Madras Agric. J., 83(8): 499-500 August 1996
https://doi.org/10.29321/MAJ.10.A01041

EFFECT OF BGA INOCULATION WITH PADDY STRAW AND GYPSUM ON RICE IN SODIC SOIL

P. PANDIYARAJAN AND S. KANNAIYAN

Department of Agricultural Microbiology
Agricultural College and Research Institute
Tamil Nadu Agricultural University
Coimbatore 641 003

ABSTRACT

Algalisation was tried in combination with paddy straw and gypsum with a view to improve the rice yield and to combat sodicity problem in soils. BGA inoculation @ 10 kg/ha and gypsum at two levels *viz.*, 50% GR and 25% GR were tried. The results indicated that BGA inoculation combined with paddy straw @ 10 t/ha and gypsum @ 25% GR increased the height, tillers, grain and straw yeild.

KEY WORDS : Blue Green Algae (BGA), Gypsum Requirement (GR) Inoculation, Soil Reclamation

A number of cyanobacteria could adapt well in rice aquatic condition and fix atmospheric nitrogen and contribute to the fertility of rice fields. Excretion of organic acids by BGA has been shown to improve the soil physical conditions and phosphorus availablity in rice fields. Soil salinity is an important agricultural problem since high concentration of salt is the principal agronomic deterrent in saline habitats (Shree Kumar Apte, 1990). In general, cyanobacteria exhibit considerable tolerance to salt, while most crop plants fail to grow on saline/alkali soils. The salt tolerance of nitrogen fixing cyanobacteria has been exploited in the past for the reclamation of saline/alkali soils with some success (Singh, 1950). For rice grown in sodic soils, an extra dose of 25 per cent nitrogen is advocated for increasing rice production.

In the present investigation, algalisation in combination with paddy straw and gypsum was tried, and in this experiment normal dose of N was used as against the extra dose of 25 percent advocated for sodic soils.

MATERIALS AND METHODS

The experiment was conducted at the Soil Salinity Research Centre, Trichy in a sodic soil having 132 kg/ha, 14.6 kg/ha, 280 kg/ha of available N, P and K respectively and a pH of 10.1. The organic carbon content of the soil was 0.298 per cent. The treatments imposed were inoculation of BGA @ 10 kg/ha alone and in combination with paddy straw @ 10 t/ha and gypsum at the levels of 50 per cent GR and 25 per cent GR under randomised block design with three replications. Half of the dose of N and full dose of P and K were applied basally and the remaining N was top dressed in two splits. Blue green algae used in this study were composite culture of *Nostoc, Anabeana, Oscillatoria, Tolypothrix, Phormidium, Calothrix Plectonema* and *Westiellopsis* isolated from sodic soils. The composite culture was powdered and sprinkled in the field seven days after transplanting. During growth, biometric data on plant height, tiller number and yield were recorded. After harvest, the soil pH was also monitored.

RESULTS AND DISCUSSION

The results (Table 1) revealed that the plant height and tiller number were significantly increased over control when BGA was inoculated in combination with either paddy straw or gypsum at two levels or both. Sharma and Mishra (1986) reported that maximum number of tillers was recorded with algal inoculation combined with fertilizer nitrogen. The interaction effect between algalisation with paddy straw and gypsum was found to be significant as expressed in terms of increased production of grain and straw.

BGA inoculation with paddy straw and gypsum @ 25 per cent GR recorded the maximum grain and starw yeild which is on par with BGA

Table 1. Effect of algal inoculation with paddy straw and gypsum on rice grown in sodic soils

Treatment	Soil pH	Plant height (cm)	Tiller number per plant	Grain yield (kg/ha)	Straw yield (kg/ha)
Control	10.1	67.6	21.3	978	4355
BGA inoculation	10.0	70.6	24.3	1667	4511
Paddy straw @ 10 t/ha	9.8	69.6	23.3	1711	5533
Gypsum @ 50% GR	9.1	72.0	24.6	2422	6177
BGA + paddy straw	9.2	75.0	29.6	1788	5199
BGA + Gypsum @ 50% GR	8.7	75.6	29.6	2366	6933
Paddystraw + gypsum @ 50% GR	9.0	72.0	29.0	2199	6022
BGA + paddy straw + Gypsum @ 50% GR	8.2	76.6	31.0	2844	7422
BGA + paddy straw + Gypsum @ 25% GR	8.4	77.0	32.0	2933	7600
CD	1.7	5.7	8.0	389	915

inoculation combined with paddy straw and gypsum @ 50 per cent GR. Kannaiyan (1985) reported that the addition of paddy straw supported multiplication of BGA and suggested that straw addition had induced multiplication of BGA which in turn improved the soil fertility and benefitted rice crop by producing growth promoting substances besides fixing atmospheric N. This was well documented by Venkataraman (1972) also. Combined application of gypsum @ 25 per cent GR and straw recorded the highest rice yield (Duraisamy *et al.*, 1986a) and is in confirmation of the present results. Inoculation of BGA combined with the application of gypsum and paddy straw had significantly reduced the soil pH from 10.2 to 8.2. This may be attributed to the replacement of sodium by calcium in the exchange sites of clay complex through the addition of gypsum and by the production of organic acids through the decomposition of paddy straw and BGA. Similar results were also reported by Gaul and Dargan (1978) and Duraisamy *et al.*, (1986b).

Blue green algae are renewable biofertilizer and rice cropping system provides favourable aquatic environment for their growth, multiplication and nitrogen fixation. The potential group of nitrogen fixing algae may be better exploited to increase the productivity of rice grown under sodic soils.

REFERENCES:

DURAISAMY,P., KOTHANDARAMAN, G.V. and CHELLAMUTHU, S. (1986a). Response of rice (var.Bhavani) to amendments and zinc in alkali soils. **Madras Agric. J. 73**:112-114.

DURAISAMY,P., .KOTHANDARAMAN, G.V. and CHELLAMUTHU, S. (1986b). Effect of amendments and zinc on chemical properties of alkali soils. **Madras Agric. J. 73**:129-134.

GAUL,B.L. and DARGAN, K.S. (1978). Effect of doses of frequency of gypsum application in reclamation and crop production in sodic soil. **Indian J. Agron., 23**: 1-4.

KANNAIYAN,S. (1985). Organic straw amendments on the growth of BGA. In: **Algal Biofertilizer for Low Land Rice**, pp 7-10.

SHARMA,M.L. and V.R.MISHRA. 1986. Effect of fertilizer nitrogen and algal inoculation on rice crop. **Madras Agric.J., 73**:155-159.

SHREE KUMAR APTE (1990). Cyanobacterial nitrogen fixation during exposure to salinity stress. In:**Biotechnology of Bio fertilizers for Rice Crop.** pp. 190-199.

SINGH,R.N.(1950) Reclamation of "usar" lands in India through blue green algae. **Nature 165**:325-326.

VENKATARAMAN,G.S.(1972) **Biofertilizer and Rice Cultivation.** Today and Tomorrow Publishers New Delhi, 81 pp

July 1995 Revised:November 1995)