

Biogas Production from Lake Bottom Biomass from Forest Management Areas

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Abstract : In areas with forest management, agricultural, and industrial activity, sediments and biomass are accumulated in lakes through drainage system, which might be a cause for biodiversity loss and health problems. One possible solution can be utilization of lake bottom biomass and sediments for biogas production. The main objective of this study was to investigate the potentials of lake bottom materials for production of biogas by anaerobic digestion and to study the effect of pretreatment methods for feed materials on biogas yield. In order to study the potentials of biogas production lake bottom materials were collected from two sites, Likokanta and Kutunjärvi lake. Lake bottom materials were mixed with straw-horse manure to produce biogas in a laboratory scale reactor. The results indicated that highest yields of biogas values were observed when feeds were composed of 50% lake bottom materials with 50% straw horse manure mixture-while with above 50% lake bottom materials in the feed biogas production decreased. CH₄ content from Likokanta lake materials with straw-horse manure and Kutunjärvi lake materials with straw-horse manure were similar values when feed consisted of 50% lake bottom materials with 50% straw horse manure mixtures. However, feeds with lake bottom materials above 50%, the CH₄ concentration started to decrease, impairing gas process. Pretreatment applied on Kutunjärvi lake materials showed a slight negative effect on the biogas production and lowest CH₄ concentration throughout the experiment. The average CH₄ production (ml g⁻¹ VS) from pretreated Kutunjärvi lake materials with straw horse manure (208.9 ml g⁻¹ VS) and untreated Kutunjärvi lake materials with straw horse manure (182.2 ml g⁻¹ VS) were markedly higher than from Likokanta lake materials with straw horse manure (157.8 ml g⁻¹ VS). According to the experimental results, utilization of 100% lake bottom materials for biogas production is likely to be impaired negatively. In the future, further analyses to improve the biogas yields, assessment of costs and benefits is needed before utilizing lake bottom materials for the production of biogas.

Keywords : anaerobic digestion, biogas, lake bottom materials, sediments, pretreatment

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