Environmental applications of *Lactobacillus* for protein recovery and biodegradation of recalcitrant chemical compounds

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Abstract

In the past few decades concern about environmental issues has increased considerably and the implementation of water management has shifted towards the incorporation of new technology for the protection of ecosystems and sustainable development. Treatment of contaminated wastewater using biological processes has been widely applied. At this point, a combination of conventional knowledge and advances in technology has generated many new biological processes for wastewater treatment.

In this chapter, a biological treatment for dairy wastewater using lactic acid bacteria (LAB), *Lactobacillus* in particular, causing solid-liquid separation via biocoagulation and flocculation was introduced. A method of applying fermented lactic acid to settle protein in dairy effluent prior to the secondary treatment was demonstrated and a significant lowering in the organic load of these effluents was achieved. It was found that *Lactobacilli* are considerably more tolerant to low cytoplasmic pH than other groups of lactic acid bacteria. Sustained lactic fermentation was achieved by means of an ingenious fill-react-drain-idle sequence. This is a highly efficient new semi-continuous system, with a micro-aerobic sequencing batch reactor (micro-aerobic SBR), lactic fermentation was achieved when *Lactobacillus* was used as a biocatalyst for dairy wastewater protein recovery and biodegradation of chemically recalcitrant compounds. This is alternative to other more costly chemical and biological treatments currently in use. Additionally, protein recovered from this process can be used as a probiotic feed replacing feed antibiotics and promoting health worldwide.

This chapter gives the understanding of lactic acid bacteria in environmental applications by providing data on its potential for biodegrading recalcitrant compounds and toxic substances, such as azo dyes, by *Lactobacillus*.

Keywords: lactic acid, semi-continuous system, micro-aerobic sequencing batch reactor (micro- aerobic SBR), Lactobacillus casei, pre-treatment, decolorization