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# BIOGAS POTENTIALS FROM MIXED SUBSTRATES: EFFECTS OF PRE-TREATMENTS AND CO-DIGESTION

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Anaerobic digestion is a biological process in which microorganism's breakdown degradable material in the absence of oxygen. The end product is biogas, which is combusted to generate electricity and heat, or converted into natural gas and vehicle fuels. Finding new crops to boost biogas production at biogas plants is vital, as manure alone has a low methane yield. The ultimate goal is to find crops that produce maximum methane yield per hectare with low environmental impact and that are economical for farmers. Miscanthus and forb species are two plant materials investigated in this study for its biogas potentials.

Lignocellulosic materials such as agricultural crops and animal manures are preferable to be used as feedstock for anaerobic digestion due to its availability, low cost and renewable factors. Nevertheless, major barrier that limits

degradation of the lignocellulosic materials during biogas production is the structure itself. Without pretreatment, enzymatic attack during hydrolysis is not effective and lead to poor yield of biogas. Pre-treatment plays an important role to increase the accessibility of microorganisms to cellulose during anaerobic digestion and thus increase the biogas potential. Extrusion, alkali, sonication and briquetting pre-treatment are analysed in depth in this research. Different parameters are manipulated to find the optimal settings for the highest biogas yield and lowest costs in terms of energy.

The influence of co-digestion of different fibre materials with animal manures is another focus area in this study. Animal manures provide buffering capacity and a wide range of nutrients while plant material with high carbon content balances the carbon to nitrogen (C/N)



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ratio, thus reducing the risk of ammonia inhibition.

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