ASSESSING THE ENVIRONMENTAL BENEFITS OF ADDED-VALUE PRODUCTS GENERATED THROUGH HYDROLYSIS OF MUNICIPAL BIOWASTE FOR USE IN AGRICULTURAL AND BIOCHEMICAL APPLICATIONS

M. Christodoulou[1], E. Montoneri[2], A. Chrysargyris[3], I. Vyrides[1], M. Koutinas[1,*], N. Tzortzakis[3,*]

[1]Department of Chemical Engineering, Cyprus University of Technology, Limassol, Cyprus

[2]Universita di Torino, DISAFA, Torino, Italy

[3]Department of Agricultural Sciences, Biotechnology & Food Science, Cyprus University of Technology, Limassol, Cyprus

*(*michail.koutinas@cut.ac.cy, nikolaos.tzortzakis@cut.ac.cy)*

ABSTRACT

Municipal Biowaste (MBW) serves as a renewable source to produce a range of bio-based products (BPs) with applications in textile dyeing, detergents manufacturing and hydrocarbons contaminated soil washing. These products have shown promising application as chemical auxiliaries in the chemical and agricultural industries [1,2]. The present study was carried out within the LIFE EBP project funded under the LIFE program of EU. The BPs employed incorporate the mixture of bioorganic molecules produced via chemical hydrolysis of MBW, aiming to evaluate at pilot-scale replication of the BPs production process, assessment of BPs quality and cost and validation of BPs performance as fertilizers, as well as to confirm BPs compliance with EU regulations for agricultural and environmental policies. During the ongoing evaluation of this technology across 4 EU countries, agricultural trials conducted in Cyprus specifically involve the cultivation of tomatoes with the incorporation of BPs and/or commercial or organic fertilizers. Trials included basic soil physiochemical analysis, plant growth, crop production, fruit quality and leaching. BP application stimulated phenolics and antioxidant capacity in leaves whereas these effects were mirrored in fruits when BP combined with commercial fertilizers. BP decreased nitrogen and potassium but increased phosphorus accumulation in leaves. Moreover, BPs have been applied as additive to reduce the ammonia content in anaerobic digestion of MBW. Based on the source of MBW, the inoculum applied and BPs content during fermentation, a reduction of up to 68% in ammonium concentration was observed in the digestate compared to control experiments where BPs were not added. According to the results obtained, the fermentation of MBW coupled to BPs addition is capable of significantly reducing the ammonia content of the digestate. Moreover, no evidence occurred for potential presence of a biochemical reaction that involved changes in the abundance of bacteria correlated to changes in the content of organic and inorganic N species due to BPs addition. The replicability of BPs derived from MBW collected in various countries has been assessed in the different industrial environments existing in each area.

KEYWORDS: Agriculture, Municipal biowaste, Anaerobic digestion, Bioproducts, Hydrolysis

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