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C5-233

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Ammonium translocation in Cyanobacteria and their possible use as Biofertilizers.

Interim Report No-4

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I. Construction of Ponds in the Philippines.

A set of 3 ponds, 2.5 m^2 each, has been constructed in the Philippines. These ponds will be use to test the environmental conditions affecting the biomass production of some of the desired strains isolated by Dr Martinez from rice paddies in the Philippines.

This set-up, together with the indoor facilities (set of tourbidostatas installed last January), provide our collaborators with the capacity for completing all biological experiments described in the project.

II. Biomass production of *Gleotrichia natans* isolated from rice paddies in the Philippines at Sede Boker.

After a successful, first attempt to cultivate a nitrogen fixing blue green alga outdoors (see Report No-2), we have tried the cultivation of an isolate from the Philippines. The study was performed according to criteria previously tested for the Anabaena azolla isolate (see Report No 1): 1) growth conditions for obtaining μ max (maximum growth rate); 2) optimal temperature for growth; 3) environmental conditions affecting nitrogenase activity: and 4) the outdoor production, for a relatively long period of time, in the 2.5 m^2 ponds. The data obtained are summarized in Figures 1, 2, 3 and 4 and in Table 1.

Conclusions:

The nitrogen fixing isolate, *Gleotrichia natans,* is a relatively fast growing strain, and has a doubling time of 9 hr (Fig. 1.). This isolate grows well at temperature over 30° C and withstands temperature up to 45° C (Fig 2). It could, therefore, be considered as a thermophilic strain. Under outdoor conditions (Fig 3), the strain exhibits a high nitrogenase activity (measured in situ), as compared to the activity measured in lab cultures (Fig 4). The maximum rate of production obtained in outdoor cultures was 18.1 gr m^2 day $^{-1}$. In all of these cultures no contamination was observed and a monoalgal innocula was obtained. The features of this isolate are considered advantageous for application as a nitrogen biofertilizers in rice fields.

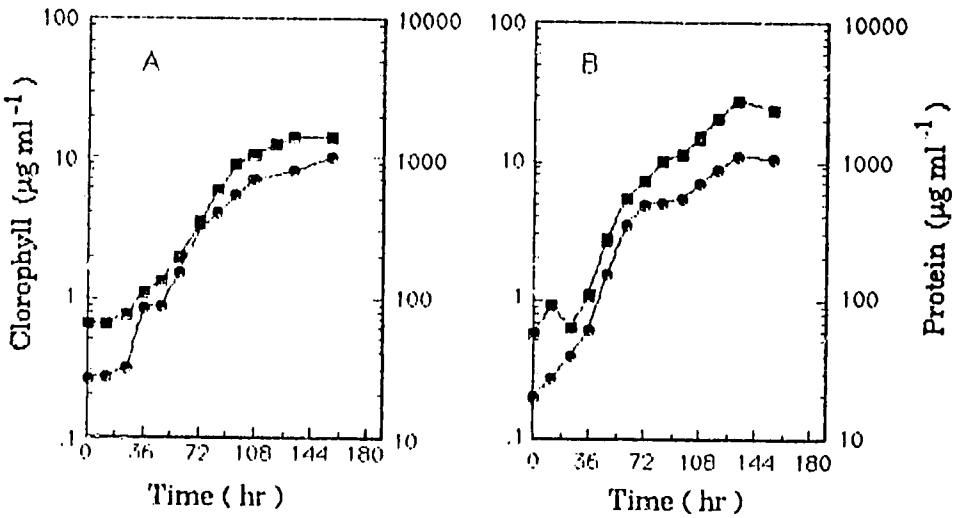

Fig 1. Growth of G. natans under different aeration regimes :
A) culture bubled with a mixture of 1.5 % carbon dioxide in air.
B) culture bubled with air

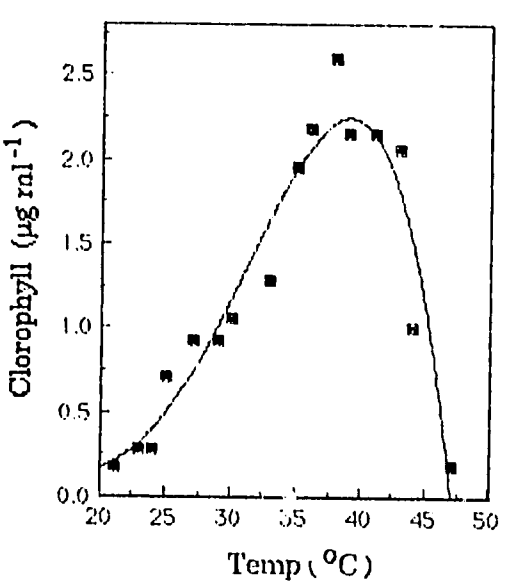

Fig 2. Effect of temperature on the growth of G. natans

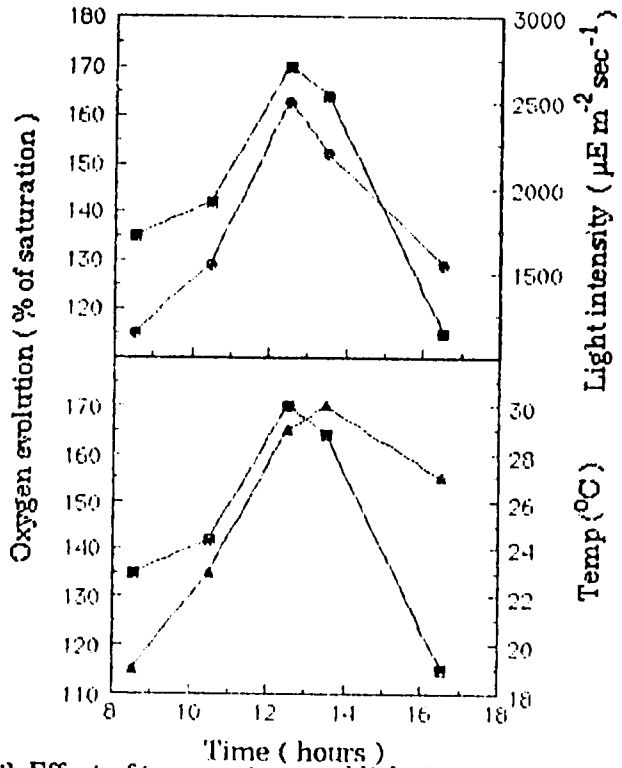

Fig 3. Effect of temperature and light intensity on oxygen evolution in G.natans cultivated outdoors in 2.5 m^2 pond.

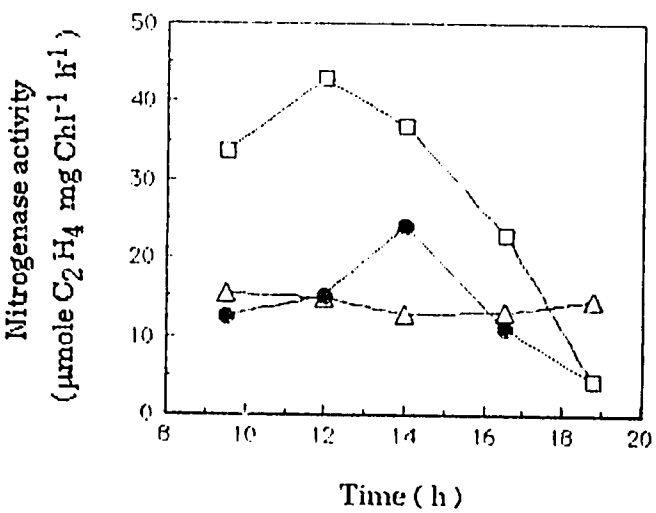

Fig4. Nitrogenase activity of G. natans under different enviromental growth conditions.

△ - nitrogenase activity assayed in the lab under controlled conditions.

□ - nitrogenase activity assayed out doors under mixing condition.

● - nitrogenase activity assayed out doors without mixing .

Table 1. Effect of cell density on the Outpout rate of *G. natans* cultuvated Outdoors in 2.5 m^2 ponds.

Cell density (g/l)	Outpout rate ($g\ m^2\ d^{-1}$)
0.70	17.1
1.15	18.1
1.50	14.7