



“Gheorghe Asachi” Technical University of Iasi, Romania



OPTIMIZATION OF THERMOPHILIC ANAEROBIC DIGESTION OF WINERY BIO-WASTE BY MICRO-NUTRIENTS AUGMENTATION

Cinzia Da Ros*, Cristina Cavinato, Paolo Pavan

*University Ca'Foscari of Venice, Department of Environmental Sciences, Informatics and Statistics,
Calle Larga Santa Marta, 30123 Venice, Italy*

Abstract

Thermophilic anaerobic digestion is a suitable technology to treat agricultural waste because of its higher biogas production, hygienisation effect and solids removal efficiency. Although these benefits, poor effluent quality and instability are encountered in some cases. The anaerobic co-digestion of winery waste and waste activated sludge at 55°C, operating at 23 days HRT and with an organic loading rate of 3.2 kg COD/m³d, was characterized by accumulation of volatile fatty acids, pH fall and reduction of biogas production, while mesophilic process was steady at long term. The study evaluated the effect of trace elements (iron, cobalt and nickel) augmentation in the thermophilic reactor at different concentration of micro-nutrients. The addition improved the process stability: pH became constant and average volatile fatty acids concentration was below 1,000 mg COD/L. The biogas production increased from 0.38 to 0.45 m³/kg COD, corresponding to 90% of COD removal, while mesophilic reactor removed the 78% of total COD. Digestate had interesting characteristics as fertilizer in fact the higher solids removal (28%) allowed to concentrate the phosphorus in the particulate fraction and nitrogen was transformed into more available form for plants growth.

Key words: mesophilic anaerobic digestion, micro-nutrients, minimum requirement, thermophilic anaerobic digestion, winery waste

Received: December, 2014; Revised final: June, 2015; Accepted: June, 2015

* Author to whom all correspondence should be addressed: e-mail: cinzia.daros@unive.it; Phone: +390422321037; Fax: +39042236498