INTRODUCTION
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Assam, one of the north eastern states of India is situated between 24° to 28°18' North latitude and 89°15' to 97°4' East longitude, covering an area of 78,523 sq. km. The area falls within the temperate zone but being close to the tropical belt it has subtropical humid climate. The annual average rainfall is 2300-2400 mm with a relative average humidity ranging from 74 to 87%. The average temperature range during summer months of July and August is 28 to 33°C while average during December-January is 6 to 12°C.

Assam is an agrarian state where 80% of the population are agriculturists, rice being their main crop. Almost 23,01,600 ha of the total cultivated land are covered by rice fields. Both wet and dry cultivations are adopted by the people, thereby rice is cultivated almost throughout the year in Assam.

The introduction of improved agricultural technology coupled with the arrival of fertilizer responsive high yielding crop varieties, had made the country self-sufficient in food grain production. But the ever increasing population has been challenging the future of the country in the area of food grain production. Therefore the country has to produce 200 million tonnes of food grains by the turn of the present century, that is an involvement of an increase of 30 million tonnes at the present level. To attain the target the country shall have to effectively manage the nutrient supply required for full exploitation of the genetically improved crop varieties.
Nitrogen, which is the most important amongst the various crop nutrients is expensive in its fertilizer forms because its fixation in the industry is an energy intensive process which is solely based in mineral oil. Moreover the fertilizer nitrogen is already in short supply.

The alarming energy crisis has caused a global concern to search for alternative renewable energy source to reduce the pressure on the fuel energy. Biological nitrogen fixation, an attribute monopolised by some of the prokaryotes holds promise to meet atleast a part of the nitrogen required for agricultural production.

Agriculture is the principal support for the economy of India and Assam is not excluded from it. This vital industry the agriculture, unfortunately is in the hands of small and marginal farmers. In Assam only about less than 10% of this vital industry is under the occupation of well to do farmers and the rest remains with the small and marginal farmers, who can not make use of the present day agricultural technology because of financial constraints. Therefore, to improve the economic status of these people the agriculture must be made 'sustainable' through increased use of farm grown inputs which are far more cheaper than the industrially produced inputs that are in use at present.

In the first phase of Green Revolution we aimed at increasing our food grain production substantially. Almost three decades after the green revolution has ushered in, scientists have now cautioned against its harmful effects which are likely to affect crop production in the future. Paroda, (1998) stated that the negative outcomes of the green revolution, such as loss of productivity of pulses, fruits and vegetables and unbalanced use of fertilizers are the two major factors that are threatening the agri-future of the country. In green revolution the emphasis was given
mainly on cereals like rice and wheat whose growth is declining worldwide. According to Paroda, from 1967 to 1978 the growth rate of cereals was 4.23 percent but it was gone down to 2.46 percent between 1991 to 1996.

Therefore, it is anticipated that the successful implementation of the second phase of green revolution will depend upon our ability to maintain an economic and ecological sustainability in agricultural sector.

Under ideal conditions, modern rice varieties, for example, have the biological potential to produce 3-10 times the yields commonly obtained by the farmers (Venkataraman, 1990). But Indian farmers produce only an average of 12-15% of the potential yield for the tropics. At present the challenge is to reduce this potential-performance gap. This requires creation of a new management infrastructure to provide a wide range of services and inputs to the farmers. In this new management revolution increasing attention must be paid to management infrastructure, such as quality seeds, soil and water management, plant protection, mechanization, agro-services and increased use of renewable energy resources with concurrent emphasis on increasing the purchase power and job opportunities.

The quantum jump in the agricultural production in the coming years will depend on the creation of a new management infrastructure as mentioned earlier and on the energy inputs particularly on the indirect cost of agricultural production. It was recorded that the share of agriculture in the total energy budget had increased from 3% in 1951 to 54 to over 10% in 1975 to 79, but indirect costs of energy inputs are far greater. Agriculture is increasingly becoming energy
intensive, each 1% growth in output requiring 2.5% growth in energy use.

Modern agriculture needs 1500 kg oil/ha for 5-6 tonne/ha rice. An ordinary subsistence agriculture system in rural India purchases so much by way of inputs to its rice that it dissipates one unit of fossil fuel energy for every metabolisable unit of energy produced (Venkataraman, 1990). Fertilizers being the most energy intensive — 2.0 kg. fuel needed for 1.0 kg. fertilizer manufacture, transport and application. The fertilizer consumption went up from 16.7 kg/ha in the Government of India's 4th plan to 29.5 kg/ha in the 5th plan. It is expected to rise to 100 kg/ha by end of the present century. In view of the rising costs and the widening gap between supply and demand, steps will have to be taken to improve the productive efficiency of the applied fertilizer and also conserve and use all organic wastes. For example, India has potential of dry dung availability of 200 million tonnes per year with a total available nitrogen of 4 million tonnes. To produce this much of nitrogen in chemical form will require 2 million tonnes of nephtha. Biofertilizer programmes to harness renewable biological nitrogen fixation process by Rhizobia, Blue Green Algae, Azolla, and other sources will have to be augmented and expanded.

The blue green algae are probably the most primitive photosynthetic organisms on earth today, which arose between 2-3x10^9 years ago (Schopf, 1970), probably from a photosynthetic bacterium. Cyanophytes were the first O_2 - producing photosynthetic organisms. They are able to grow anaerobically, a property not associated with eukaryotic algae. The cyanobacteria are of ubiquitous distribution in soil. In temperate soils blue green algae are less abundant than in tropical...
and sub-tropical regions. Watanabe (1959) and Watanabe and Yamamoto (1971), found that nitrogen fixing BGA were widely distributed throughout the tropical, sub-tropical and temperate regions but the frequency of their occurrence was more prominent in southern than in the northern regions.

The paddy field ecosystem provides a favourable environment for the growth of BGA with respect to the requirement for light, higher temperature and nutrient availability. Moreover, a microaerophilic condition is also found in the sub-soil region and soil-water interphase in a rice field, where non heterocystous BGA can also add substantial nitrogen through dinitrogen fixation. The BGA have trophic independence for carbon and nitrogen, this attribute makes them the most promising self supporting system which can be used as an inexpensive input in rice cultivation.

Several workers have indicated possibility of using nitrogen fixing BGA as an input in rice cultivation (De, 1939; Watanabe, 1960; Singh, 1961 and Venkataraman, 1966). They suggested that by virtue of their capacity to carryout both photosynthesis and nitrogen fixation, certain BGA are ecologically and agriculturally important particularly in tropical rice fields.

Multilocational trials under varied agroecological conditions with different rice varieties have shown an yield increase ranging from 10-40%. The supplementation effect remains perceptible in presence of high levels of chemical nitrogen (Venkataraman and Goyal, 1969; Goyal, 1982) and in upland paddies also (Rao et al., 1972). Algalization affected plant size, its nitrogen content and the number of tillers, ears, spikelets and filled grain per panicle (Roger and Kulasooria, 1980, Singh,
In trials conducted in 5 stations in India, it was observed that by adding 10 kg algal cultures per hectare costing about Rs.30/-, extra yields of paddy worth Rs.500/- to Rs.700/- was obtained on the average (Rao, 1978).

Considering the importance of role of BGA in economization of rice cultivation and to facilitate our knowledge on this role of BGA in Assam condition, the present studies were undertaken to have an appraisal of:

1. Qualitative analysis of BGA in certain rice fields of Assam.
2. Quantitative analysis of the BGA in those rice fields.
3. Their distributional pattern in the rice fields.
4. Nitrogen fixing potential of some of the selected BGA.
5. Supplementation effect of the BGA in rice cultivation.
6. Analysis of economy of use of BGA.