



## How fungi can help to convert Swiss cattle manure to biomethane

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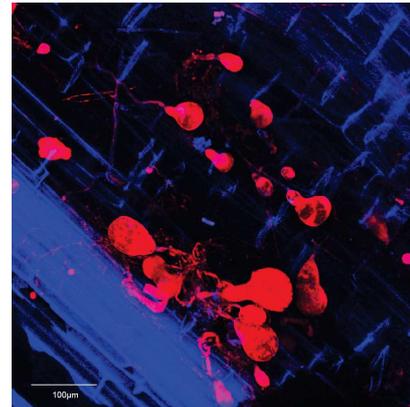
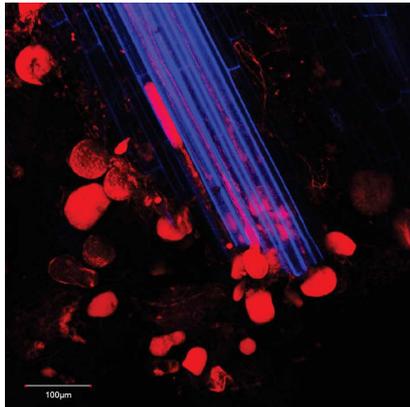


Figure 3. Confocal laser scanning images of a new isolated anaerobic fungi (red) located on a lignocellulose fiber (blue). Fungal hyphae are growing inside the plant cells (hay).

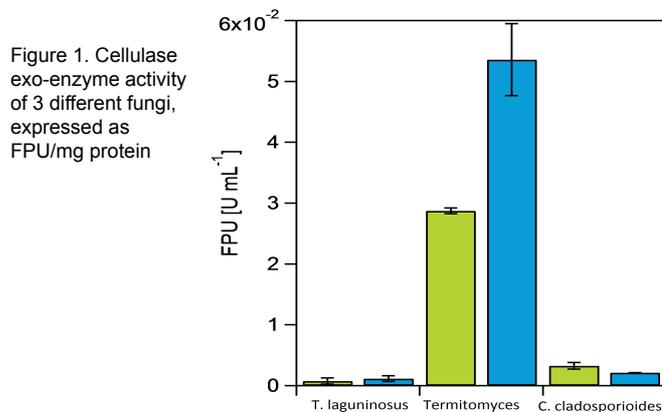
### Introduction

Fungi are known to produce a set of enzymes which are able to digest lignocellulose material such as wood or straw. Also cattle manure which is a major organic resource contain a high amount of lignocellulose. Pure enzymes are expensive and limit the economics of biogas production from lignocellulose. A combined bioprocess should couple the aerobic hydrolytic activity of living fungi with the anaerobic digestion to form methane gas.

We tested the fungi *Termitomyces sp.* and others in order to better hydrolyze the fibers in cattle manure.

### Enzyme activities

Only one of three investigated fungi, *Termitomyces* produced cellulases in high amounts. As shown in figure 1. FPU (filter paper units) is the standard activity unit for cellulase activity. Blue columns; pH was adjusted to 4.8, an optimum pH for cellulases, green columns; in situ pH.



### Biomethane production from fungi pre-digested cow manure solids

The enzymatic activity of aerobic fungi was reflected in the amount and rate of methane production from cow manure solids, Figure 2. Compared to the untreated samples, fungi may increase methane formation up to 12 % after a 1 to 2 days incubation time.

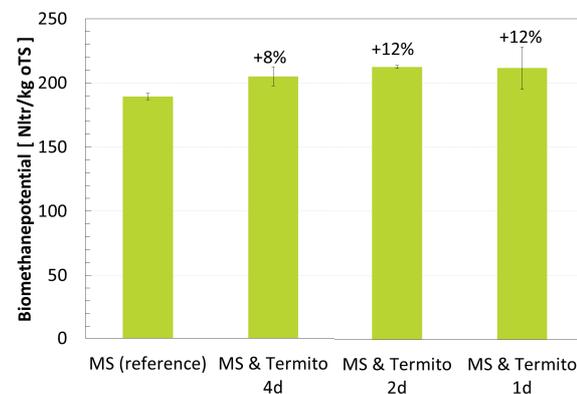


Figure 2. Biomethane potential from cow manure solids after incubation with the fungus *Termitomyces sp.* Pre-incubation times with fungi were 4d, 2d and 1d. MS = manure solids.

### Conclusion

In a first laboratory experiment, we demonstrated that fungi can influence the biomethane production from cattle manure fibers, in both directions. An increase in biogas formation up to 12 %, but also inhibition was observed. In future, new anaerobic fungi will be screened for hydrolytic activities, as shown in figure 3.

