



DIVERSITY OF SOIL ALGAE IN WHEAT FIELD OF AHMEDNAGAR DISTRICT (M.S.)

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ABSTRACT

Present research work deals with the detailed and scientific study of diversity of soil algae of wheat (*Triticum aestivum L.*) field. Soil algae are one of the important components of soil microflora which plays a crucial role in fertility of soil. Algal samples from moist places of wheat field were collected at regular intervals from November 2015 to March 2016. Bold's basal medium was also used to culture algae from soil of wheat field. Collected and cultured algal samples were observed thoroughly under research microscope and identified with the help of standard literature on algae. A total of 77 species under 32 genera belonged to Chlorophyceae, Bacillariophyceae and Cyanophyceae were identified and recorded. Cyanophyceae algae were found dominant followed by Bacillariophyceae and Chlorophyceae. Algal forms *Gloeocystis*, *Chlorococcum*, *Chlorella*, *Navicula*, *Gomphonema*, *Nitzschia*, *Aphanothece*, *Myxosarcina*, *Spirulina*, *Oscillatoria*, *Phormidium*, *Lyngbya*, *Microcoleus*, *Nostoc* and *Plectonema* were found abundant. Physicochemical analysis of wheat field soil was also carried out by selecting certain physicochemical parameters such as pH, electrical conductivity, organic carbon, available nitrogen, available phosphorus and available potassium to understand fertility status of soil. Wheat field soil supports growth and development of algae. Algal flora of wheat field is rich and it is found in diverse form.

KEYWORDS : Soil algae, Wheat field and physicochemical analysis.

INTRODUCTION

A soil alga is one of the important group of soil microflora. They are generally found on or in the soil. Soil algae are ecologically important and play a significant role in fertility of soil. Cyanophycean algae especially heterocystous algal forms fixes atmospheric nitrogen and increases fertility of soil. Majority of the species of algae helps in retention of soil moisture and provides germination ground for seeds of flowering plants. The cultivated field ecosystem provides a favourable environment for the growth and development of algae with respect to their requirements of light, water, temperature and nutrient availability. Since past few decades soil algae have attracted attention of phycologists (Meeting 1981, Bongale 1985, Prasad 2005, Auti and Pingle 2007, Jadhav 2010, Nimbhore and Jadhav 2014). Soil algal flora of paddy, banana, wheat, sugarcane and brinjal fields have been studied extensively by earlier research workers. (Bongale and Bharati 1980, Kolte and Goyal 1985, Kottawar and Pachpande 1986, Nayak et.al. 2001, Patil and Chaugule 2004, Prasad 2005, Auti and Pingle 2006, Nimbhore and Jadhav 2014). Wheat (*Triticum aestivum L.*) is one of the cereal crop of India. It is also cultivated on large scale in western region of Maharashtra. Review of literature reveals that, very rare attention has been paid towards algal flora of wheat field. Therefore it has been decided to work systematically on algal diversity of wheat field soil.

MATERIALS AND METHODS

A wheat field located in Rahuri tehsil area of ahmednagar district of Maharashtra has been selected for the collection of algal and soil samples. Algal samples were collected in sterilized collection bottles from moist places of selected wheat fields at regular intervals, from November 2015 to March 2016. Collected algal samples were brought to the laboratory for observation and identification. The sun dried soil samples collected from same wheat field were examined for their algal components by petriplate culture method. 1gm of pulverized soil poured and spread uniformly into the petriplates containing agarized Bold's basal medium (Bold 1942). Liquid nutrient medium was poured into the plates at the time of keeping those for incubation and frequently supplemented with the same. The petriplates were incubated under tubelights having 1000 to 1500 lux capacity in the algal culture chamber. Petriplates were checked for the growth of algal colonies. After sufficient growth, algal colonies were picked up for identification.

Algal samples were observed under research microscope and identified with the help of standard literature on algae. In order to

know the fertility status of selected wheat field, analysis of soil was performed for certain selected physicochemical parameters such as pH, electrical conductivity, organic carbon, available nitrogen, available phosphorus and available potassium (Trivedi et.al. 1998).

RESULTS AND DISCUSSION

A total of 77 species under 32 genera belonged to Chlorophyceae, Bacillariophyceae and Cyanophyceae were identified and recorded. Of these 8 species under 7 genera belonged to Chlorophyceae, 14 species under 7 genera belonged to Bacillariophyceae and 55 species under 18 genera belonged to Cyanophyceae (Table 1). Cyanophycean algae were found dominant. Bongale and Bharati (1984), Kottawar and Pachpande (1986), Auti and Pingle (2006), Nimbhore and Jadhav (2014) observed dominance of Cyanophycean algae from wheat field. During present investigation *Aphanothece*, *Myxosarcina*, *Spirulina*, *Oscillatoria*, *Phormidium*, *Lyngbya*, *Microcoleus*, *Nostoc* and *Plectonema* were dominant. Similar kind of observations were made by Prasad (2005) and Nimbhore and Jadhav (2014).

During present study *Gloeocystis*, *Chlorococcum* and *Chlorella* were found abundant. Prasad (2005) also reported abundance of *Chlorococcum* and *Chlorella* from wheat field of Nepal. *Chlorella Vulgaris*, *Chlorococcum humicola* and *Stichococcus subtilis* are important constituent of soil algal flora of various parts of world. Occurrence of *Stichococcus subtilis* in wheat field soil is the first time report from western region of Maharashtra.

Occurrence of diatoms in remarkable number in wheat field is interesting feature of present study. A total of 14 species of diatoms were recorded. Among diatom species of *Navicula*, *Gomphonema* and *Nitzschia* were common. Prasad (2005) and Nimbhore and Jadhav (2014) also recorded dominance of *Navicula* and *Nitzschia* in wheat field. Unicellular, colonial and filamentous algal forms were recorded during present research work. Filamentous algal forms were found in maximum number. Classwise percentage contribution study of algal flora of wheat field reveals that, highest contribution was of Cyanophyceae 71% followed by Bacillariophyceae (18 %) and Chlorophyceae (11%) (Fig.1) Overall algal taxa which were found common in wheat field during present research work were *Gloeocystis gigas*, *Gloeocystis major*, *Chlorococcum humicola*, *Chlorella vulgaris*, *Navicula cupsidata*, *Nitzschia palea*, *Aphanothece nidulans*, *Aphanothece Saxicola*, *Myxosarcina burmensis*, *Spirulina gigantea*, *Spirulina labrinthiformis*, *Oscillatoria acuta*, *Oscillatoria Obscura*, *Oscillatoria Subbrevis*, *Phormidium*, *abronema*, *Phormidium*

bohneri, *Phormidium corium*, *Phormidium jenkelianum*, *Phormidium molle*, *Lyngbya hieronymusii*, *Microcoleus acutissimis*, *Microcoleus subtorulosus*, *Nostoc mucorum* and *Plectonema gracillimum*.

Analysis of Physicochemical parameters of soil reveals fertility status of soil. The overall fertility status of selected wheat field soil was moderate alkali (pH 7.79) normal electrical conductivity (0.29 M mhos/cm), moderately high organic content (0.61%), and moderate available nitrogen (306.00 kg/hectare), low available phosphorous (23.06% kg/hectare) and very low available potassium (84.67 kg/hectare). Moderate alkaline soil favours growth of algae. Normal electrical conductivity supports growth of algae. Soil rich in nitrogen, phosphorous and potassium harbours algal flora. In wheat field available nitrogen is moderate; available phosphorous low and available potassium is very low.

CONCLUSION

A total of 77 species under 32 genera of algae were recorded from soil of wheat field. Cyanophyceae are found dominant than Bacillariophyceae and Chlorophyceae. Unicellular, Colonial and filamentous algae were recorded. Filamentous algal forms were found abundant. Algal flora of wheat field is rich and it is found in diverse form. Soil is moderate alkali with normal electrical conductivity. Organic carbon is moderately high. Nitrogen is moderate whereas phosphorous is low and potassium is very low. Moderate alkaline soil harbours growth of Cyanophyceae algae. Present research work will enrich the knowledge of soil algae of western region of Maharashtra.

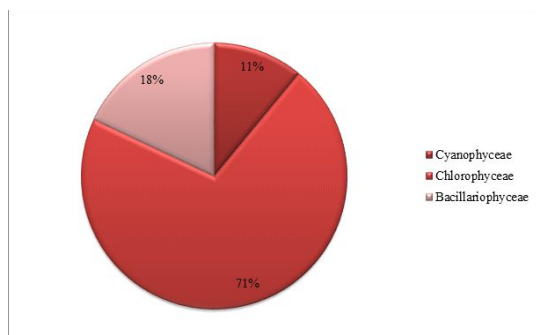


Figure 1: Classwise Percentage contribution of Algal of Wheat field soil.

Table 1: Diversity of soil algae from Wheat field.

Chlorophyceae

Gloeocystis gigas, *Gloeocystis major*, *Stichococcus subtilis*, *Chlorococcum humicola*, *Chlorella vulgaris*, *Ankistrodesmus falcatus*, *Spirogyra aequinoctialis*, *Cosmarium subumidum*.

Bacillariophyceae

Fragilaria construens, *Fragilaria brevistriata*, *Navicula cupsidata*, *Navicula hustedtii*, *Pinnularia sp.*, *Cymbella aspera*, *Gomphonema aqaur*, *Gomphonema monatum*, *Gomphonema sp.*, *Nitzschia obtusa*, *Nitzschia obtusa var. scalpelliformis*, *Nitzschia palea*, *Nitzschia wardhensis*, *Surirella ovata*.

Cyanophyceae

Chroococcus minor, *Chroococcus minutus*, *Chroococcus turgidus*, *Gloeothece palea*, *Aphan othece nidulans*, *Aphanothece saxicola*, *Synechococcus aurginosus*, *Synechocystis aquatilis*, *Merismopedia tenuissima*, *Myxosarcina burmensis*, *Spirulina gigantea*, *Spirulina labyrinthiformis*, *Spirulina laxissima*, *Spirulina subtilissima*, *Oscillatoria acuta*, *Oscillatoria acuminata*, *Oscillatoria anguina*, *Oscillatoria animalis*, *Oscillatoria chorina*, *Oscillatoria obscura*, *Oscillatoria princeps*, *Oscillatoria quadripunctulata*, *Oscillatoria schultzei*, *Oscillatoria subbrevis*, *Phormidium abronema*, *Phormidium bohneri*, *Phormidium jadinianum*, *Phormidium jenkelianum*, *Phormidium molle*, *Phormidium subincrustedatum*, *Phormidium usterii*, *Lyngbya austerii*, *Lyngbya birgei*, *Lyngbya hieronymusii*, *Lyngbya magnifica*, *Lyngbya martensina*, *Lyngbya major*, *Lyngbya majuscula*, *Microcoleus acutissimus*, *Microcoleus lacustris*, *Microcoleus paludosus*, *Microcoleus sociatus*, *Microcoleus subtorulosus*, *Cylindrospermum sp.*, *Nostoc commune*, *Nostoc linkia*, *Nostoc muscorum*, *Plectonema gracillimum*, *Plectonema puteale*, *Plectonema radiosum*, *Scytonema bohneri*, *Calothrix marchia*, *Stigonema hormoides*.

Table 2: Physicochemical analysis of Wheat field Soil.

Sr. No.	Parameter	Observation	Fertility Status
1	pH	7.79	Moderate alkali
2	Electrical Conductivity (Mili mhos / Centimeter)	0.29	Normal
3	Organic Carbon (%)	0.61	Moderately High
4	Available Nitrogen (Kg / hectare)	306.00	Moderate
5	Avilable Phosphorous (Kg / hectare)	23.06	Low
6	Avilable Potassium (Kg / hectare)	84.67	Very Low

REFERENCES

1. Auti, B.K. and Pingle, S.D. (2006) Nostocales from circle of Ahmednagar district (M.S.) Indian Hydrobiology. 9(2): 147-150.
2. Auti, B.K. and Pingle S.D. (2007) The Myxophyceae of the Arable lands from Ahmednagar district (M.S.) Ad. Plant Sci. 20(II): 387-389.
3. Bongale, U.D. (1985) Systematic account of diatoms from the cultivated soils of Karnataka state, India Phykos. 24: 18-26.
4. Bongale, U.D. and Bharati, S.G. (1980) On the algal flora of cultivated soils of Karnataka state, India Phykos. 19(1): 95-109.
5. Jadhav Milind (2010) Algal diversity of Sorghum field. The Biosphere. 2(1): 89-90.
6. Kolte, S.O. and Goyal, S.A. (1985) Distributional pattern of blue green algae in rice field soils of Vidarabha region of Maharashtra state. Phykos. 19(1): 95-109.
7. Kottawar, S.T. and Pachpande, P.R. (1986) Additions to the soil algae of Banana fields of Jalgaon district (Maharashtra). Indian Bot. Reporter. 5 (2): 130-133.
8. Metting, B. (1981) The Systematics and Ecology of soil algae. Bot. Rev. 47(2): 196-312.
9. Nayak, S.R., Prasanna, T. Dominic and P. Singh (2001) Floristic abundance of reulative distribution of different Cyanobacterial genera in rice field at different crop grow stages. Phykos. 40: 15-22.
10. Nimbhore, B.S. and Jadhav, M.J. (2014) Algal flor of Brinjal field soil of Aurangabad. Bioscience discovery. 5(1): 42-44.
11. Nimbhore, B.S. and Jadhav, M.J. (2014) Soil algal flora of wheat field. Journal of Science Information. 5(1): 31-36.
12. Patil, S.R. and Chaugule, B.B. (2004) Species diversity in paddey field, blue-green algae of the western Maharastra. Abstract Nat. Symp. Bist and Biodiversity of the fresh water algae. CAS, University of Madras : 30.
13. Prasad, V. (2005) Algal and Cyanobacterial distribution in the wheat fields of Bara, Parsa and Rauth at Nepal. Int. J. Meldel. 22(3-4): 77-78.