

Thesis Title	Biogas production from rubber leaves by co-digestion with pig manure for household-scale
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ABSTRACT

In the present, increasing in energy demand and the issues about rapid depletion non-renewable energy resources as well as their environmental shortcomings led researchers to investigate alternative energy sources during the last two decades. Biogas technology has been known for a long time, but in recent years the interesting in it has been significantly increased, especially due to the higher cost of living and low cost fulfill of biomass. This research interested in increasing biogas production potential from co-digestion between pig manure and rubber leaves was evaluated in laboratory study by batch tests under room temperature at different proportions of pig manure and rubber leaves, size of rubber leaves in feedstock and feedstock proportions of pig manure and rubber leaves were 8-20% of Total Solid (TS). The research findings revealed that the optimum total solid for biogas production is 12%. The optimum fraction of pig manure and rubber leaves for biogas production is 50:50 and the optimum size of rubber leaves for biogas production is small particle size. In the subsequent experiment, laboratory scale co-digester were studied by semi-continuously testing under room temperature at different proportions of feed of pig manure and rubber leaves, organic loading rate (amount of feed), proportions of initial feedstock of pig manure and rubber leaves, total solid of feed and control total solid of feedstock at 12%. The result was found that the experimental set which provided the highest biogas production with organic loading rate of $2.56 \text{ kg COD/m}^3/\text{D}$, hydraulic retention time of 20 days, proportions of feed of pig manure and rubber leaves of 75:25, proportions of initial feedstock of pig manure and rubber leaves of 50:50, total solid of feed of 12%, methane yield $1.89 \text{ L/g TS}_{\text{removed}}$, total solid removal 45.50% and COD removal 26.36%. The result of the experiment of co-digestion between pig manure and rubber leaves in 200 liters container in pilot household scale by semi-continuous tests to find out the efficiency of

biogas production. The results showed that the amount of biogas was 10,043 liters, (112 L/Day), methane yield 13.53 L/g TS_{removed}, total solid removal 51% and COD removal 44.57%. Biogas production of pilot household scale is consistent with biogas production. Results from this study suggest that pig manure and rubber leaves are potential substrates for anaerobic co-digestion for the production of biogas and could provide additional benefits to agriculturist n southern Thailand.