This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691911

Technology Description (TD) for

Substrate Pre-Treatment Technologies

Contact Information:

TECHNOLOGY/ EQUIPMENT SUPPLIER	*Name of institution:*	Latvia University of Agriculture Faculty of Engineering, Institute of Energetics		
	Name of contact Person:	Vilis Dubrovskis		
	Street:	5 J. Cakstes Blvd.,		
	Town:	Jelgava	Zip code	LV3001
	Country:	Latvia		
	Phone:	+ 37126410882		
	e-mail:	vilisd@inbox.lv		
	www:	http://www.llu.lv/en/faculty-of-engineering		
	Date (of filling the TD):	08.03.2017		

Technology Description:

NAME OF TECHNOLOGY	finely chopped cellulolitic raw materials using for biogas production
ASSIGNMENT OF TECHNOLOGY	
TECHNICAL READINESS LEVEL **TRL 1** - basic principles observed **TRL 2** - technology concept formulated **TRL 3** - experimental proof of concept **TRL 4** - technology validated in lab **TRL 5** - technology validated in relevant environment (industrially relevant environment in case of key enabling technologies) **TRL 6** - technology demonstrated in relevant environment (industrially relevant environment in case of key enabling technologies) **TRL 7** - system prototype demonstration in an operational environment **TRL 8** - system completed and qualified **TRL 9** - actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)	1 2 3 **4** 5 6 7 8 9
TECHNOLOGY/EQUIPMENT AVAILABILITY	YES
PATENT RIGHTS	NO

METHOD OF MAKING THE TECHNOLOGY AVAILABLE	*Licence selling*	NO
	Licence granting	NO
POSSIBLE END USERS OF TECHNOLOGY	*Please name end users/ contacts that should be invited to project workshops*	Biogas producers, equipment, which can be used for finely chopping, producers

Description of the technology/equipment:

Investigations on laboratory equipment with different raw materials were carried out using one method. At first the equipment was started using inoculum and cow manure, then stable performance of the equipment was reached (beneficial bacteria association was grown for providing a good bioconversion process). Then bacteria were tamed to use co-fermentation products – sludge and whey and finally, the third test material was added in each digester**.** As test materials, raw materials that could be used in a biogas plants were selected. The first stage of the investigation – growing of beneficial bacteria association in each digester lasted up to two months, but the investigation of the addition of the third material – up to one month. This investigation shows the results obtained from facilities after the third material was added. The average sample was taken and the Bioenergy Laboratory of Latvia University of Agriculture determined the composition of the substances using ISO 6496:1999. The samples from each type of raw materials were analyzed for dry matter, organic matter, ash content and chemical composition. The analysis was measured by using standardized methods. Stable working with sludge and whey in the bioreactor was added third raw- straw. Barley straw was used as raw material. The straw was carefully shredded and its size did not exceed 1 cm. Of the sludge's, whey and barley straw co-digestion produced an average of 284 l / kgDOM methane, which is a good result. This is maybe explained too by the fact that the elements of straw composition have a longer decomposition period. Cellulose and hemicelluloses decompose slower and therefore its amount in digestate and dry matter content was increasing. (Fig. 1).

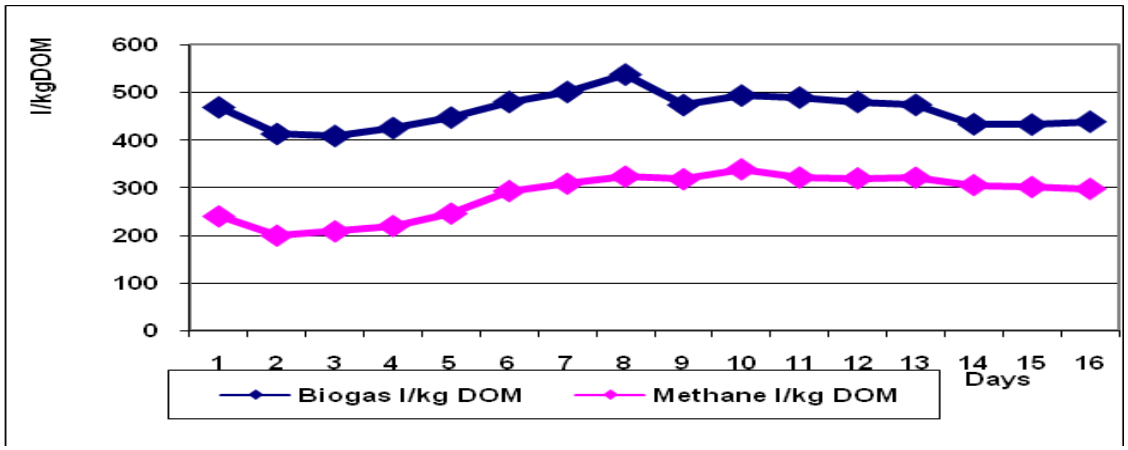

Figure 1: Biogas and methane yields from co-fermentation with barley straw

The trees leaves collected in the Jelgava park were used as raw material. The leaves were carefully shredded and its size did not exceed 1 cm. Results showed in Figure 2.

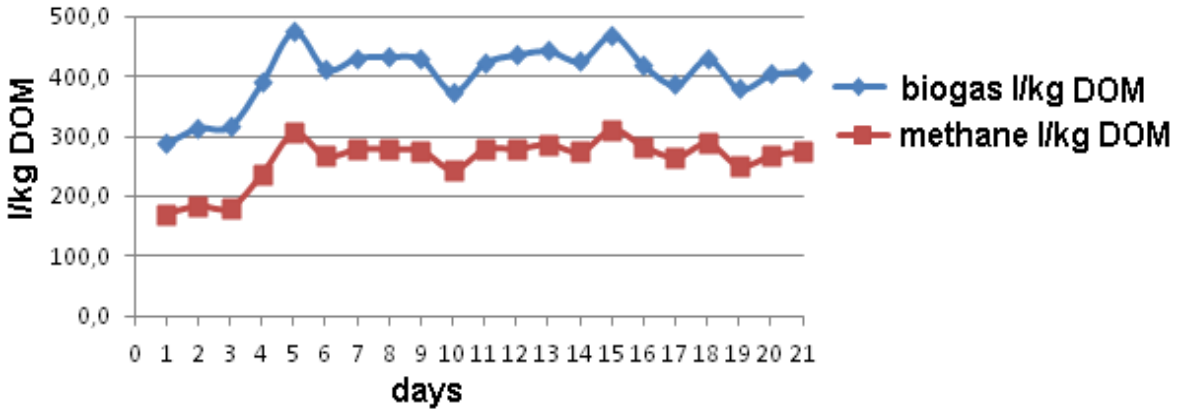

Fig.2 Biogas and methane yields from co-fermentation with leaves of trees

Results of studies convince that co-fermentation of grinded cellulolitic raw materials with more N rich biomass is desirable, because it improve C/N.

Very important is level of chopping. Barley straw with various chopping level was digested together with cow manure as inoculum in batch mode 5 l bioreactors. Results are shown in Fig.3. It can be explained- chopped straw is favourable for bacteria and moisture. Nonchopped straw rise to upper level.

Conclusion: Well ground straw or other similar biomass can produce more biogas. Such biomass are recommended for co-fermentation with N rich raw materials.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691911

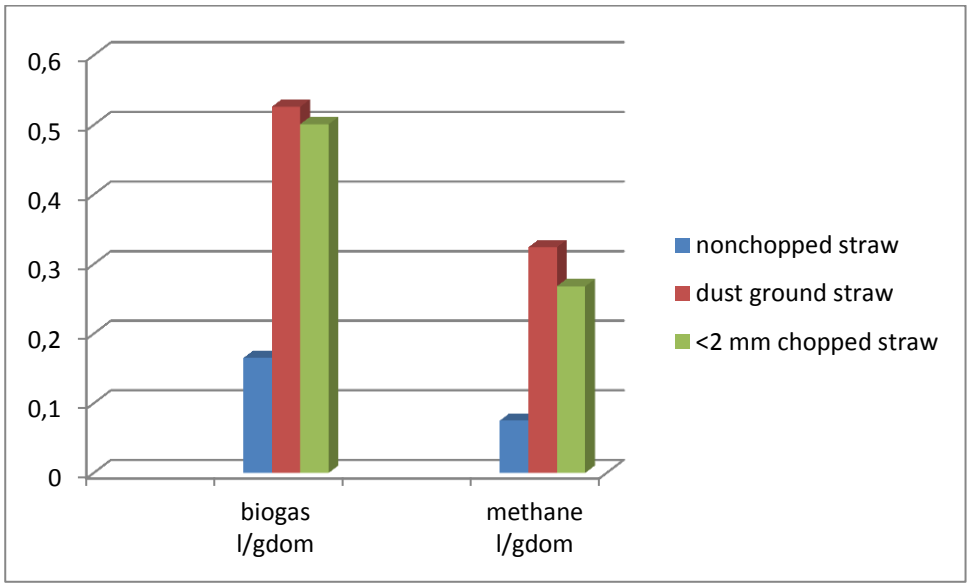

Fig.3 Biogas and methane yields from various chopping level barley straw

Data Usage:

I agree that the above data can be published on the "Biomethane Map" www.biomethane-map.eu and to the further use for other possible scientific purposes.

Signature: