Biogas Production from Pistachio (Pistacia vera L.) Processing Waste

Authors : İ. Çelik, Goksel Demirer

Abstract : Turkey is the third largest producer of pistachio (Pistacia vera L.) after Iran and United States. Harvested pistachio nuts are covered with organic hull which is removed by de-hulling process. Most of the pistachio by-products which are produced during de-hulling process are considered as agricultural waste and often mixed with soil, to a lesser extent are used as feedstuff by local livestock farmers and a small portion is used as herbal medicine. Due to its high organic and phenolic content as well as high solids concentration, pistachio processing wastes create significant waste management problems unless they are properly managed. However, there is not a well-established waste management method compensating the waste generated during the processing of pistachios. This study investigated the anaerobic treatability and biogas generation potential of pistachio hull waste. The effect of pre-treatment on biogas generation potential was investigated. For this purpose, Biochemical Methane Potential (BMP) Assays were conducted for two Chemical Oxygen Demand (COD) concentrations of 22 and 33 g tCOD l-1 at the absence and presence of chemical and thermal pre-treatment methods. The results revealed anaerobic digestion of the pistachio de-hulling wastes and subsequent biogas production as a renewable energy source are possible. The observed percent COD removal and methane yield values of the pre-treated pistachio de-hulling waste samples were significantly higher than the raw pistachio de-hulling waste. The highest methane yield was observed as 213.4 ml CH4/g COD.
Keywords : pistachio de-hulling waste, biogas, renewable energy, pre-treatment

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