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**Effect of biogas from swine wastewater on microalgae growth and evaluation of harvesting methods on cellular composition**

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Phycoremediation is a well-known tertiary treatment process used to remove nutrients from swine wastewaters. The produced microalgae can provide a valuable source of renewable feedstock for biofuels and/ or food production. The objectives of this work were: (1) verify the effects of biogas from the anaerobic degradation of raw swine manure on the growth rate of *Chlorella* sp., (2) characterize cellular composition of microalgae, and (3) determine the effects of centrifugation (EVODOS) and flocculation (tannin) harvesting methods on cellular composition.

Lab scale photobioreactor (PBR) was maintained at room temperature (23°C), continuously stirred under mixotrophic conditions and exposed to red LED (148.5  $\mu\text{mol m}^{-2} \text{s}^{-1}$ ). Biogas was purged in the headspace. A 400L tank was also used to grow microalgae, which was placed in a greenhouse under natural sun light and stirred continuously with vertical rotor paddle. Digestate from field scale UASB was used as nutrient (6% v/v dilution). 30% v/v ( $\approx 10 \text{ g L}^{-1}$  dry weight) of a stock microalgae consortium dominated by *Chlorella vulgaris* was used as inoculum.

Microalgae specific growth rate was 3× higher when exposed to atmospheric biogas. The increase in biomass coincided with the reduction in CO<sub>2</sub> (6.4% uptake) and reached a plateau once CO<sub>2</sub> was no longer available. H<sub>2</sub>S present in the biogas was rapidly removed from the PBR headspace. Methane concentrations remained constant throughout the experimental time frame.

Microalgae were harvested from the tank after 11 days when ammonia and phosphorus were completely removed (> 99.4%). Cells harvested by flocculation showed 50,3% proteins, 41% carbohydrates and 1,3% lipid. Stress-induced mechanical centrifugation increased lipid by 3-fold.

Despite the superior microalgae growth using biogas, unwanted CO<sub>2</sub> and H<sub>2</sub>S are removed which enhances the value of biomethane. The high nutritional composition of the biomass suggests it could be recycled as processed food minimizing our dependence on crop production.

Keywords: Chlorella, biofilter, lipids, phycoremediation