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Nitrate reductase activities on *Capsicum annuum* L. by treating vermi compost and blue green algae

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Abstract
The application of bio fertilizers to the crops is being propagated through out the world. The popular and cheap bio fertilizers are vermi compost and Blue green alga. Blue green algae were applied to mainly to paddy fields. Recently they are applied to other crops also. Experiments were conducted to investigate the Nitrate reductase activities of vermi compost and BGA on Capsicum annum L. in single and double combinations. It was found that Vermi compost in single fertilizer treatment; Vermi compost and BGA in double fertilizer treatment were found to have comparatively high values in nitrate reductase activity. The cultivated crops showed maximum value in double fertilizer treatment. Thus the combination of these fertilizers enhances the growth and yield.

Keywords: Bio chemical activities, Crop plants, Blue green algae, Vermicompost

Introduction
Blue green algae constitute an important group of micro-organisms capable of nitrogen fixation. Most of the species possessing nitrogen fixation ability belong to the order *Nostacales* and *Stigonematales* under the genera Anabaena, *Anabaenopsis, Aulosira, Chlorogloea, Cylindrospermum, Nostoc, Calothrix, Sytonema, Tolypothrix, Fischerella, Halplosiphon, Mastigoclades, Stigonama* and *Westiellopsis*. 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.
Vermicompost is the remnants of the earthworms which feed voraciously on organic matter. Earthworms are beneficial organic creatures which man has not explored. They eat voraciously and feed day and night all garbage if it is shredded to fine pieces. The earthworms are called intestines of the earth and are bio-refineries purifying all waste into useful compost. Every house can adapt this simple process of converting garbage waste into wealth (Sultan A Ismail 1997) [17]. The compost contains approximately 0.5 percent Nitrogen, 0.2 per cent phosphorus and potash in soluble form. It also contains sufficient quantities of micronutrients. The earthworms also release enzymes that lead to growth of microbes and bacteria.

Study Plants Capsicum, Chillies, sweet or bell pepper

Family: Solanaceae

In almost every tropical country, capsicums have become the most popular condiment, being used to add zest and flavour to otherwise dull foods. The large green non-pungent forms of *C. annum* are eaten raw as salads. They have a thick flesh and are hollow, often being stuffed with meat or potatoes and then cooked. The large sweet red fruited types of capsicums are used in the dressing up of cheese, for stuffing olives and in various tinned meats. The small fruited, stronger flavoured types of *C.annum* yield 'paprika' which is used as a flavouring and colouring material in cookery. Commercially, large quantities of paprika are used in the manufacture of sausages and other meat products. Spanish paprikas (pimiento), however, lack pungency.

Red or cayenne pepper, obtained by grinding dried fruits of 'bird chillies', *C. frutescens*, is used in the manufacture of sauces and curry powders and also in the preparation of pickles. Tabasco sauce is prepared by pickling the pulp of chilli fruits in salted water or strong. Vinegar. Capsaicin, the pungent constituent of Capsicum pods, is used in the manufacture of ginger ale and ginger beer. Medicinally, Capsicum peppers have been used internally, in the past, as a powerful stimulant and carminative, but externally as a counter irritant to cure rheumatism.

Typically, the seeds are first sown in nurseries and the seedlings transplanted later in the field when about 15 cm high. The bisexual flowers are arranged in cymose inflorescences, having a floral organization of K(5) C(5) A5 G(5). The family is peculiar in having an obliquely placed ovary with swollen, axile placenta. The fruit is a berry or capsule; the seeds have a large endosperm and a curved embryo.

Experimental Method

The seeds of chilli were obtained from the Agriculture University, Madurai. The seeds were sown in separate pots and allowed to germinate. Four pots were selected for each crop. The pots were labeled for crop. The parameters were calculated in triplicates for the purpose of statistical evaluation. The following labels were pasted for each crop.

- Control
- BGA
- Vermicompost
- BGA + Vermicompost

The vermicompost and Blue green algae were collected from the research centre of the college.

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

Estimation of nitrate reductase activity

200 mg of leaf material was cut into small bits and incubated in glass vials containing 5 ml of incubation medium with the following reagents (Jaworski 1971) [9]:

100 Mm KH_2 PO4 KOH buffer P^H 7.5
100 Mm KNO_3
1% N-propanol
1% triton x 100

Incubation was carried out in the dark for 1 h 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 1.5 ml of distilled water was added, to which 1 ml of 3 per cent sulphanilamide in 3 N HCl and 1 ml of 0.02 per cent 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 540 nm.

Result and Discussion

Nitrate Reductase activity in leaves ranged from 0.13 mg/g/f.wt -0.34mg/g/f.wt in chilli. In single fertilizer treatment maximum nitrate reductase activity was observed in Vermicompost. In double fertilizer treatment Vermicompost and Blue green algae showed higher than single fertilizer treatment.

Table 1: Nitrate Reductase activities on *Capsicum annum* L.

Crops	Control	Blue Green Algae	Vermicompost	Blue Green Algae and Vermicompost
Chilli	0.13±0.007	0.20±0.012	0.22±0.01	0.27±0.009

Discussion

Generally farmers apply fertilizers to enhance the yield of crop plants. The fertilizers are of two types namely chemical and bio fertilizers. Both of these are available in markets in different commercial brands. Application of Bio fertilizers is recommended by the agronomists to save the expenditures incurred by the farmers. Cultivation of Cheap and effective fertilizers are undertaken by the farmers under the guidance of agriculturists. For example in several rural areas vermicompost is being manufactured and sold in Markets. These fertilizer products fetch a considerable income to the farmers.

In the present study application of vermicompost alone to chilli gives higher growth features than BGA. However, Subbiah and Sundarajan (1993) [16] made a critical study on the influence of organic and inorganic fertilizers on the yield and nutients uptake in Bhindi fruit was significantly increased by vermicompost treatment.

In Double fertilizer treatment it was found that vermicompost and BGA shows better growth properties. Application of Azolla, Vermicompost and Urea on Paddy (Singh *et al*. 2005) [5], Farmyard manure + Sesbania green manure+ Blue green algae+ Phosphate Solubilising bacteria on Paddy(Nguyen Van Quyen and Sharma 2003) [13] Showed better yield than control.

Vermicompost contains a good amount of macro and micronutrients. It also serves as a very good base for establishing and multiplication of beneficial symbiotic microbes which helps in fixing nitrogen in the soil, besides enhancing the availability of phosphate and nitrogen uptake of phosphate by plants (Kale 1995) [11].

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