Examination of segregated biowaste dehydration method to obtain an alternative biomass material for lignocellulosic ethanol production


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Abstract

The results of the demonstration of a state of the art household bio-waste management scheme established in two Greek Municipalities (Papagos-Cholargos and Aspropyrgos) for the production of lignocellulosic ethanol using dehydrated household bio-waste as a substrate are presented within this research. Bio-waste drying at decentralized level for the production of second generation of ethanol has never been tested in the past. The use of this state of the art waste management scheme containing innovative aspects regarding the implementation procedure proved that the household bio-waste reduction may reach 80.32% while the average volume reduction was measured equal to 80.23%. The basic chemical properties related to lignocellulosic ethanol presented have proved to differ substantially between seasons thus special attention must be given to the process used for ethanol production mainly regarding the enzyme quantity used. At optimal pretreatment conditions (100 °C, 60 min), glucose yields of 54.69 and 58.39 % (of the theoretical based on potential glucose content in the HFW) were achieved at 30 and 50 % w/v substrate concentration, respectively. The total mass of household dehydrated bio-waste that may be converted to ethanol using the SSF process has been
calculated equal to 40% thus becoming one of the most promising bioconversion methods for the transformation of household bio-waste into second generation of ethanol.

**Keywords:** Ethanol, biofuels, bio-waste, waste management, waste treatment,