

## Process optimisation with the help of additives

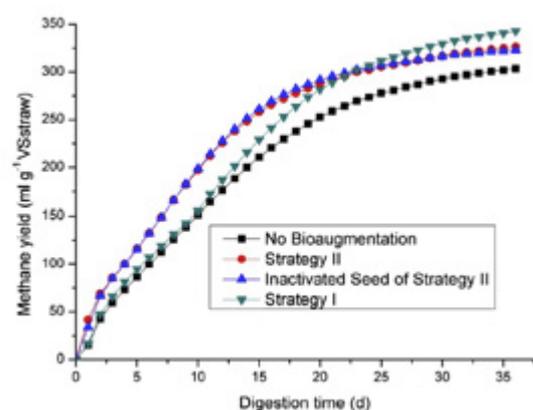
Many biomass sources used to produce biogas are suffering from insufficient amounts of various essential nutrients. These deficiencies mean that the microorganisms in an anaerobic digester are working at suboptimal conditions, which may lead to unstable processes with uncertain long-term performance. Additions of micro-/macronutrients or process stimulating agents such as enzymes and bacteria may help to

improve the biological degradation process and ensure a more productive operation. However, many of such additives (e.g. trace elements) are toxic in too high concentrations and the optimal amounts required are different among processes. With the highly automated batch fermentation platform AMPTS II the user can easily investigate the direct impact of different additives and learn more about how they influence the AD process.

### Example 1

## Evaluation of micro- and macronutrients supplementation

A proper balance of micro- and macronutrients is essential for an efficient and productive anaerobic conversion. The AMPTS II allows the user to investigate with high accuracy and a minimal labour demand the direct effect of such additives (both type and amount) on the methane production.



Specific methane production of wheat straw with and without bioaugmentation with *Clostridium cellulolyticum* (Peng et al., 2014).

## Example 2

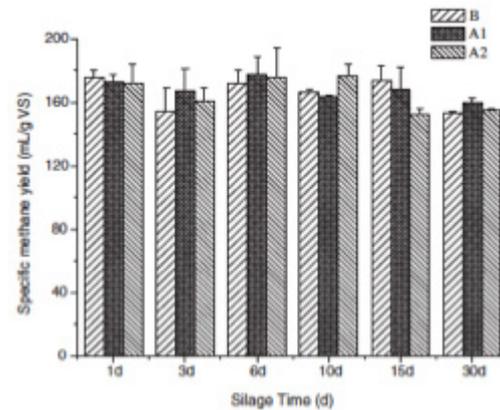
## Decrease toxicity through addition of supplements

Many potential substrates for biogas production may contain toxic compounds (e.g. humic acid, salts in high concentration) which have negative effects on the process efficiency. The AMPTS II can be used to study these effects and investigate how of various supplements (e.g. trehalose, glycine and different salts) can decrease the toxicity of a sample (Zhang et al., 2014; Azman et al., 2015).

## Example 3

## Optimisation by bioaugmentation strategies

Addition of specialised microorganisms might be necessary to improve the biodegradability of certain recalcitrant materials. With the AMPTS II it is possible to quickly analyse how bioaugmentation with various microorganisms directly influence the degradation process (Peng et al., 2014; Sträuber et al., 2015).



Methane potentials of Manyflower silvergrass silage after different silage times with (A1-2) and without (B) microalgae supplementation (Li et al., 2015).

## References

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