

Mixotrophic Growth of *Chlorella* sp. on Raw Food Processing Industrial Wastewater: Effect of COD Tolerance

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Abstract : The effluents from various food processing industries are found with high BOD, COD, suspended solids, nitrate, and phosphate. Mixotrophic growth of microalgae using food processing industrial wastewater as an organic carbon source has emerged as more effective and energy intensive means for the nutrient removal and COD reduction. The present study details the treatment of non-sterilized unfiltered food processing industrial wastewater by microalgae for nutrient removal as well as to determine the tolerance to COD by taking different dilutions of wastewater. In addition, the effect of different inoculum percentages of microalgae on removal efficiency of the nutrients for given dilution has been studied. To see the effect of dilution and COD tolerance, the wastewater having initial COD 5000 mg/L (± 5), nitrate 28 mg/L (± 10), and phosphate 24 mg/L (± 10) was diluted to get COD of 3000 mg/L and 1000 mg/L. The experiments were carried out in 1L conical flask by intermittent aeration with different inoculum percentage i.e. 10%, 20%, and 30% of *Chlorella* sp. isolated from nearby area of NEERI, Nagpur. The experiments were conducted for 6 days by providing 12:12 light- dark period and determined various parameters such as COD, TOC, NO₃⁻ N, PO₄⁻ P, and total solids on daily basis. Results revealed that, for 10% and 20% inoculum, over 90% COD and TOC reduction was obtained with wastewater containing COD of 3000 mg/L whereas over 80% COD and TOC reduction was obtained with wastewater containing COD of 1000 mg/L. Moreover, microalgae was found to tolerate wastewater containing COD 5000 mg/L and obtained over 60% and 80% reduction in COD and TOC respectively. The obtained results were found similar with 10% and 20% inoculum in all COD dilutions whereas for 30% inoculum over 60% COD and 70% TOC reduction was obtained. In case of nutrient removal, over 70% nitrate removal and 45% phosphate removal was obtained with 20% inoculum in all dilutions. The obtained results indicated that Microalgae assisted nutrient removal gives maximum COD and TOC reduction with 3000 mg/L COD and 20% inoculum. Hence, microalgae assisted wastewater treatment is not only effective for removal of nutrients but also can tolerate high COD up to 5000 mg/L and solid content.

Keywords : *Chlorella* sp., chemical oxygen demand, food processing industrial wastewater, mixotrophic growth

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