METHANE USE BY ANAEROBIC DIGESTION OF MICROALGAE BIOMASS

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Introduction

Figure 1: Substrate production. Indoor and outdoor crops.

Biogas
- It was studied the feasibility of quantitative and qualitative biogas production from the anaerobic digestion of microalgal biomass using Chlorella sp. and Scenedesmus sp.
- Through the anaerobic degradation, significant amounts of biogas were obtained. This biogas can be used in power generation.

Algae
- It was used fresh and dried microalgal biomass, as well as algae before and post lipid extraction.
- Native algae species isolated in Mendoza, Argentina, and cultures grown indoor and outdoor, without sterility verification and with industrial CO_2 injection.

Glycerol
- It was added as co-substrate, glycerin from biodiesel production, to improve the reaction performance and for providing a destination to a coproduct that, so far, It´s just a waste.

Experimental design
The experiment involved 7treatments performed by triplicate. It was used 60% inoculum and 40% of substrate in each reactor based on volume. The total volume in each reactor was two liter.

Anaerobic Digestion
Biomass was degraded in 4 liter stainless steel reactor in mesophilic conditions at 37 ° C in a thermostatic water bath.

Biogas Production
Gas production was measured indirectly through the registration of the accumulated pressure in the reactors. Gas quality was measured by gaseous chromatography in three stages.

Figure 2: Reactors arrangement in water bath.

Results and discussion.

Table 1: Reactors loading scheme.

	Inocum volume (l)	Algae volume (l)	Glycerin volume (l)	[ST] /reactor (g/l)
S1	1,25	0,75		5,008595853
S2	1,25	0,75		0,326970853
S3	1,25	0,75	1,07681E-05	0,33277304
S4	1,25	0,75	5,38403E-05	0,355981165
C+1	1,25	0	1,07681E-05	0,023039532
C+2	1,25	0	5,38403E-05	0,060182605
C-	1,25	0 (0,75 l H_2O)		0,008595853

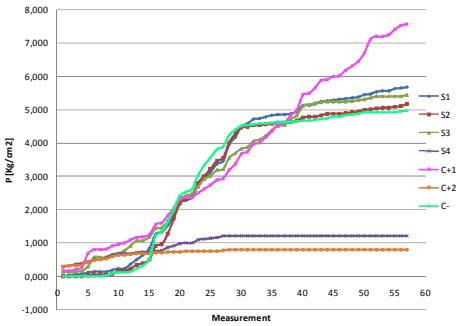

Figure 3:Cumulative pressure per treatment in kg/cm²

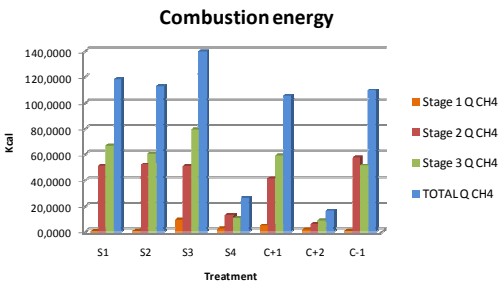

Figure 4: combustion energy in kcal.

Conclusions

The quantitative and qualitative biogas production from anaerobic digestion of microalgal biomass (Chlorella sp. and Scenedesmus sp.) is feasible in Mendoza, Argentina.

The addition of 1% glycerin in treatments brings an improved performance in biogas volume production but does not improve the proportion of methane in the mixture. The treatment with improved performance in combustion energy was fresh microalgal biomass with addition of 1% glycerin, generating 139,54 kilocalories, thereby 209,67 kilocalories per gram of total solid. It is concluded that this would be the optimum mixture for power generation from waste under the conditions studied.

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