-	+	0.78
21	*Cheatomium thermophilie*	+	-	12.6	+	+	14.8	+	+	48.7
22	*Humicola grisea*	-	+	34.0	+	+	18.6	-	-	-
23	*Mucor pusillus*	+	-	42.4	-	-	-	+	+	72.6
24	*Rhizopus stoloniter*	+	-	112	+	+	69.4	+	-	115.2
25	*Thermomyces lanuginosus*	-	+	0.45	-	-	-	+	-	15.8
26	*Torula thermophila*	-	+	0.29	+	-	46.2	+	-	18.4
	Non sporulating colonies	+	+	52.4	+	+	30.2	+	+	60.4

Among the mesophilic fungi, nine species (*Aspergillus chevalieri, A. flavipes, A. flavus, A. niger, Curvularia lunata, Drechslera australieses, Monila siophila, Pencillium oxalicum and*

Mucor racemosus) were found to be common to all the three water bodies. No mesophilic species were found, that were unique to these ponds. However in Mangaraipettai pond two species (*Aspergillus corymbifera, Pencillium funciculosum*) were absent which were recorded in the other two ponds. In Attalepettai pond 5 species (*Aspergillus nudulans, A. terreus, Cunninghamella echinulatus, Fusarium oxysporum and Paecilomyces variotii*) were found to be absent which were present in other two ponds. Thambiran pond recorded species that were found in both the other ponds. Among the Thermophilic fungi 5 species (*Aspergillus fumigatus, A. terrus, Cheatomium var.thermophilie, Rhizopus stolonifer and Torula thermophila* were found to be common among all the three water bodies. Among Thermophilic fungi also there were no unique species found. But in Mangaraipettai pond, 3 species *Cheatomium var.dissitum, Mucor pusillus* and *Thermomyces lanuginosus* were absent when compared to the other two ponds. In Attalapettai pond again 2 species (*Humicola grisea, Cheatomium var.coprophile*) were absent. Here also, Thambiran pond, all the species were recorded that were found in the other two ponds.

In the present study, *Aspergillus* was the most dominant genera found in all three ponds. Among this genus, *Aspergillus niger* was also notices by Hiremath *et al*.(1990) in a sewage pond in New Delhi, while Paul raj *et al*. (2003) recorded this in prawn culture ponds as Sivakami *et al*. (2007) in a perennial fish culture pond of Tamil Nadu. As all the three ponds are used for aquaculture, the artificial feed given to these fishes would have provided the nutrients necessary for the growth of these fungi. Literature reveals that Sigh and Wadhwani (1989) reported that fungi were abundant in stagnant waters when compared to flowing water. The high amount of fungal flora can be attributed to the stagnancy of water which provided better chances for germination, growth and survival of fungi on dead and decaying organic matter lying at the pond bottom (Monoharachary,1983).Among two groups, mesophilic fungi were found in larger diversity than thermophilic species. The presence of higher mesophilic fungi diversity observed in this study has also been noticed earlier by Hiremath *et al*. (1990), Paul rai *et al.* (2003). Nevertheless, same some of the fungi present in the aquatic body in the present study have also been isolated from air and cowdung (Cooney, 1964). Thus the presence of fungi in the sediment of fresh water ponds might be due to aerial dissemination or manuring the pond with Cowdung or both. In the present study, higher fungi diversity noticed in Thambiran pond may be attributed to larger entry of sewage entering this pond when compared to the other two ponds as this pond is located closer to human settlements. The variability in counts (CFU'S) between similar species in all the 3 (three) ponds could be due to difference in the nutrient availability in the three water bodies.

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