

Preliminary studies on microbiological and physico-chemical characteristics of wastewater generated from desiccated coconut industry

R.K.Wickramasinghe, S.I. Abeygunawardena, S.Widanapathirana,
D.L.Jayarathne
Department of Microbiology, Faculty of Science, University of Kelaniya

ABSTRACT

Desiccated coconut (DC) industry generally produces solid and liquid wastes. Liquid waste, a combination of coconut water, coconut cream, and wash water can cause serious environmental problems when discharged in to lands and aquatic systems without proper treatment. In Sri Lanka most of the DC factories release their wastewater into nearby streams, rivers, paddy fields or uncultivated lands without any treatment. Understanding of the microbiological and physico-chemical characteristics of wastewater is an important step in the development of an efficient wastewater treatment system to the industry. In this study some of the relevant physico-chemical parameters and characteristic features of autochthonous microorganisms of DC mill waste effluent were investigated. Physico-chemical parameters such as BOD₅, COD, total suspended solids, pH, temperature, conductivity, turbidity, oil and grease level.

The effluent samples were collected from three DC mills and one coconut cream-producing mill (CC mill-1) for a period of seven months to study the microbiological and physico-chemical characteristics of liquid wastes. All these mills have simple pond type treatment facilities. NWRI agar (HPCA) medium with 10% of effluent, plate count agar and nutrient agar were used for enumeration and isolation of bacteria and *Saccharomyces sp.* Starch casein agar for isolation of *Actinomyces sp.* and kings ward raneys media for isolation of *Pseudomonas sp.* were used.

Some of the autochthonous organisms isolated from the wastewater samples were identified as *Bacillus megaterium*, *Bacillus pumilus*, *Bacillus acidocaldarius*, *Bacillus stearothermophilus*, *Bacillus sphaericus*, *Pseudomonas spp.*, *Actinomyces sp* and *Saccharomyces spp.* When NWRI medium was used as an isolation medium, many gram-negative bacteria were isolated from the samples. This medium is a low nutrient medium, which

supports the growth of heterotrophic bacteria. When nutrient rich medium such as nutrient agar or plate count agar was employed, gram-positive species mainly *Bacillus spp.* were isolated as predominant organisms.

The quality of the wastewater generated from three mills in terms of BOD₅ and COD values were ranged from 8345-19,201 mg/L and 22,504-51,101 mg/L respectively.

The DC wastewater is acidic and it had high electrical conductivity (0.63-3.22 mS). The turbidity, total suspended solids and oil & grease content of the wastewater ranged from 723 - 2344 (NTU), 0.75 -8.3 (g/l) and 6.0 - 35.0 (g/l) respectively.

Proposed standards (maximum allowable concentrations) for the discharge of DC mill effluent in to inland surface waters are 6.5-8.0 in terms of pH, 150 mg/l in terms of BOD₅, 850 mg/l in terms of COD, 50 mg/l in terms of oil level, 80 mg/l in terms of suspended solids. (CEA 1992)

The wastewaters from DC mills recorded very high pH, BOD, COD, total suspended solids and oil and grease levels more than maximum allowable concentrations specified by Central Environmental Authority (CEA) in 1992.