

Mechanical pretreatment of source-collected municipal biowaste prior to energy recovery by anaerobic digestion

Mariana Moreira de Oliveira^{a,b}, Paul Moretti^a, Carina Malinowsky^c, Rémy Bayard^a, Pierre Buffière^a, Armando Borges de Castilhos Júnior^c, Joacio de Araujo Morais Júnior^b, Gilson Barbosa Athayde Júnior^b, Rémy Gourdon^a.

^a University Lyon, INSA Lyon, DEEP, EA7429, 69621 Villeurbanne, France

^b Federal University of Paraíba, Department of Civil and Environmental Engineering, João Pessoa, CEP 58051-900, Paraíba State, Brazil

^c Federal University of Santa Catarina, Department of Sanitary and Environmental Engineering, Florianópolis, CEP 88040-970, Santa Catarina State, Brazil

Abstract

Pretreatments are usually necessary to prepare biowaste for anaerobic digestion. In this study, two wet mechanical pretreatments, namely air-compressed press (PT#1) and worm screw press (PT#2), were investigated on urban household biowaste (HBW). Two Liquid to Solid ratios were tested in each pretreatment. Anaerobic digestion of pretreated biowaste was studied by measuring their biomethane potentials (BMP) and by controlled experiments in a Continuously Stirred-Tank Reactor (CSTR) with a feed load of 3.5 gVS.L⁻¹.d⁻¹. It was observed that increasing Liquid/Solid ratio in the pretreatments allowed to increase the proportion of biodegradable organic matter extracted from the biowaste, up to 949 gCOD.kg⁻¹TS from HBW. The BMPs of pretreated waste were very high (up 525 LCH₄.kg⁻¹VS) and COD (949 gCOD.kg⁻¹TS) from HBW. The anaerobic digestion process in CSTR was able to convert a high fraction of COD load (81%) and a high methane production up to 345 LCH₄.gVS⁻¹.

Keywords: pretreatment, press, anaerobic digestion, biowaste, biomethane potential.