

POPULAR SCIENCE ARTICLE

In an attempt to reduce dependency on fossil fuels and to reduce the impact of greenhouse gas emissions, the European parliament and the council of the European Union has set a directive to increase the use of renewable energy sources to 20% by the year 2020. One such renewable source is the production of biogas from biomass.

At the division of Biotechnology, Lund University, biogas production from sugar beet leaves was studied during 2014.



Sugar beet leaves – Energy for the future? (Photo: Emma Kreuger)

While production of biogas from sugar beet leaves is not a new idea it is partly an untapped resource since there are still ways in which the process might either be optimized or at least better understood.

One problem that often occurs in large-scale stirred biogas reactors is process disturbances such as acidification of the reactor or that foam starts to accumulate on the surface of the liquid, which can have a negative impact on the process, such as for example clogging of pipes. In extreme cases the facility may even have to be shut down in order to manage such issues. Several ways have been used to deal with this problem such as for example anti-foam agents, and commonly the feeding rate to the reactor is kept at low levels in order to prevent the foam from forming in the first place. The main cause of foam formation in reactors is the

Fact box

Biogas – Mixture of methane gas and carbon dioxide produced by microorganisms, which can be used for heat and electricity production

reduction of surface tension in the liquid as a result of metabolic by-products. Earlier studies have found that the presence of soluble, easily digestible compounds such as glucose – which are present in sugar beets - can exacerbate the foam formation. In addition accumulation of acidic by-products may also occur, and thereby lead to a reduction of pH, which has been shown to have a detrimental effect on the metabolic processes of biogas reactors.

One of the purposes of this project has been to see if foam is produced when digesting sugar beet leaves and if the foam production in those reactors can be mitigated by reducing easily digested compounds through removing the beet juice from the leaves. If this is possible, then the feeding rate to the reactors might be increased which could potentially increase the biogas production.

The results from this project have not been conclusive. Process disturbances occurred in all reactors, and the experiment should be run for a longer time period in order to reliably evaluate the process. However, if it worked in practice it could improve the productivity of biogas production from beet leaves, and possibly benefit other similar substrates as well. In the future further reactor experiments examining the biogas production from the beet juice may also be interesting to look at. Fractionation could also have other benefits, such as using the different parts of the beet leaves for manufacturing other products. For example fodder for cattle or compounds for the chemical industry.

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