INTRODUCTION

Algae are abundant in water both sea water and fresh water. They are with different coloured pigments like green, blue, red coloured unicellular filamentous, or thalloids forms. They gain importance in the modern time not only as an alternative potential source of protein for man but also as the primary source of food for aquatic animals. It is well known fact that algae with the help of pigment complex and in the presence of carbon dioxide and water, convert effectively solar energy into chemical energy. Algae being phototophs are capable of chief food supplier for most of the small aquatic animals, which in turn are consumed by the bigger animals. This forms the basic food chain in any aquatic ecosystems and large numbers of such food web algae form the chief source of food. The utilization of fresh water algae in large amount in mass culture is as great as their potential value of concentrated protein, carbohydrates, fats, vitamins and minerals.

The growth accumulation of algae at or near surface of the water is called blooms or mats. These massive growth or algae can be troublesome and as a source of odour particularly if anaerobic decomposition occurs. It is essential to study the algal community from lentil and lotic bodies of dams and rivers respectively and also make comparative study of algal flora of different habitats. In the present

century great advances have been made in the investigation of fresh water algae in many parts of the world and particular attention has been paid to their biology and ecology.

It is revealed from the literature that during the growth of algae in water they release several bioactive compounds in water in the form of exudates therefore the algal blooms have been found to be harmful to associated flora and fauna. Some time algal blooms due to exudates it also affect on the water quality. On the other hand it is also reported that many algae from fresh and marine source have been found to be useful for mankind. It is directly useful as a source of food, as most of the algae are rich in vitamins, fat, protein, fibre etc. It was also observed that several algae are found to be stimulatory for the seed germination as well as plant growth as biofertilizers. Several workers also reported that the exudates release by the algae in water and the bio-active compounds present in the algae are having antifungal and antibacterial properties.

Considering the importance of fact the present research work has been carried out by collection “Studies on antifungal properties of fresh water algae from Solapur district Maharashtra”.

The first part of research work is mainly based on survey, collection, preservation and detail study of different seasonal variation of fresh water algae from different water reservoirs of Solapur District

region. Second part of the work is based on antifungal property of selected Algae.

REVIEW OF LITERATURE

There is an uneven distribution of water resources on this planet. Only 30% of the global water is found in the continents and the rest it present in oceans. Out of this 30% about ¾ is locked in the icebergs and glaciers. Thus the source of water available to the humans is less than a percent in the lakes, streams and ground. Therefore, we should realize the value of water and there is a need to preserve the water bodies free from pollutions. Pure or clean water particularly in density populated industrial areas will be scarce and may be inadequate for maintaining the normal living standards.

Algae gain its importance in the modern time not only as an alternative potential source of protein for the hungry man but also as the primary source of food for aquatic animals. They are the means of controlling the pollution in the aquatic ecosystem, apart from being put to use as inexpensive and more acceptable fertilizer in the crop field and as an efficient means of sewage treatment and purification (Jain, 2002).

Indian workers had paid very serious attention on the Limnobiological work. They work on types of fresh water ecosystem such as ponds, rivers and lakes. Earlier limnologist were also showed more importance on limnology of lentil and lotic water bodies by several workers (Ganpati, 1940, Bharati and Kore, 1975; Nirmalkumar, 1991;

Shrivastava et al., 1993) but in Maharashtra State very few earlier workers had carried out the work on such type of studies of algae of different water reservoirs of Maharashtra (Bapat and Madlepure, 1971; Pingle, 1981; Jagdale et al., 1984).

BIODIVERSITY AND SEASONAL VARIATION IN ALGAE

Seasonal variation and biodiversity of fresh water algae was reported by several algologist. Hate (1909) recorded two species of *Chara* from Bombay island. Parandekar (1935) reported two charophytes from Kolhapur. Apte (1936) observed some spacies of *Volvax* from Pune. Gonzalves and Joshi (1946) studied fresh water algae in some rain water pools near Boriwali and rain water puddles near Joshiwari at Bombay respectively, they also observed seasonal succession of algae in the tank of Bandra. Patel (1966) for the first time reported occurrence of *Oedogonium itzigsihnti* var. minus at Mahabaleshwar from Maharashtra State.

Ashtekar and Kamat (1978) extensively worked on Oedogonioceae and Zygnemataceae of Aurangabad district of Marathwada region. They also reported a new species of *Katagnytmene* which is addition in Desmids and worked on species of Chroococcales and filamentous Maxophyceae of Aurangabad district. Freitsa and Kamat (1979) also observed Desmids of Nagpur. Sarode and kamat (1979) studied the

Diatoms of Marathwada of Maharashtra. Bahare and Tarar (1981) studied algal flora of Tapti river flowing through Bhusawas tahasil of Maharashtra. They have reported 41 algal taxa of which one belong to Cyanophyceae and Eight to Chorophyceae and 32 to Bacillariophyceae.

Gunale and Balkrishnan (1981) has used algae as biomonitors of eutrophication in the study of Pavana, Mula and Mutha rivers flowing through Pune city.

Ashtekar (1980) recorded 58 taxa of Euglenophyceae belonging to five genera namely euglena, Lepocinclis, Phacus, Trachelomonas, Eutreptia from Aurangabad, Maharashtra.

Mahajan and Mahajan (1988) studied the algal community in Velhala lake near Bhusawal and used algae as indicators of organic pollution. Pandey et al, (1992) showed species diversity plantion in fish pond at Pune, Nandan (1993) studied algal flora of fish pond in Dhule, Hosetti et al., (1994) observed water quality in Jayanti Nalla and Panchganga at Kolhapur. More and Nandan (2000) recorded 4 groups of algae from 3 stations of river from Panzara river.

Recently Pingle (2007a) reported 210 species belonging to chlorophyta and about 104 species of cyanophyta were encountered from fresh water ponds. Some of them belonging to chlorophyta and

cyamophyta seem to be first time reported from the region and also from Maharashtra. Similarly he also reported 157 taxa of algae were collected and identified from Pashan lake which mainly belongs to Chlorophyceae, Bacillariophyeae,Fuglenophyceae, Fuglennophyceae and dinophyceae.

Dhande et al., (2007) recorded 6 species of Spirogyra for the First time from Maharashtra and tow species collected for the first time form India while Spirogyra pateli sp. Nov., is new to science.

Mahajan et al., (2007) reorted 32 algae taxa from 3 stations of Hartala lake situated on small tributary river Tapati, out of these 32 species belong to 5 genera of Euglenoids, 3 species of genera Euglena, 2 species of Heteronema, one species of Petauomonas and 3 species of Trachlomonas have been recorded I the servey genus Phaceus represented with 19 species.

Narkhede et al., (2007) reported 15 taxa of Euglenoids from Suki dam, Jalgaon. Similary Kumawat et al., (2007) described 31 Phacus taxa of Eulenieae from Lawal and Raver tehsil of Jalgaon district. Whereas Jawale et al., (2007) reported systematic account of genus Characium from Hartala lake district of Jalgaon. Eight taxa of Caracium are investigated, from that 3 taxa are recorded first time in Maharashtra and 2 taxa are new to science. Similarly, Vanjari et al., (2007) also observed 135 taxa from Padmalaya lake of Jalgaon district. Of these 52 taxa elong

to Chorophyceae, 39 to Bacillariphyceae, 20 to Euglenineae, 23 to Myxophyceae and 1 to Dinophyceae.

Nandan et al., (2007) recorded 322 algae taxa were recorded from Hartala lake of river Tapti from that genera Teraedron, Oocystis, Scenedesmus, Spirogyra, Closterium and Cosmarium were most frequently observed.

Jadhav et al., (2007) studied algal diversity of water tank of Yeola, he got 56 genera and 116 species of Phytoplankton were encountered. Out of them 10 genera, 22 specidies of Cynophyta, 18 genera 33 species of chlorophyta,4.

Such type of studies of algae of different water reservoirs of Maharastra (Bapat and Madlepure. 1971; Pingle, 191; Jagdale et al., 1984).

Magar et al., (2007) observed algal flora of Kasura Reservoir, he found 53 species belonged to 28 genera indentified, of which 27 species under 11 genera belonged to Cyanophyceae, 19 species under 12 genera belonged to Chlorophyceae and 7 species under 5 genera belonged to Bacillariophyceae.

Jadhav et al., (2007) studied algal diversity of Salim Ali lake, Aurangabad. A total of 56 species belonged to 39 genera were identified.

Which are belonged to Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae. He also studied algal flora of world famous Lonar crater, at their selected sites. A total 25 species belonged to 19 genera were identified. Algal members belonging to Cyanophyceae, chlorophyceae, Balcillariophyceae and Euglenophyceae were identified. Cyanophyceae members were dominated algal flore of Lonar crater.

Bioactive Compound of Algae

The marine as well as fresh water algae are known to have variations of biochemical compounds. The relative distribution of organic and inorganic and other elements may change from place to place. The changes are also reported due to environmental factor, therefore, considering the commercial value of alga the investigation of bioactive compounds, elements vitamins contents of algae become necessary.

Material and Methods

1. Survey of water reservoir

Each tahasil wise all water reservoirs should visit atleast two times, in tenure of research work.

2. Collection of Algae

Study area

1. Ujjani dam
2. Ashti reservoir
3. Hipparga Lake

3. Field work :-

Algal samples were collected in acid washed collection bottles. Floating, plantonic, submerged & attached epiphytic (only filaments & branched) algal samples were collected separately in bottles after collection algal samples were brought to the laboratory for further investigation.

4. Taxonomic investigation :-

For taxonomic investigation collected algal forms were observed under microscope and indentified them by referring to the standard literature on algae (desikachary, 1959; Fritsch, 1935, 1945; Pal et al.,

1960; Prescott, 1951; Randhawa, 1959) Taxonomic account of all identified algal specimens are.

1. *Cladophora callicoma*
2. *Nostoc punctiformae*
3. *Spirogyra Plena*

5. Preparation of fine powder :-

The samples were collected directly from water bodies, all were kept in to oven at 40^0C for removal of moisture. After removal of moisture fine powder was prepared in grinder and stored in acid washed air tight specimen bottles.

6. Preparation of algal samples for bioassays

1 gm of fine powered was taken in a glass bottle and four times the desired solvent was added in it. The volume was restored and content filtered through What man filter paper No. 1 and filtrate was allowed to dry at room temperature. In similar fashion the crude extracts of all algae were prepared by using different solvent.

Experimental Results

WATER RESERVISERS OF SOLAPUR DISTRICT

Sr. No.	Project Name	Beneficial District	Taluka
A)	**Big Project**		
1	Bhima (Ujani)	Solapur	Madha
B)	**Medium Project**		
1	Ekruk	Solapur	North Solapur
2	Budhihal	Solapur	Sangola
3	Mangi	Solapur	Karmala
4	Javalgaon	Solapur	Barshi
5	Hingani (Pa.)	Solapur	Barshi
6	Pimpalgaon (Dhale)	Solapur	Barshi
7	Bori	Solapur	Akkalkot
8	Ashti	Solapur	Mohol
C)	**Small Project**		
1	Parewadi	Solapur	Karmala
2	Vadshivane	Solapur	Karmala
3	Hingan(C)	Solapur	Karmala
4	Mhasewadi	Solapur	Karmala
5	Veet	Solapur	Karmala
6	Kondhej	Solapur	Karmala
7	Rajuri	Solapur	Karmala
8	Kumbhej	Solapur	Karmala
9	Sangavi	Solapur	Karmala
10	Nerale	Solapur	Karmala
11	Saptane	Solapur	Madha
12	Parite	Solapur	Madha
13	Nimgaon	Solapur	Madha
14	Hotgi	Solapur	S.Solapur
15	Rampur	Solapur	S.Solapur
16	Hanamgaon	Solapur	S.Solapur
17	Pathari	Solapur	Barshi
18	Kerogaon	Solapur	Barshi
19	Gormale	Solapur	Barshi
20	Kari	Solapur	Barshi
21	Walvad	Solapur	Barshi
22	Kategaon	Solapur	Barshi

WATER RESERVISERS OF SOLAPUR DISTRICT

Sr. No.	Project Name	Beneficial District	Taluka
23	Tawadi	Solapur	Barshi
24	Mamdapur	Solapur	Barshi
25	Shelgaon(R)	Solapur	Barshi
26	Vairag	Solapur	Barshi
27	Chare	Solapur	Barshi
28	Kalambwadi	Solapur	Barshi
29	Darfal BB	Solapur	N. Solapur
30	Soregaon	Solapur	N. Solapur
31	Galoragi	Solapur	Akkalkot
32	Shirvalwadi	Solapur	Akkalkot
33	Chikkehalli	Solapur	Akkalkot
34	Hanjagi	Solapur	Akkalkot
35	Dombarjavalge	Solapur	Akkalkot
36	Bhurikawate	Solapur	Akkalkot
37	Kazikanbas	Solapur	Akkalkot
38	Gholasgaon	Solapur	Akkalkot
39	Satandudhani	Solapur	Akkalkot
40	Borgaon	Solapur	Akkalkot
41	Achakdani	Solapur	Sangola
42	Chincholi	Solapur	Sangola
43	Geradi	Solapur	Sangola
44	Javala	Solapur	Sangola
45	Hangirage	Solapur	Sangola
46	Junoni	Solapur	Sangola
47	Bhose	Solapur	Mangalwedha
48	Huljanti	Solapur	Mangalwedha
49	Talsangi (Old)	Solapur	Mangalwedha
50	Talsangi (New)	Solapur	Mangalwedha
51	Lavangi	Solapur	Mangalwedha
52	Maroli	Solapur	Mangalwedha
53	Dogargaon	Solapur	Mangalwedha
54	Padvalkarwadi	Solapur	Mangalwedha
55	Chiklagi (Shirnandgi Pra.)	Solapur	Mangalwedha
56	Pokharapur	Solapur	Mohol

Biodiversity and Seasonal variation in Algae

Ujjani Dam

UJJANI DAM

Name of algae	Monsoon June to Sept.	Winter Oct to Jan.	Summer Feb. to May
I-CYANOPHYCEAE			
Anabaena sphaerica	++	++	+
Lyngbya birgei	++	++	+
Microcysits aeruginosa	+	++	+
Nostoc muscorum	++	+++	+
Oscillatoria obscura	++	++	+
II-CHLOROPHYCEAE			
Cladophora callicoma	++++	++++	+++
Clorella vulgaris	+	++	-
Cosmarium obtusatum	-	+	-
Nitella batrachoperma	++++	++++	+++
Oedogonium americanum	+	++	-
Pithophora oedogonia	++	+++	+
Zygnema mucigenum	+	-	-
III-BACILLARIOPHYCEAE			
Fragilaria construens	-	+	-
Nitzschia palea	-	++	+
Algal diversity	12	13	09

+ Minimum, ++ Moderate, +++ Middle, ++++Maximum

Table 1

Biodiversity and Seasonal variation in Algae

Ashti Reservoir

ASHTI DAM

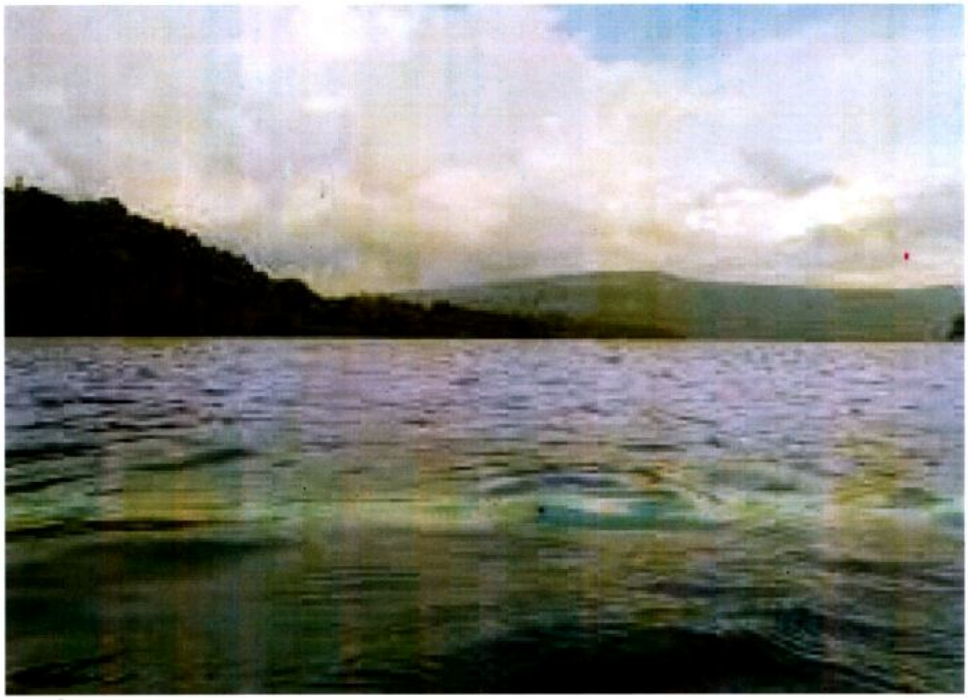
Name of algae	Monsoon June to Sept.	Winter Oct to Jan.	Summer Feb. to May
I-CYANOPHYCEAE			
Anabaena microscopic	++	++	-
Aphanothece nidulans	+	++	-
Lyngbya majuscule	++	+++	+
Merismppedia glauca	+++	++	-
Nostoc punctiformae	++++	++++	+++
Oscillatoria perornata	+++	++	+
Phormidium jankelinum	++	++	-
II-CHLOROPHYCEAE			
Coelastrum microperma	+	++	-
Gloeocystis gigas	-	+	-
Nitella batrachosperma	++	+++	+
Schizomeris leibleinii	+++	+++	++
Spirogya inconstans	++	++	-
Zygnema mucigenus	-	+	-
III-BACILLARIOPHYCEAE			
Fragilaria construens	+	+	-
Nitzschia palea	-	+	-
Algal diversity	*12*	*15*	*05*

+ Minimum, ++ Moderate, +++ Middle, ++++Maximum

Table 2

Biodiversity and Seasonal variation in Algae

Hipparga Lake

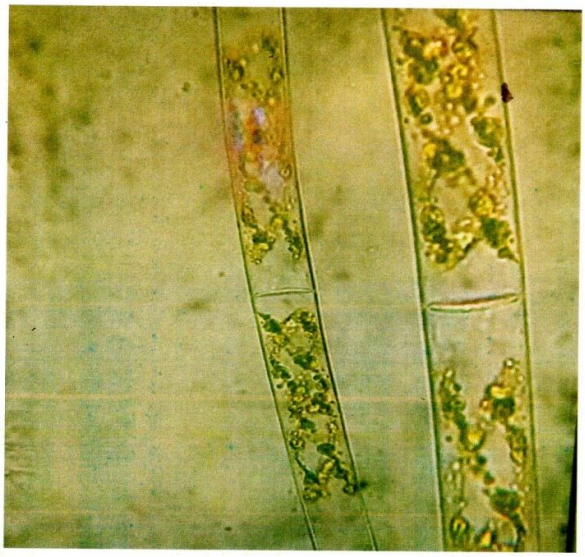


HIPPARGA LAKE

Name of algae	Monsoon June to Sept.	Winter Oct to Jan.	Summer Feb. to May
I-CYANOPHYCEAE			
Aphanothece saxicola	+++	++	+
Lyngbya majuscule	++	+++	++
Merismopedia slogans	+	++	-
Nostoc punctiformae	+++	++	-
Oscillatoria perornata	+	++	+
Phormidium laminosum	++	++	+
Spirulina Platensis	++++	++++	++
II-CHLOROPHYCEAE			
Chara Grovesii	+++	+++	++
Cosmarium obtusatum	+	++	+
Euastrum spinulosum	+	++	-
Gleocystis gigas	++	+	-
Spirogyra incostans	+++	++	-
III-BACILLARIOPHYCEAE			
Cymbella aspera	+	++	-
Nitzschia palea	++	++	-
Pinnularia acrosphaeria	-	+	-
Algal diversity	**14**	**15**	**07**

+ Minimum, ++ Moderate, +++ Middle, ++++Maximum

Table -3



Spirogyra pleana

Cladophora callicoma

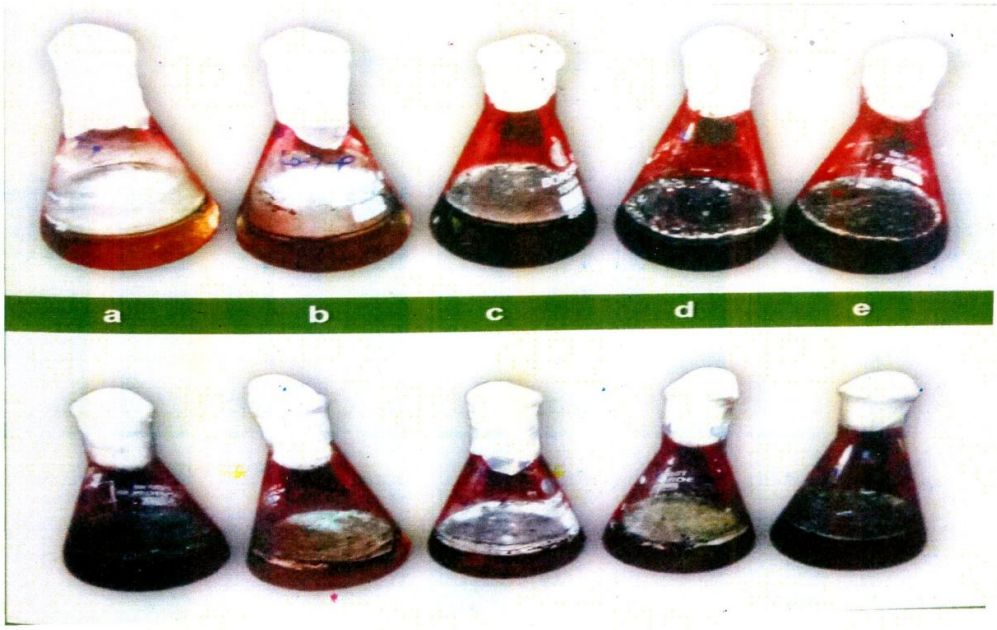
Nostoc punctiformae

Effect of algal extract in Cold water on fungal growth

Name of algae	***Alternaria alternate***	***Aspergillus flavus***	***Curvularia lunata***	***Fusarium roseum***	***Trichoderma harzianum***
Cladophora callicoma	0.029	0.086	0.050	0.039	0.070
Nostoc punctiformae	0.101	0.041	0.070	0.080	0.070
Spirogyra plena	0.014	0.067	0.040	0.049	0.047
Control	0.086	0.076	0.075	0.063	0.080

Table – 4

CONTROL



TREATED WITH ALGAL EXTRACT

Effect of algal extract in Hot water on fungal growth

Name of algae	***Alternaria alternate***	***Aspergillus flavus***	***Curvularia lunata***	***Fusarium roseum***	***Trichoderma harzianum***
Cladophora callicoma	0.090	0.069	0.042	0.094	0.082
Nostoc punctiformae	0.079	0.021	0.039	0.038	0.055
Spirogyra plena	0.004	0.060	0.038	0.032	0.040
Control	0.060.	0.137	0.053	0.050	0.070

Table – 5

At the site of selected place of Ujjani dam I have noticed 12 algal species in monsoon season, 13 species in winter and 09 species in summer season. In monsoon season 5 species of cyanophyceae, 7 species of chorophyceae are identified. In winter season 5 species of cyanophyceae, 6 species of chlorophyceae and 2 species of bacillariophyceae are noted. In summer season 5 species of cyanophyceae, 3 species of chlorophyceae and 1 species of bacillariophyceae is identified. (Table - 1)

At Ashti reservoir total 12 species identified in monsoon season, 15 species reported in winter season and 5 species identified in summer season. As we study all the species of Ashti reservoir Cyanophycea reported 7 species, 6 species are recorded from Chlorophyceae and 3 species of Bacillariophyceae (Table - 2)

Hipparga Lake is situated near to solapur city, located on solapur, tuljapur highway, at the selected place of hipparga lake I have traced 14 species in monsson season, 15 species in winter season and only 7 species in summer season with the above numbers cyanophyceae repoted 7 species Chlorophyceae recorded 5 species and Bacillariophyceae shows only 3 members. (Table - 3)

To know the antifungal properties of algae the extraction of algae was made in hot water the result shows that algal extract of *Cladophora*

callicoma and *Spirogyra plena* indicate inhibitory action against *Alternaria alternate*, while *Nostoc punctiformae* indicate stimulatory action.

Extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena* shows inhibitory action against fungi *Aspergillus flavus*. The growth of *Curvularia lunata* indicated inhibitory action due to application of cold water extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena.* The extract of *Cladophora callicoma* and *Spirogyra plena* reveals inhibitory action to the growth of *Fusarium roseum* while *Nostoc punctiformae* shows stimulatory action as compare to control.

The growth of *Trichoderma harzianum* is inhibited due to extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena.* (Table - 4)

The hot water extract of algae *Cladophora callicoma,* and *Spirogyra plena* shows inhibitory action against to fugal growth of *Alternaria alternate*, while *Nostoc punctiformae* indicated stimulatory action to the growth of *Alternaria alternate.* All the extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena* reveals the inhibitory action for the growth of *Aspergillus flavus*. The growth of

Curvularia lunata is highly inhibited due to extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena*.

All the three algal extract show inhibitory property for the growth of *Fusarium roseum.* The extract of *Spirogyra plena* indicate highly inhibitory action against the growth of *Trichoderma harzianum* , while extract of *Cladophora callicoma* and *Nostoc punctiformae* show less inhibitory action compare to *Spirogyra plena* but when we compare to the control all algal extract indicate inhibitory action.

As compare to cold water extract hot water extract of all algal species clearly reveals higher inhibitory properties against all plant pathogenic fungi *Alternaria alternata, Aspergillus flavus, Curvularia lunata, Fusarium roseum* and *Trichoderma harzianum*.

Result and Discussion

In Solapur District several water reservoirs are present the are located on big rivers which covers most of the part of Solapur district. Some water reservoirs are natural and some are man made. Which varies in their water holding capacity small dams and Natural dam completely dried in summer season, thire seasonal variation gives interesting picture of bio diversity. Due to water availability of water in all seasons only 3 water reserviors are selected for present study.

Ujjani dam :-

Ujjani dam is biggest dam of solapur district, Ujjani dam is also known as Bhima dam, due to is on the Bhima river. It is an earth fill cum masonry gravity dam located near Ujjani village of Meadha taluka of Solapur district of the Maharashtra state. The Bhima river which originates in Bhimashankar of the western ghats and forms the Bhima vally with its tributary rivers and streams has 22 dams built on it of which the Ujjani dam is the terminal dam on the river and is the largest in the vally that intercepts a catchment area is 14,858 km^2 (5737 sq.m.)

Co ordinates of the dam is 18^0 04' 26" N 75^0 07' 12" E.

Hight – 56.4m (185ft)

Length – 2534m (8314ft)

Width – 6.7m (22ft)

Actually the place which I have selected for study in the Ujjani dam at that side I have tresed 11 algal species in Monsoon Season, out of that 5 species are of cyanophyceae, 7 species of chlorophyceae & 3 species of Bacillariophyceae, when studied all algal species cladophora calicoma is abundant growth formed in all season so it is selected for future study.

Ashti lake :-

Ashti lake is huge and spread over area about 1145 hector and containing 15500 million cubic feet of water. The lake is old and was constructed in 1881, it is situated in the Madha subdivision, 12 miles (22km) north east of Pandharpur city in district solapur it is located at 17^0 48' 11.24"N latitude and 75^0 25' 33.42" E longitudes and 458m.

Ashti reservoir is also good in water holding capacity through the year. In frequently visit to the side selected spot of ashti reservoir total 12 species identified in monsoon season 15 species reported in winter season & 5 species recorded in summer season. Cyanophyceae reported 7 species, 6 species are reported from Chlorophyceae and 3 species of Bacillariophyceae.

Hipparga Lake :-

It is the most beautiful and small picnic site to the tourist where there is natural abundance of flora and fauna with beautiful migratory birds this lake is near to the solapur city. Coordinates – 17^0 44' 34" N 75^0 55' 4" E

Hipparga lake is situated near to solapur city, which is located on solapur Tuljapur road, at the selected place I have noticed 14 species in monsoon season 15 algal species in winter season and only 7 species in summer season. After investigation Cyanophyceae has 7 species Chlorophyceae has 5 species and Bacillariophyceae has 3 species are recorded.

Antifungal Properties of algae

Algae are known to have several bioactive components in it, relatively large number of bioactive substance produced by lagae which was either inhibit or stimulate microorganisms, in order to study the role of algal extract against fungi in Hot and Cold water are used for extraction of bioactive compounds and it was used against the growth of known pathogenic fungi like alternaria alternate, Aspergillus flavus, Curvularia lunata, Furarium roseum and Trichoderma harzianum.

A fine powder of algae was extracted in cold water and it is used against the fungal growth.

the extraction of algae was made in hot water the result shows that algal extract of *Cladophora callicoma* and *Spirogyra plena* indicate inhibitory action against *Alternaria alternate*, while *Nostoc punctiformae* indicate stimulatory action.

Extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena* shows inhibitory action against fungi *Aspergillus flavus*. The growth of *Curvularia lunata* indicated inhibitory action due to application of cold water extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena.* The extract of *Cladophora callicoma*

and *Spirogyra plena* reveals inhibitory action to the growth of *Fusarium roseum* while *Nostoc punctiformae* shows stimulatory action as compare to control.

The growth of *Trichoderma harzianum* is inhibited due to extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena.* (Table - 4)

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action to the growth of *Alternaria alternate*. All the extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena* reveals the inhibitory action for the growth of *Aspergillus flavus*. The growth of *Curvularia lunata* is highly inhibited due to extract of *Cladophora callicoma, Nostoc punctiformae* and *Spirogyra plena*.

All the three algal extract show inhibitory property for the growth of *Fusarium roseum*. The extract of *Spirogyra plena* indicate highly inhibitory action against the growth of *Trichoderma harzianum* , while extract of *Cladophora callicoma* and *Nostoc punctiformae* show less inhibitory action compare to *Spirogyra plena* but when we compare to the control all algal extract indicate inhibitory action.

As compare to cold water extract hot water extract of all algal species clearly reveals higher inhibitory properties against all plant pathogenic fungi *Alternaria alternata, Aspergillus flavus, Curvularia lunata, Fusarium roseum* and *Trichoderma harzianum*.

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