

BLUE GREEN ALGAE AND WASTE LAND RECLAMATION

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Submitted
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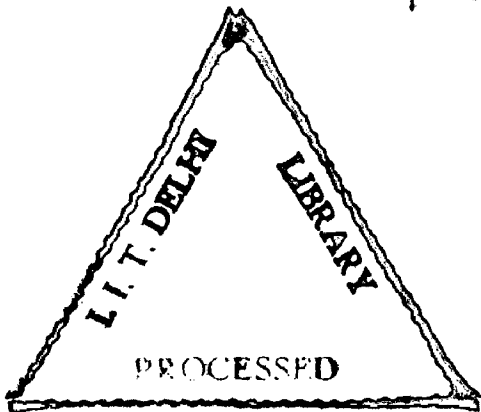
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Dedicated
to
My husband

CERTIFICATE

This is to certify that the thesis entitled "**BLUE GREEN ALGAE AND WASTE LAND RECLAMATION**", submitted by **Ms. G. Pushpa Kumari** has been prepared under our guidance in conformity with the rules and regulations of Indian Institute of Technology, New Delhi, India. The research report and results presented in this thesis have not been submitted for any degree or diploma in any other University / Institute.



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ABSTRACT

Due to indiscriminate use of irrigation water, the salt level of cultivated land in Indo-gangetic plains have increased, resulting in soil salinity and alkalinity, Salinity and alkalinity in soil greatly reduces crop productivity.

Such soils can be reclaimed by chemical and biological mehtods. The chemical reclamation of alkaline or sodic soils is achieved by the application of gypsum followed by leaching and raising a salt tolerant crop like rice, whereas saline soils are subjected to leaching alone. Application of adequate amount of nitrogenous fertilizers, and organic manures are the essential features for successful cropping. However, due to constraints, it is not possible to lay underground drainage as required for gypsum or any other chemical amendment to reclaim such soils. By using biological methods like growing halo tolerant green manure crops, grasses or blue green algae (BGA) not only such soils can be reclaimed but partially meeting the nutrient requirement also. So far reclamation with BGA has been reported with the identical strains both for alkali and saline soils, without any distinction between alkali tolerant and saline tolerant strains. Therefore in the present investigations region specific strains of BGA isolated from the same habitat were used to reclaim salt effected soils.

Alkali soils was collected from Gwalpahari village near Gurgaon (Haryana) from a barren field. These soils were characterized with high pH of 10.6 and exchangeable sodium percentage (ESP) of 83.12, low in organic carbon and available nitrogen, but high in available phosphorus. Blue green algae (BGA) were isolated from these soils on BG-11 medium. The dominant species were *Nostoc punctiforme*, *N. linckia*, *Anabeana sphaerica*, *Calothrix Sp.* and *Oscillatoria sps.*

Saline soils was collected from a barren uncultivated field from the farm of the Agricultural College Bapatla, Andhra Pradesh Agricultural University (A.P.). The soil had electrical conductivity (ECe) of 11.0 dsm⁻¹ and pH 8.5. The most dominant species were *Nostoc microscopicum*, *Aulosira aenigmatica*, *Anabeana Sp.* and *Westiellopsis prolifica*.

BGA based bioameliorant was prepared from the strains, isolated from alkaline and saline soils, independently by the standard soil culture method in trays. The soil based BGA inoculum in the form of dry flakes was used for experiments.

The efficiency of BGA as a bioameliorant for alkaline soil was investigated in pot/micro plot experiments with rice and succeeding wheat crop. The results showed that there was a significant reduction in soil pH, exchangeable sodium and increase in soil nutrient status (C, N and available P) due to amendments with BGA. There was a significant increase in grain and straw yield of rice followed by wheat.

The ameliorative effect of blue green algae on saline soil was also studied in pot as well as under field. The results showed 0.1 to 0.2 unit reduction in pH and electrical conductivity by 0.7 - 0.9 units due to bioamelioration at different levels of nitrogen. The percentage of organic carbon enhanced significantly. The biological amendments not only increased the crop yield over the control but also nitrogen uptake in grain and better utilization of nitrogen.

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