Studies on some nitrogen fixing cyanobacteria (blue green algae) from the rice fields of coastal Karnataka

ABSTRACT

The objectives of this study are to survey, isolation and characterization of efficient nitrogen fixing cyanobacteria (blue green algae) from the rice fields of coastal Karnataka. The effects of pH and some pesticides on the growth and yield of rice was undertaken. Besides, the effect of cyanobacterial isolates alone and in combination with nitrogen sources on rice were studied.

The studies have indicated that the distribution of the species vary from place to place. Nineteen species of cyanobacteria were identified. Among them the predominant species are *Anabaena, Calothrix, Cylindrospermum, Nostoc,* and *Westiellopsis*. They are widely distributed in the coastal districts of Karnataka and others found scarsely in the zone are *Hapalosiphon* and *Tolypothrix.* Among the species studied, *Anabaena variabilis, Calothrix marchica, Cylindrospermum muscicola, Cylindrospermum sphaerica, Hapalosiphon welwitschii, Nostoc commune Tolypothrix* sp. and *Westiellopsis prolifica,* (CK-1) have shown good response towards production of biomass and total nitrogen fixation.

Effect of pH on growth and nitrogen fixation indicated that at pH 4.0 *Westiellopsis prolifica* and *Nostoc commune* yielded maximum biomass of 27.20 mg and 26.74 mg respectively. At pH 5.0 *Nostoc muscorum* showed an increased trend of biomass (36.32 mg) as well as N content. Higher biomass content was noticed at pH 7.0 and 8.0.

The effect of insecticide on growth under laboratory condition revealed that the higher growth was observed at lower concentration of insecticide and fungicide while, the herbicide at 50% recommended and 100% recommended dosage recorded higher biomass and nitrogen fixation. Pot and field studies on growth and yield parameters revealed that the influence of single and mixed cyanobacterial isolates and in combination with nitrogen (T_{10}) on yield parameters has shown significant results. It has recorded highest growth parameters like, plant height, number of tillers, dry matter production, leaf area, leaf area index at different growth stages and yield parameters like panicle number (113.0), maximum number of grains per panicle (170.0), grain yield per plant (20.0 g), maximum 1000 grain weight of 25.6 g was observed in the treatment T_{10} compared to control. The highest grain yield (4788 kg ha^{-1}) and straw yield (6136 kg ha^{-1}) obtained in treatment T_{10} and it is significantly superior over control (3500 kg ha^{-1}). Similar trend was seen in the harvest index also.

Studies indicated that the major nutrient and micronutrient status has been increased in treatments with cyanobacterial isolates alone and in combination with nitrogen and compost. The results clearly indicated that the maximum returns could be obtained in the treatment T_{10} (32.6 %). It was mainly due to the influence of blue green algal mixture in the presence of 25 % nitrogen and 10 ton compost per ha^{-1}. Among the blue green algae alone and with the mixture, the highest returns showed in the treatment T_5 (22.8 %) with mixed culture compared to single isolate of T_3 (17.0 %). The studies were conducted during the year 2000 to 2004 at the Agricultural Research Station, Mangalore and in the Department of Biosciences, Mangalore University.

Key words: Cyanobacteria, Nitrogen fixation, rice fields of coastal Karnataka, growth studies, yield parameters.

Ph.D candidate
N.A.Janardhana Gowda

RESEARCH GUDE
Dr.M.Rajashekhar
Dept. of Biosciences
Mangalore University
Mangalagangothri- 574199