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Growth promoting effect and biochemical character of *Solanum melangena* L. by treating blue green algae

S Sarguna Sundaram

Research center in Botany, Saraswathi Narayanan College, Madurai, Tamil Nadu, India

Abstract
Biofertilizers provide "Eco-friendly" organic agro- input. Biofertilizers such as Rhizobium, Azotobacter, Azospirillum and Blue green algae (BGA) have been in use a long time. Rhizobium inoculants is used for leguminous crops. Azotobacter can be used with crops like Wheat, Maize, Mustard, Cotton, Potato and other vegetable crops. Azospirillum inoculations are recommended mainly for Sorghumm, Millets, Maize, Sugarcane and Wheat. Blue green algae belonging to a general Cyanobacteria genus, Nostoc or Anabaena or Tolypothrix or Aulosira, fix atmospheric nitrogen and are used as inoculations for paddy crop grown both under upland and low land conditions. The present study was carried out to investigate Growth promoting effect and Biochemical character of *Solanum melangena* L. by treating Blue green algae.

Keywords: Growth character, brinjal, bio chemical character, blue green algae

Introduction

Blue green algae are photoautotrophic, Prokaryotic algae. They are free living creatures and also known as cyanobacteria. It fixes atmospheric nitrogen in moist soils. So BGA is recommended as Bio fertilizer. The algae includes unicellular as well as filamentous species. Some of the filamentous form have specialized cells called heterocysts. Eg Nostoc and Anabaena etc. These cells are the site of Nitrogen fixation.

Blue green algae constitute an important group of microorganisms capable of nitrogen fixation. Most of the species possessing nitrogen fixation ability belong to the order Nostacales and stigonematales under the genera *Anabaena, Anabaenospsis, Aulosira, Chlorogloea, Cylindrospermum, Nostoc, Calothrixm Sytonems, Tolypothrix, Fischerella, Haplosiphon,* Mastogoclades, Stigonema and Westiellopsis. At present over 100 species of blure green algae are known to fix atmospheric nitrogen. Therse have been found to be very effective on the rice and banana plantation. There is considerable variation between different forms of blue green algae and sometimes within the species in the culture flasks N fixed per 100 ml nutrient medium. Under field condition overall increase

Blue green algae are one of the most well adopted algal forms in slaine habits. It has tremendous capacity to transform saline soil into productive neutral soil with greater amount of available nitrogen and carbon. Incubation of saline or alkaline soils with native blue green algae in vitro or *in vivo* resulted an improvement of Physico-chemical properties of Soils. At present over 100 species of blue green algae are known to fix atmospheric nitrogen. These have been found to be very effective on the rice and banana plantation. There is considerable variation between different forms of blue green algae and sometimes within the species in the culture flasks N fixed per 100 ml nutrient medium. Under field condition overall increase in the grain yield of rice is amounted to about 586 kg/ha. In case of crops other than rice algalization increased nearly 34 per cent yield.

Study Plant: *Solanum melagena* L. Brinjal, egg plant

Family: Solanaceae

Brinjal is now most important in India and the Far East. It is now consumed ina variety of ways. In Japan and other other parts of the orient, much of the crop is pickled. It is made into bharta, a preparation relished in most parts of India by roasting, mashing and seasoning with salt, onion, chillies, tomato, coriander leaves and fatty oil. The fruit is sliced or broiled. The immature fruits are sometimes used in curries.

The egg plant is a much branched, spiny perennial, usually grown as an annual under cultivation, attaining a height of 0.5 to 1.5 m. The much branched stem may be erect or spreading, woody at the base but herbaceous above. The leaves are simple, alternate, ovate, to oblong ovate (7.5-15cm long) with margins sinuately lobed and are covered with wolly, stellate hairs beneath. The flowers are solitary or in few flowered lateral cymes, having a deeply lobed and toothed calyx (Usually bearing a few prickles) and a rotate purplish corolla. The calyx is persistent, enlarging with the fruit. The fruit is a large, smooth, glossy, firm fleshed, pendant berry (up to 15cm long), usually ovoid, oblong or obovoid, ranging, ranging from white or yellow to deep purple or black, or even striped. In the flesh of the fruit numerous, small, brown, kidney shaped seeds are embedded.

Experimental method

The seeds of Brinjal were obtained from the Agriculture

University, Madurai. The seeds were sown in Pots and Categorized into two one is control and Blue green algae. The parameters were calculated in triplicates for the purpose of statistical evaluation.

Blue green algae were collected from the research center of the college. It was identified that the algae found in the research center were *Lyngbya*, *Oscillatoria*, and *Rivularia*. These algae are very common in the lake adjoining the college and also in the paddy fields of Perungudi Village. 100 gm of algae was applied the experimental pots.

After three months the fertilizers were applied in Brinjal. The yield and growth parameters were assessed.

Estimation of chlorophyll content

Leaf material (200mg) was ground in a pre-chilled pestle and mortar in diffuse light with 80 per cent cold acetone and the homogenate was centrifuged at 3000 × g for 2 minutes. Aliquots of 10 ml of 80 percent cold acetone were added to the pellet and centrifuged till it was non-green. The supernantants were pooled and protected from light prior to the estimation of chlorophyll content.

The concentration of chlorophyll was calculated using the formula of Arnon (1949) [3].

Chlorophyll a: 0.0127 × A663-0.00269 × A 665(mg/ml)

Chlorophyll b: 0.0229 × A 645-0.00488 × A 663(mg/ml)

Total Chlorophyll: 0.0202 × A 645 +0.00802 × A 663(mg/ml).

Estimation of soluble starch

The leaves were homogenized in 80 per cent acetone and centrifuged at 3000 × g for 10 minutes. The residue was used for the estimation of soluble starch. Known volume of distilled water was added to the residue and it was boiled for a few minutes. Then it was centrifuged and the supernatant was collected and used to estimate the total starch. 0.1 ml of iodine reagent (3 gm of iodine and 1.5 gm of potassium iodide in 100 ml of distilled water) was added to 0.4 ml of the sample and the volume was made up to 5ml with distilled water. It was mixed thoroughly and absorbance was measured at 600 nm (Mc Cready *et al* 1950) [24]. Potato starch was used as standard.

Estimation of glucose

200mg of leaf material was ground in 80 percent methanol. It was filtered through muslin cloth and centrifuged. The supernatant was saved and the pellet was collected and washed again with 80 percent methanol and centrifuged. The pooled supernatant was taken for study. To 1 ml of 0.5 percent phenol and 5ml of Conc. Sulphuric acid were added. Then the whole solution was made up to 12 ml with distilled water. The absorbance was read at 490 nm (Dubois *et al*. 1956) [14]. The total glucose was estimated with glucose standard graph.

Estimation of soluble protein

The leaves were homogenized in 80 percent acetone and centrifuged at 10,000 × g for 10 minutes. To the pellet 2ml of 0.N NaoH solutions was added and centrifuged again. Soluble protein content of the centrifuged homogenate was determined by the method of Bradford (1976) [10]. The absorbance was calculated from calibration graph plotted using known amount of bovine serum albumen as protein standard.

Estimation of nitrate reeducates activity

200mg of leaf material was cut in to small bits and incubated in glass vials containing 5 ml of incubation medium with the following reagents (Jaworski 1971).

100Mm KH_2 Po_4 KOH buffer pH 7.5

100MmKNO_3

1% N-Propanol

1% triton × 100

Incubation was carried out in the dark for 1h at room temperature giving occasional shaking. Aliquots of 0.5 ml of the incubation mixtures were analyzed for nitrite after 1 hr of incubation. To 0.5 ml of incubation medium 1.5ml of distilled water was added, to which 1ml of 3 percent Sulphanilamide in 3N HCl and 1 ml of 0.02 percent N-Napthyl ethylene diamine dihydrochloride (N-1-N) were added in quick succession. 15 minutes was allowed for color development and absorbance was read at 540nm (Muthuchelian 1989) [25].

The growth parameters such as shoot length, root length, number of flowers, fruit weight, and number of leaves, fresh weight and dry weight of the plants and Bio chemical parameters were calculated.

Result

The shoot length ranged from 29.5 cm- 31 cm. The root length ranged from 15.5cm-16.1cm. The number of leaves ranged from 7-11.The number of flowers ranged from 7-8.The fruit weight ranged from 14.6gm-19gm. Fresh weight ranged from 5.3gm-6.1gm. Dry weight ranged from 3.7gm-4.3gm.Chlorophyll content ranged from 0.17mg/g/F.wt-0.19mg/g/F.wt.Protein content ranged from 0.12mg/g/F.wt-0.17mg/g/F.wt.Starch content ranged from 0.14mg/g/F.wt-0.21mg/g/F.wt.Glucose content ranged from 0.07mg/gF.wt-0.15mg/g/F.wt.Nitrate reductase activity ranged from 0.14mg/g/F.wt-0.20mg/g/F.wt

Table 1: Growth characters of *Solanum melangena* L

Brinjal	Control	Blue green algae
Shoot length	29.5 cm	31 cm
Root length	15.5cm	16.1cm
Number of Leaves	7	11
Number of Flower	7	8
Fruit weight	14.6gm	19gm
Fresh weight	5.3gm	6.1gm
Dry weight	3.7gm	4.3gm

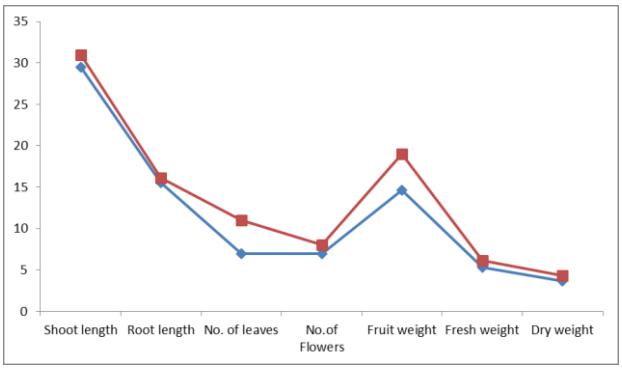

Fig 1: Growth characters of *Solanum melangena* L.

Table 2: Biochemical parameters of *Solanum melangena* L.

Brinjal	Control	Blue green algae
Chlorophyll content	0.17±0.09	0.19±0.003
Protein content	0.12±0.010	0.17±0.015
Starch content	0.14±0.012	0.21±0.023
Glucose content	0.07±0.031	0.15±0.003
Nitrate Reductase activity	0.14±0.006	0.20±0.029

Fig 2: Biochemical parameters of *Solanum melangena* L.

Discussion

The present study showed that application of Blue green algae enhance the growth and Bio chemical parameters when compare to control plants. Application of Blue green algae on Lupinus termis (Ordog 1999; Haroun and Hussein 2003) [27, 16], Tomato (Zeenat Rizvi and Sharma 1999) [37], Banana (Pachpande 1990) [29], Mulberry (Bongale *et al*.1980; Bongale, 1986; Lokanath and Shivashankar 1986) [8, 11, 12], Cucumber (Nanda *et al*. 1991) and *Vigna catjang* (Gupta and Gupta 1973) [15] were found to have enhancing effect on growth and yield.

Conclusion

The findings of the present investigation mainly focused on effect Blue green algae increases growth parameters as well as Biochemical parameters on crop plants. It can be concluded that Enhancement of Biochemical parameters such as chlorophyll content, Protein content, Starch content, Nitrate reductase activity by treating Blue green algae. Blue green algae were applied to paddy fields. Recently they are applied to other crops also.

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