

ID: 298

## Culturing of nitrogen-fixing cyanobacteria in a bioreactor for the production of a biofertilizer

S. D. P. N. Jayasinghe<sup>1</sup>, S. U. Kumari<sup>2</sup>, and P. N. Yapa<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihintale, Sri Lanka

<sup>2</sup>Department of Bioprocess Technology, Faculty of Technology, Rajarata University of Sri Lanka, Mihintale, Sri Lanka

### Abstract

Cyanobacteria can be considered as the most primitive inhabitants on earth. They have the capability of performing oxygenic photosynthesis, and some of them are able to fix nitrogen by converting atmospheric nitrogen (N<sub>2</sub>) into ammonia (NH<sub>3</sub>). The nitrogen-fixing cyanobacteria were isolated in BG110 medium, and *Anabaena* sp., *Oscillatoria* sp., and *Nostoc* sp. were identified with the aid of Nikon Eclipse Ts2 inverted phase contrast microscope. Cyanobacterial counts were checked for each individually for identified species using a haemocytometer and it was  $1 \times 10^7$  CFU ml<sup>-1</sup>. The volume of 300 ml of identified nitrogen-fixing cyanobacteria were cultured in BIOSTAT® A bioreactor to increase their biomass under optimized conditions of 100 rpm agitation, 27 °C temperature, 7.1 pH, 150 ccm flow rate of Oxygen and a constant light intensity of 300  $\mu\text{Em}^{-2}\text{s}^{-1}$  for a period of seven days. The final volume of cyanobacterial culture obtained from the bioreactor was 2334.15 ml. The cyanobacterial growth difference before and after culturing in the bioreactor was  $9.3 \times 10^7$  CFU ml<sup>-1</sup>. Biofertilizer was prepared after checking the cyanobacterial cell density using a haemocytometer and it was  $10.3 \times 10^7$  CFU ml<sup>-1</sup> for the cyanobacterial mixture cultured in the bioreactor. The total nitrogen content of 0.2 g of oven-dried nitrogen-fixing cyanobacterial biofertilizer was checked by the Kjeldahl procedure and estimated as 2.52%.

**Keywords:** *Cyanobacteria, Nitrogen fixation, Photobioreactor, Biofertilizer, Kjeldahl method*

