

Evaluation of an automatized technical scale anaerobic leachbed reactor system for VFA production with scheduled removal of leachate

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The focus of this research work is on increasing the efficiency of anaerobic digestion plants through coupled energetic and materials use of the biomass. Short chain fatty acids, produced in the acidification phase of anaerobic digestion are to be removed from the process and methane formation must be prevented. Therefore an automatized leachbed reactor system was built to produce VFA from solid biomass (Fig 1), withdraw 1 kg of leachate according to a schedule and replace the withdrawn amount by filtered digestate of an anaerobic digestion plant. The six digesters were filled with 6 kg of grass silage and 13 kg of distilled water. Two different temperatures were tested (37°C, 55°C). Both variations were done in triplicates and the experiment was running already 20 days and will be continued till 35 days. The values for pH, Redox and temperature were measured continuously and stored in a database. The leachate was automatically removed from the reactors and the amount was measured by weighing machines and also saved in a database.

For the first 20 days, a difference in the total volatile fatty acids (VFA) concentration can be observed (Fig). The digesters at 37°C show a constant concentration of 10 g/kg leachate (Fig 2). On the other hand the digesters at 55°C show a much higher gas production (Fig 2). In case of the removed leachate, for the digesters at 37°C, 45 kg were produced for the digesters at 37°C compared to 37 kg (55°C).

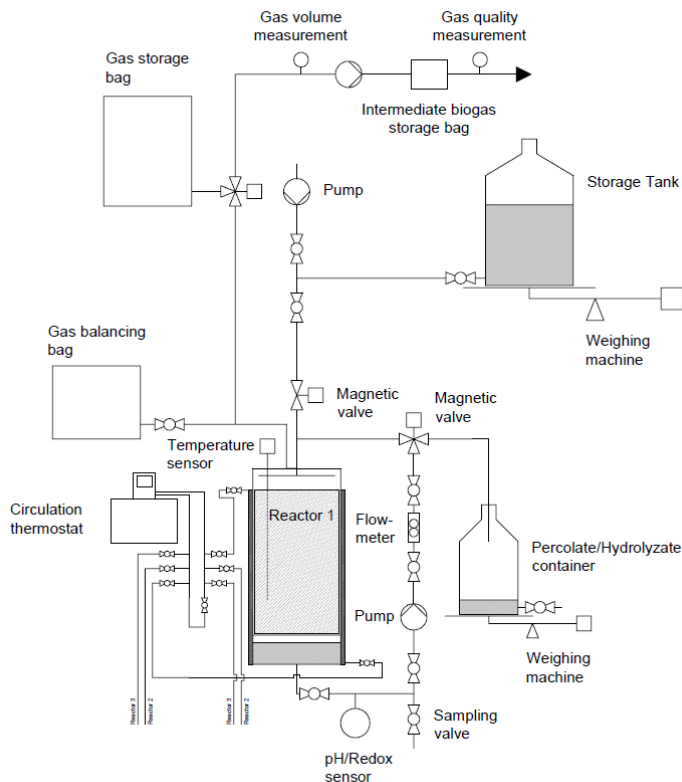


Figure 1 P&I scheme of one leachbed reactor

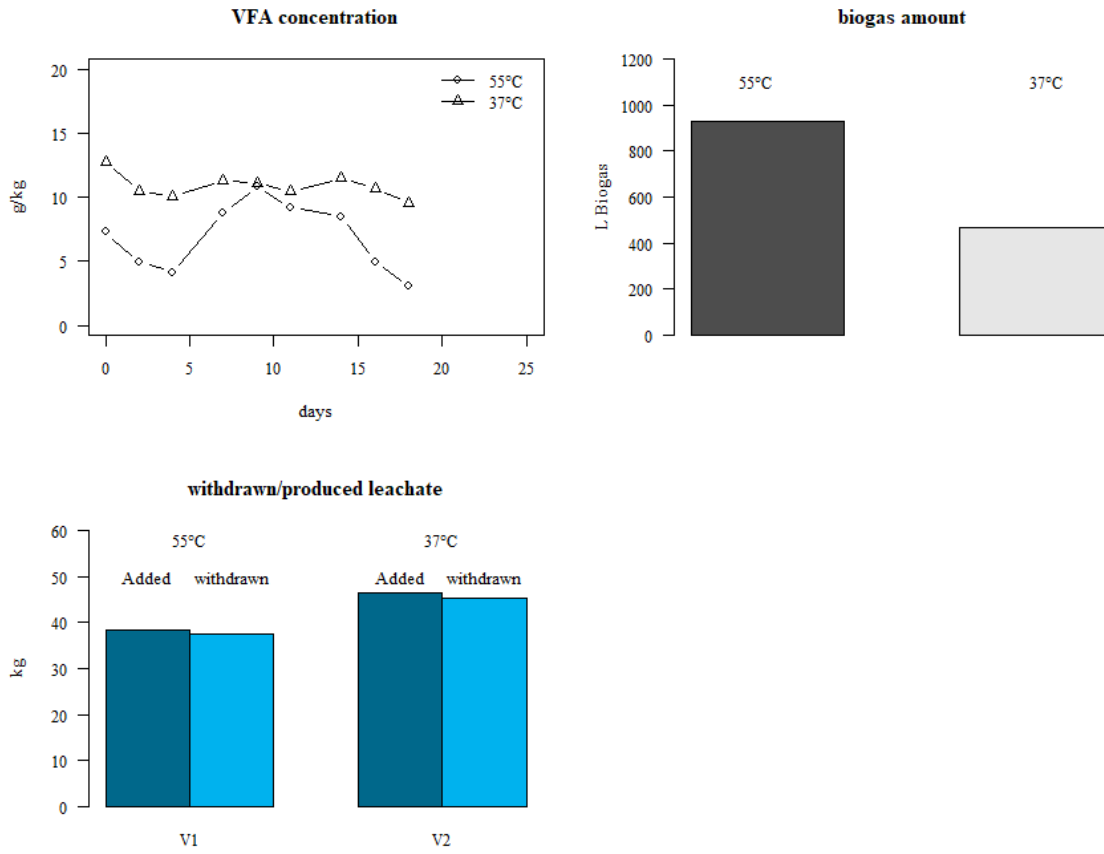


Figure 2 VFA concentration, produced biogas and amount of withdrawn leachate from the reactors