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## GROWTH OF *Phormidium bigranulatum*-DOMINATED MAT IN RELATION TO NATURE OF THE SUBSTRATUM, TIME, pH AND NUTRIENT AVAILABILITY

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### Abstract

The growth of a non-axenic *Phormidium bigranulatum*-dominated mat was tested under a range of chemical parameters and types of substrate. Total biomass yield (in term of mg chlorophyll *a*) of mats grown on muslin cloth (0.64 mg) and cotton mesh (0.62 mg) were significantly higher than those on other substrates, such as, nylon net (0.50 mg), sands of river Sone (0.43 mg) and river Ganga (0.30 mg), rice husk (0.38 mg) and saw dust (0.21 mg). The *Phormidium* mat would be easy to handle in bioremediation process as it grew well enmeshed in nylon net. The mat biomass increased with increasing phosphate enrichment of the medium up to 0.25 mM, whereas higher concentrations were inhibitory. At low levels of phosphate (<0.10 mM) in the medium, green algae, especially *Oocystis lacustris* (13%), *Scenedesmus obliquus* (10%), and *Chlorella vulgaris* (9%), became abundant in the mat community. Whereas ammonium chloride, ammonium nitrate, urea and glutamic acid (1 to 10 mM) failed to support the growth of the test mat, nitrate best supported the growth of the mat at concentrations above 10 mM. Low concentrations of nitrate (1 and 5 mM) could not sustain the growth of the mat for 30 days experimental period. The optimum sulfate concentration for mat growth was 0.10 mM. Air bubbles were seen entrapped in the mat due probably to the dense matrix of exopolymers which seem to have hindered the escape of oxygen and other gases. Conditions favoring high rate of photosynthesis, such as, optimal nutrient supply, led to the entrapment of a large number of air bubbles in the mat. Since the test mat requires high phosphate and nitrate concentrations for growth, it is a good candidate for removing nutrients from wastewaters.

**Key words:** air bubble, cyanobacterial mat, growth optimization, nutrient availability, *Phormidium bigranulatum*

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