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Mechanical pretreatment at harvesting increases the bioenergy output from marginal land grasses - DTU Orbit (09/11/2017)

Mechanical pretreatment at harvesting increases the bioenergy output from marginal land grasses

Meadow grass has recently gained increased attention as a substrate for full-scale biogas reactors. However, to increase its biodegradability, pretreatment is needed. In the present work, different harvesting machines were compared in order to assess their effect on biogas production. Specifically, a Disc-mower, an Excoriator and a Chopper were used to define the most appropriate machinery in order to improve the energy output per hectare for full-scale biogas plants. Among the harvesters, Excoriator, a novel simultaneous harvest and mechanical treatment, was found to significantly increase the methane yield of meadow grass by 20% compared to a classical Disc-mower. The positive effect was also validated by three kinetic model equations. The modified Gompertz model was the most capable of determining the kinetics of anaerobic digestion process, pointing out also the superiority of Excoriator. The usage of the novel harvester was associated with increased energy output, either for electrical/thermal energy generation or for transport fuel production, compared to the alternative machineries. Moreover, it was shown that the co-digestion of harvested biomass with different types of manure can enhance the bioenergy output of a full-scale biogas plant in a range of 12%-23%. (C) 2017 Elsevier Ltd. All rights reserved.

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