

Algal Diversity in Paddy Fields of Bhor and Velhe Talukas of Pune District Maharashtra State, India

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Abstract

A variety of Algae occurs in the water and soil of rice field ecosystems. These algae include green algae, desmids, diatoms and blue green algae with respect to their requirements like light, water, high temperature and nutrient availability. Paddy field ecosystem provides an environment favorable for the growth of BGA (Blue Green Algae). Algal flora is an idea of utilizing it as biofertilizer as an alternative or supplementary source of nitrogen, for rice is a potential biological system under low-cost rice production technology. The resulting nitrogen fertility by algal application has permitted moderate but constant productivity in fields having no application of Nitrogen fertilizer (Kannaiyan, 1993). In this respect, algal flora from rice fields from Bhor and Velhe has been documented with proper identification. During the survey, more than 20 algae were found.

Keywords: Algae, Paddy Fields, BGA, Diversity, Bhor, Velhe

Introduction

Blue green algae are found in all types water bodies. But paddy fields are one of the common habitats of BGA. The occurrence of blue green algae in cultivated paddy fields in India was first reported in 1939. The study of this group of organisms in last 3-4 decades have not only focused on their role in the conservation of nitrogen but also in the understanding of the problem of nitrogen metabolism. The process of nitrogen fixation by blue green algae is a highly oxygen sensitive reaction and it can take place in the same cells that release oxygen during photosynthesis. As reported under widely different climatic conditions of India (Mitra, 1951), Japan (Okuda and Yamaguchi, 1956) and Ukraine (Prihod'kova, 1968) in the paddy fields, the relative occurrence of BGA varies within large limits. In India these comprised more than half the total number of blue green algal species recorded. In acidic soils of Kerala state (India), their abundance varied between 0-76% of the total algae (Aiyer, 1965). In countries where high levels of nitrogenous fertilizers are commonly used, BGA have also been isolated from such soils (Bunt, 1961).

In India out of total 157 million hectares of cultivable area 49 million hectors of land are acidic in nature (Dass, 1996). Moore (1963) reported occurrence of many BGA in acidic soils. Many BGA cultures were isolated from acidic soils of Kerala having a pH 3.8 (Madhusudhanan and Dominic, 1995). The survival of Cyanobacteria under acid soil rice field conditions was studied (Jorgensen and Davy, 1968). Latter (Sardeshpande and Goyal, 1981) observed that the native isolates survey viewed better under acid soils than the introduced culture. Isolated many acid tolerant strains of Cyanobacteria from acidic soils of

Nagaland (Singh et al., 1997). The acid tolerance strain of Cyanobacteria namely *Westiellolopsis* performed better both under normal and acidic pH levels like 4, 5 and 6 (Selvem, 1998). Kolte & Goyal (1985) studied distributional pattern of blue green algae of rice field soils of Vidharbha region. They found rich blue green algal flora even in soils with pH less than 6.0. Rice field soils of Western Maharashtra studied and isolated 11 and 14 species of blue green algae (Patil and Satav, 1980). Patil (2000) studied blue green algae of paddy fields of Kolhapur, Pune, Raigad, Ratnagiri, Sangli, Satara, Sindhudurg and Thane districts of the western Maharashtra.

Material and Methods

The field survey of rice fields from Bhor and Velhe Talukas was undertaken during the monsoon season in the year 2018 and 2019. Naturally occurring algal samples were collected from surface layers of soils from different paddy fields of the localities selected for the study. Collected algal forms were preserved in 4% formalin for further taxonomical study. Algal forms were observed, line drawing was made with camera lucida and identified by relevant monographs (Desikachary, 1959; N Anand, 1989; Mahajan, 1983).

Result and Discussion

The following algae were found during the survey. In results, the localities as well as the features of the algae are mentioned.

(1) *Chroococcus Minutus* (Kuetz) Naeg.

Cells spherical, hemispherical or oblong, single or in groups of 2-4; sheath common as well as individual, distinct and colourless. Cells light blue in colour.

Occurrence: Paddy field of Hatnoshi, Taluka: Bhor.

(2) *Chroococcus Coharens* (Breb.) Nag.

Thallus slimy and gelatinous blue to dark green, cells single or group.

Occurrence: Paddy field of Karnavadi, Taluka: Bhor.

(3) *Cylindrospermum Indicum* Rao, C.B.

Trichome single with constricted at the joints, dark blue green cells quadrate and barrel shaped, long heterocyst one at each end, long spore ellipsoidal.

Occurrence: Paddy field of Mhalavdi, Taluka: Bhor.

(4) *Gloeocapsa Rupestris* Kuetz

Cells in colonies, colonies many assigned irregularly in expanded mass. Individual colony 2-4 celled, cells spherical with sheath, sheath yellow brown in colour with concentric layers, cells blue green in colour.

Occurrence: Paddy field of Bare, Taluka: Bhor.

(5) *Gloeotrichia Pilgeri* Sch.

Thallus hemispherical, filament long base with 2-3 heterocyst. Trichome broad ending in long hair, heterocyst basal.

Occurrence: Paddy field of Margasani, Taluka: Velhe.

(6) *Aphanocapsa Roseana* de Bary.

Thallus blue green in colour, colonial, amorphous, mucilaginous, sheath homogenous and colourless, cells rounded to oval loosely arranged.

Occurrence: Paddy field of Kari, Taluka: Bhor.

(7) *Oscillatoria Limosa* Ag. ex. Gom.

End cell flatly rounded with slightly thick membrane thallus dark blue green to brown. Trichomes more or less straight.

Occurrence: Paddy field of Pasure, Taluka: Bhor.

(8) *Oscillatoria Princeps* Vaaucher ex Gomont

Trichome straight, blue green or violet not constricted at cross walls, slightly attenuated at the tip and bend. End cell slightly capitates, rounded with thick membrane.

Occurrence: Paddy field of Vinzar, Taluka: Velhe.

(9) *Nostoc Muscorum* Ag. Ex Born. Et Flap.

Thallus gelatinous, trichome broad, cells cylindrical, blue green, hetero cysts spherical, broad, spores' oblong, many in series, pore smooth and yellow.

Occurrence: Paddy field of Bare, Taluka: Bhor.

(10) *Nostoc Punctiforme* (Kuetz) Hariot.

Thallus light blue green, globose, filament densely entangled, sheath delicate, hyaline, mucous trichomes broad, cells short, barrel shaped. Cells are blue green heterocyst subspherical.

Occurrence: Paddy field of Margasani, Taluka: Velhe.

(11) *Nostoc Calcicola* Breb. ex Born. et Flah.

Thallus mucilaginous, blue green, distinct trichome cells barrel shaped, heterocyst subspherical spores subspherical.

Occurrence: Paddy field of Velhe Village, Taluka: Velhe.

(12) *Anabaena Variabilis* Kuetzing ex Born et Flah.

Thallus light blue green, gelatinous, trichomes broad, constricted at cross walls. Heterocyst nearly rounded akinetes away from heterocyst, smooth barrel shaped long colourless.

Occurrence: Paddy field of Dhanep, Taluka: Velhe.

(13) *Anabena Fuellebornii* Schm.

Trichome mucilaginous, straight, blue green, cells cylindrical with rounded ends, spore on one side of the heterocyst single ellipsoidal.

Occurrence: Paddy field of Salungan, Taluka: Bhor.

(14) Aulosira Firtschii Bharadwaja

Thallus dark blue green, wooly, attached to the paddy leaves. Filaments unbranched, broad straight, sheath colourless, trichome slightly constricted, light blue green in colour. Heterocyst intercalary and single.

Occurrence: Paddy field of Nigudghar, Taluka: Bhor.

(15) Microcystis Marginata (menegh.) Kutz.

Colonies irregularly flattened simple mucilage distinct on margins cells.

Occurrence: Paddy field of Karaje, Taluka: Bhor, Pabe village Taluka: Velhe.

(16) Microcystis Elabens Kutz

Colonies flat and expanding blue green cells.

Occurrence: Paddy field of Sakar, Taluka: Velhe.

(17) Scytonema Chiastum Geitler.

Thallus blue green, filaments slightly curved, broad, single as well as multibranched. Pseudobranches long narrower than main filament, constricted at cross walls, heterocyst single.

Occurrence: Paddy field of Ambawane, Taluka: Velhe.

(18) Synechococcus Eruginosus Nag.

Cells cylindrical, broad single or 2-4 together pale blue colour.

Occurrence: Paddy field of Vanjale, Taluka: Velhe.

(19) Gloeotrichia Intermedia (Lemm.) Geitler

Thallus smooth, rounded, light brown in colour. Filaments very thin, sheath close to trichome, brownish, trichome broad, construction at the joints, cells flattened at the base and barraled shaped. Heterocyst spherical, single and broad.

Occurrence: Paddy field of Bhutonde, Taluka: Bhor.

(20) Spirulina Meneghiniana Zanard. Ex Gom.

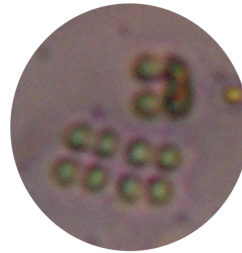
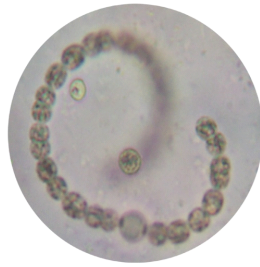
Trichome broad irregularly spirally coiled, bright green spirals broad.

Occurrence: Paddy field of Vinzar, Taluka: Velhe.

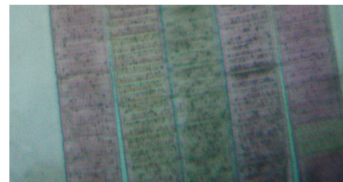
Following are some of the images of algae that are found in the area selected.

PLATE 4.8

ALGAE IN RICE FIELD



Anabaena variabilis Kuetzing ex Born et Flas. *Chroococcus minutus* (Kuetz) Naeg.



Nostoc punctiforme (Kuetz) Hariot.

Oscillatoria princeps Vaucher ex Gomont



Conclusion

During the survey, more than 20 Algae were found in rice fields of Bhor and Velhe Talukas. It is clearly seen that Blue-green Algae play the major role in nitrogen fixation so they can be the best biofertilizer for paddy fields. The people from these areas do not know importance of algae and unknowingly they remove it from paddy fields. Therefore, there is need to create awareness among them.

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