



## **COLD PRESSING AND WATER-STEAM DISTILLATION PRETREATMENTS OF CITRUS PEEL FOR BIOGAS PRODUCTION**

### **ABSTRACT**

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The presence of citrus peel essential oil (CPEO) was suggested to inhibit the anaerobic digestion of citrus peel. In order to achieve successful biogas production, this essential oil should be first separated prior to the process. The effect of cold pressing and water-steam distillation, which could recover CPEO, was studied as the pretreatments of citrus peel in this work.

*Citrus nobilis* var. *microcarpa* peel was used as the raw material. Cold pressing was carried out to chopped citrus peel at 500 kg/cm<sup>2</sup> of hydraulic pressure. Citrus peel was first dried using cabinet dryer at ambient temperature for water-steam distillation. Thereafter, the distillation was conducted to dry citrus peel with variation of time for 3-6 hours. The anaerobic digestion of untreated and pretreated citrus peels was carried out for 52 days at 35°C.

Cold pressing and water-steam distillation resulted in significant CPEO removal in the percentage of 71% and 40-63% (w/w), respectively. Even though high amount of CPEO was already reduced, it was only cold pressing that was able to improve the methane production of citrus peel by 53%. For water-steam distillation, the anaerobic digestion of distilled citrus peel resulted in lower methane production, 35-52%, compared to that of untreated citrus peel. Low solid recovery of water-steam distillation, 66-73% (w/w), which might refer to the loss of highly digestible substances, was suggested to be the possible cause for low methane production of distilled citrus peel. On the other side, high solid recovery of 92% (w/w) was obtained for cold pressing. In this study, cold pressing was considered to be the potential pretreatment of citrus peel for biogas production.

Keywords: citrus peel, anaerobic digestion, cold pressing, water-steam distillation