Isolation of fresh water cyanobacteria and screening their potential in nitrate reduction

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Nitrate contamination in water bodies has become a serious concern due to excess application of nitrogen fertilizers. Due to the mixing up of abundant nitrogenous waste and synthetic and animal fertilizers, nitrate (11mg/l of NO_3^- - N) levels exceeded WHO limits in Jaffna. It is necessary to treat contaminated water for domestic and agriculture purposes. The aim of the present study was to investigate the nitrate reduction potential of fresh water cyanobacteria isolated from Jaffna. Experiments were conducted in artificial media under controlled conditions to avoid interactions with indigenous microorganism. Fresh water samples collected from ponds of Jaffna were filtered using 20 μm planktonic net and retentiate was cultured in to BG11 medium with frequent sub-culturing. 28 axenic cultures were isolated through subsequent streaking. Based on visible growth in BG 11 medium, fast growing 5 strains were selected for further screening and identified as *Calotrix* sp (T8), *Dichothrix* sp (T15), *Lyngbya* sp (T20) *and Phormidium* sp (T11 and T21). Nitrate reduction ability was evaluated in artificial medium containing initial nitrate concentration of 40 mg/l at 25°C, 120 rpm. pH, OD and nitrate concentration of medium were determined in three days intervals. In present study increased value of pH and OD was recorded for all strains and all 5 strains showed more than 80% nitrate reduction at the end of the day and *Lyngbya* sp (T20) showed highest percentage reduction of nitrate 93.8% (from 40 mg/l to 2.48 mg/l) while *Phormidium* sp (T11) showed lowest percentage reduction of 85.05% (from 40 mg/l to 5.98 mg/l) compared to other four strains. This preliminary study therefore suggests that these selected cyanobacteria strains can be recommended as effective nitrate reducers to be applied in nitrate contaminated water treatment with further improvements. However, further studies are necessary for the identification of possible toxin effects.

Keywords: Axenic culture, Cyanobacteria, Isolation, Nitrate, Reduction