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# Effects of Air Injection and Iron Oxide Pellet Addition on Hydrogen Sulfide Removal and Biogas Production

Lytour LOR\*, Machito MIHARA, Bunthan NGO, Lyhour HIN, Dyna THENG, Sokhom MICH, Chan Makara MEAN, Chhiengputheavy CHHORTH, and Bart FREDERIKS

Email: [lor\\_lytour@yahoo.com](mailto:lor_lytour@yahoo.com)

## INTRODUCTION

Hydrogen Sulfide ( $H_2S$ ) is an unwanted gas mixed in biogas because it is toxic to humans at low concentrations and corrosive to engines. High concentrations of  $H_2S$  can corrode engines or metal parts, and lead to faster degradation of engine lubricant oil. Various methods of  $H_2S$  removal are available with their own advantages and disadvantages.

This study aimed to compare the 2 desulfurization methods, air injection and iron oxide pellets, on  $H_2S$  removal and quantity and quality of biogas producing from pig manure and food waste.

## METHOD

The experiment was carried out with two floating drum digesters (1 m<sup>3</sup> each) constructed at Royal University of Agriculture, Phnom Penh, from January to August 2020. Three levels of air injection at 2%, 4%, and 6% of  $O_2$  regarding the daily biogas production and iron oxide pellets at 1 kg, 2 kg, and 4 kg per m<sup>3</sup> of biogas were applied to remove  $H_2S$  in biogas from different raw materials of pig manure and food waste. Air was daily injected into the floating drum after biogas was emptied. Iron oxide pellets were stored in a filter container through which biogas was passed and  $H_2S$  was removed. The amount of daily biogas production was quantified by gas flow meter, and biogas quality was measured using a GEM5000 gas analyzer.

## RESULTS

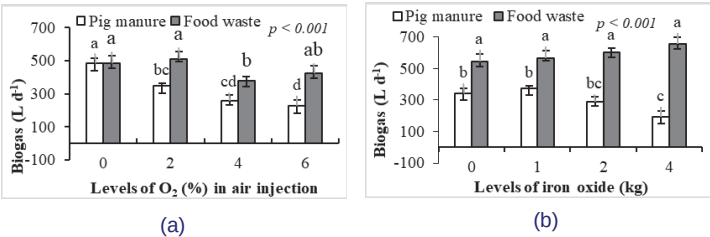


Figure 2 Comparison of biogas production with air injection (a) and with iron oxide pellet (b)

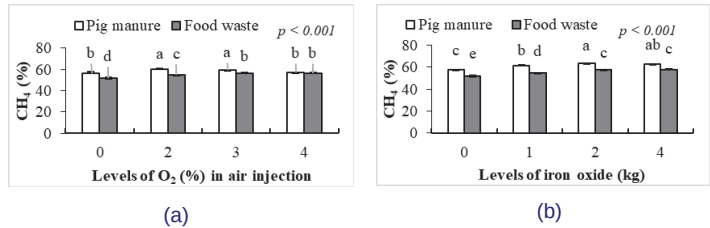


Figure 3 Comparison of  $CH_4$  content with air injection (a) and with iron oxide pellet (b)

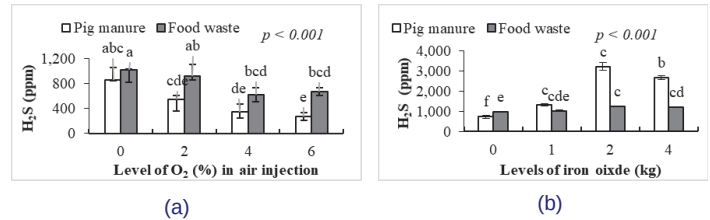


Figure 4 Comparison of  $H_2S$  reduction by air injection (a) and by iron oxide pellets (b)

## CONCLUSION

It was concluded that both desulfurization methods with air injection and iron oxide pellets were effective in  $H_2S$  removal, however the use of air injection tends to be more effective than ferrous oxide.

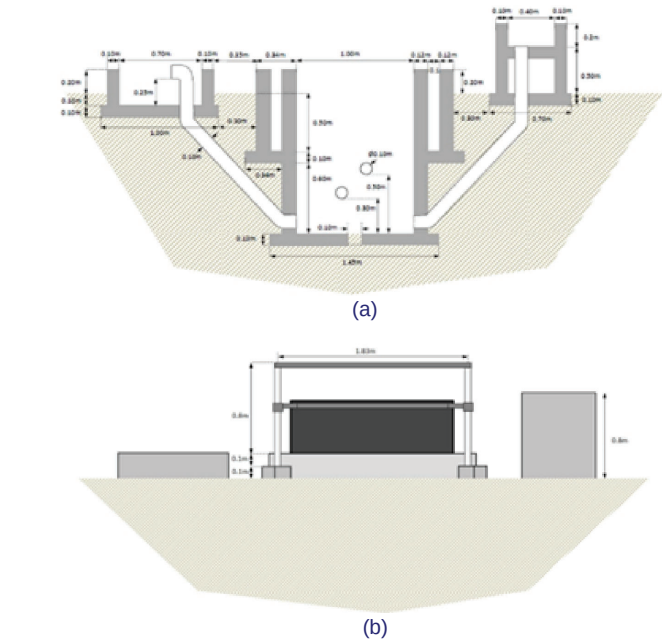


Figure 1 Technical drawing of the floating drum biodigester used in this experiment, cross-section of the digester (a) floating drum in which air injection was injected (b)