

Biodegradation of Dairy Waste Effluent using Aerobic Microflora

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Introduction

Dairy industry is one of the major food industries in India, and India ranks first among the maximum major milk producing nation. Consequent to the increased milk production and processing, waste water generation has also increased. The dairy industry in India on an average has been reported to generate 6-10 litres of waste water per litre of the milk processed. However an efficient multi product dairy plant may use one litre water per litre of milk processed. Waste water from dairy creates pollution problems, when dissolved oxygen is insufficient for oxidation of organic matter in the dairy waste water. Hence, it is highly essential to reduce the organic load of dairy waste water by use of efficient microflora before being discharged into waterways.

Objective

The aim of the present study is to isolate potential bacterial strain from dairy waste water and then apply it for the treatment of the waste water.

1. To isolate the most predominant aerobic bacteria for reduction of COD and BOD from twelve different dairy plants of Gujarat.
2. To evaluate the efficiency of selected isolate in decreasing Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) of dairy effluent sample.

Methodology

Sample of treated effluents were collected from the final disposal tank among 12 different dairy plants of Gujarat and were analysed for Chemical oxygen in demand (COD), Biochemical oxygen in demand (BOD), pH and Total dissolved solids (TDS). Composite sampling was used for collection of sample. Individual samples were taken on defined schedule and pooled together into one container. As the sampling site was at distant from the laboratory, the samples were collected in sterilized bottles and stored at below 4 °C. All the samples were labelled and identified as to the location of the source, date and time of collection and the type of sample and were tested within 12 h of sampling. The plating of the sample was done on nutrient agar and was kept at 25 and 37 °C and colonies formed on the medium after 24h of different shapes were randomly picked up and transferred in to sterile nutrient broth. The isolates were purified by repeated streaking on nutrient agar. The isolates were inoculated in artificial effluent and kept on a shaker for 24h at 170 rpm. The isolates that gave a maximum reduction in COD in the wastewater during the same set of conditions were selected as the potential strains Completely randomized design (CRD) was used for selecting the most predominant isolate on the basis of reduction of COD and BOD out of three best isolates selected from 64 isolated cultures.

Result and Discussion

Sixty Four isolates were picked up based on COD reduction. The isolates were characterized for phenotypic characteristics by performing morphological, cultural and biochemical tests. Using these characteristics, they were identified up to genus level. Bacteria showing highest COD reduction was evaluated for effect on BOD, TDS, pH and it was further characterized based on Bergeys manual of systematic bacteriology 2006.



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Conclusion

The microorganisms of choices should have a strong degradative capacity and high toxic resistance. The process of seeding inoculation of microorganisms for degrading waste materials on streams, rivers and treatment tanks has been rapidly increasing practice in many countries because it is economical and the application is uncomplicated. This was the idea behind isolating a most prominent culture which will degrade the COD of the dairy effluents. Microflora from treated effluents showed dominance of genus *Bacillus* followed by *Alcaligenes*, *Pseudomonas*, *Citrobacter* and *Sporolactobacillus*. The best isolate *B. circulans* (C5) was selected based on maximum COD reduction (70%) and were also tested for reduction in BOD (Biochemical Oxygen in Demand) (40.23%), and an increase in pH (8.62) and TDS (Total Dissolved Solids) (33.64%).

