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## Bioaugmentation with anaerobic fungi for biogas production from straw

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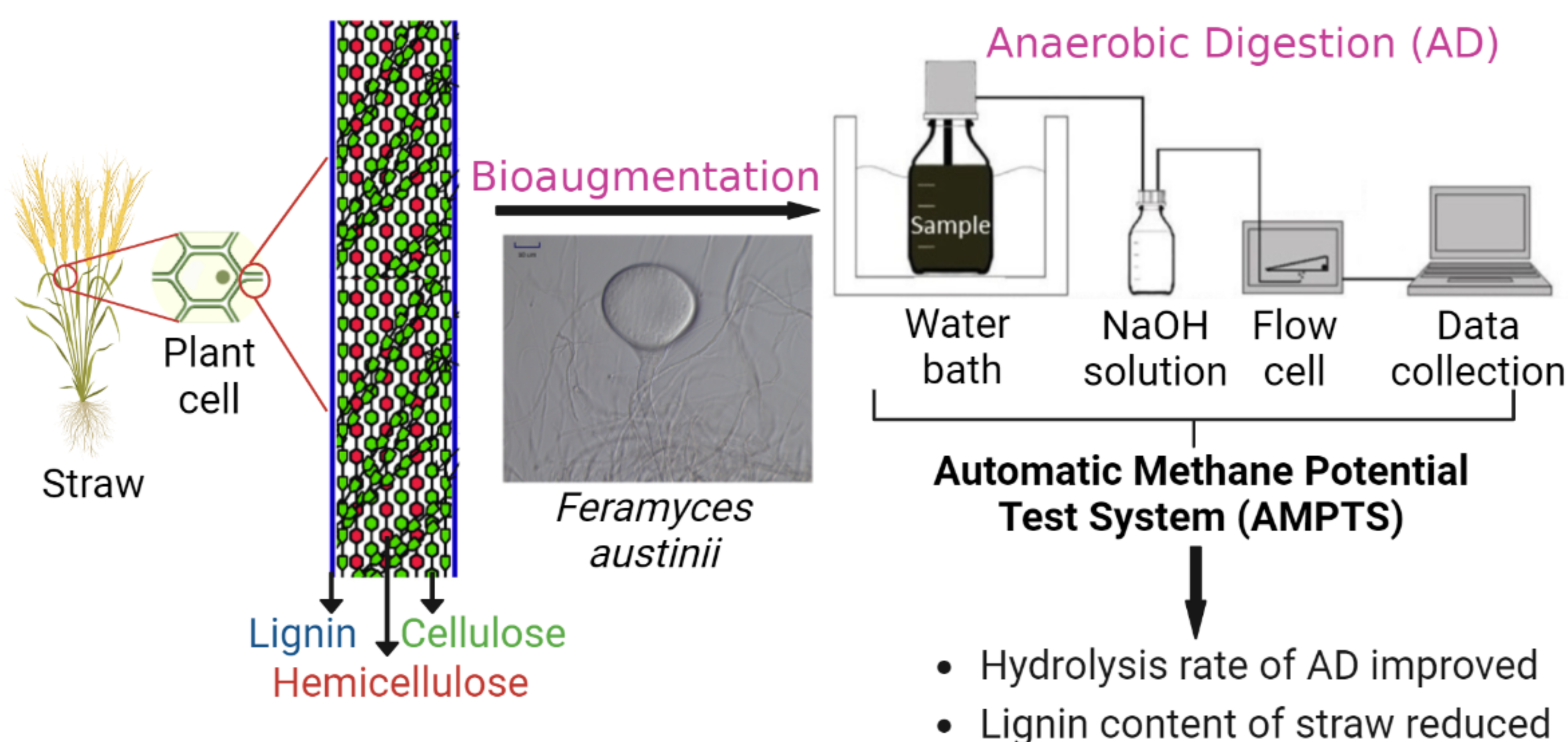
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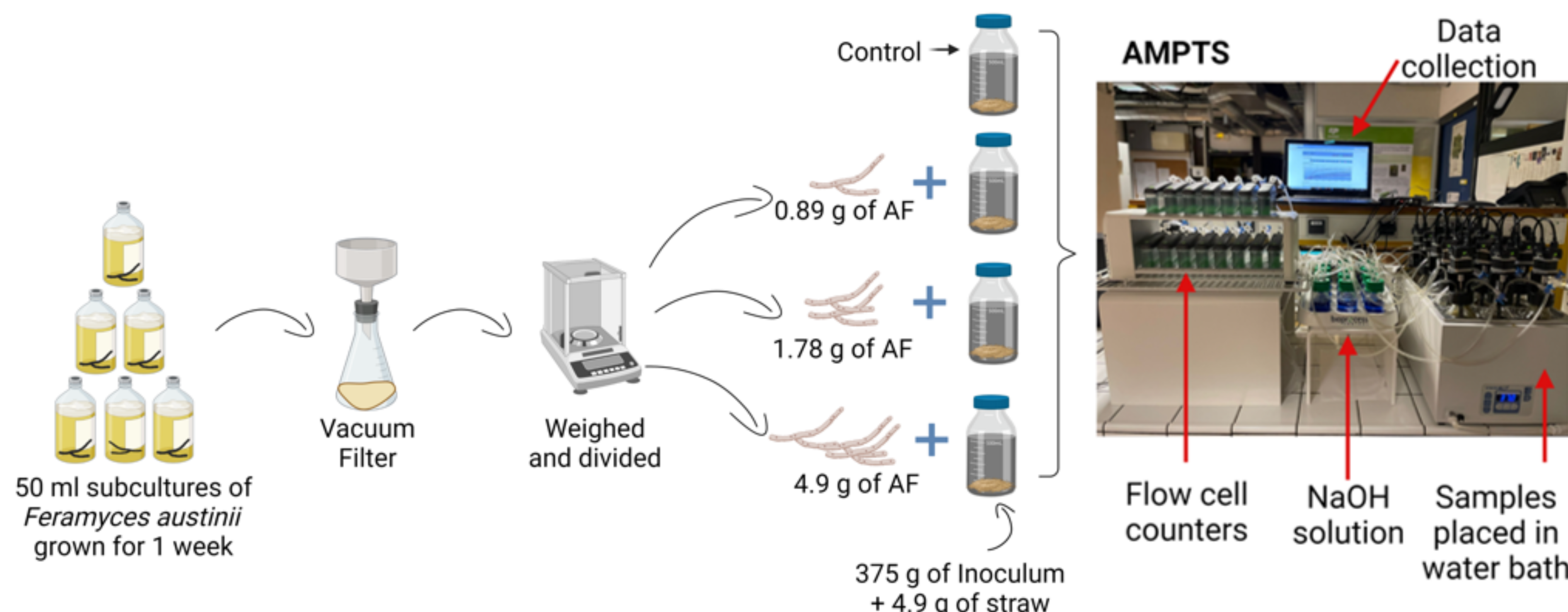
## ABSTRACT



## INTRODUCTION

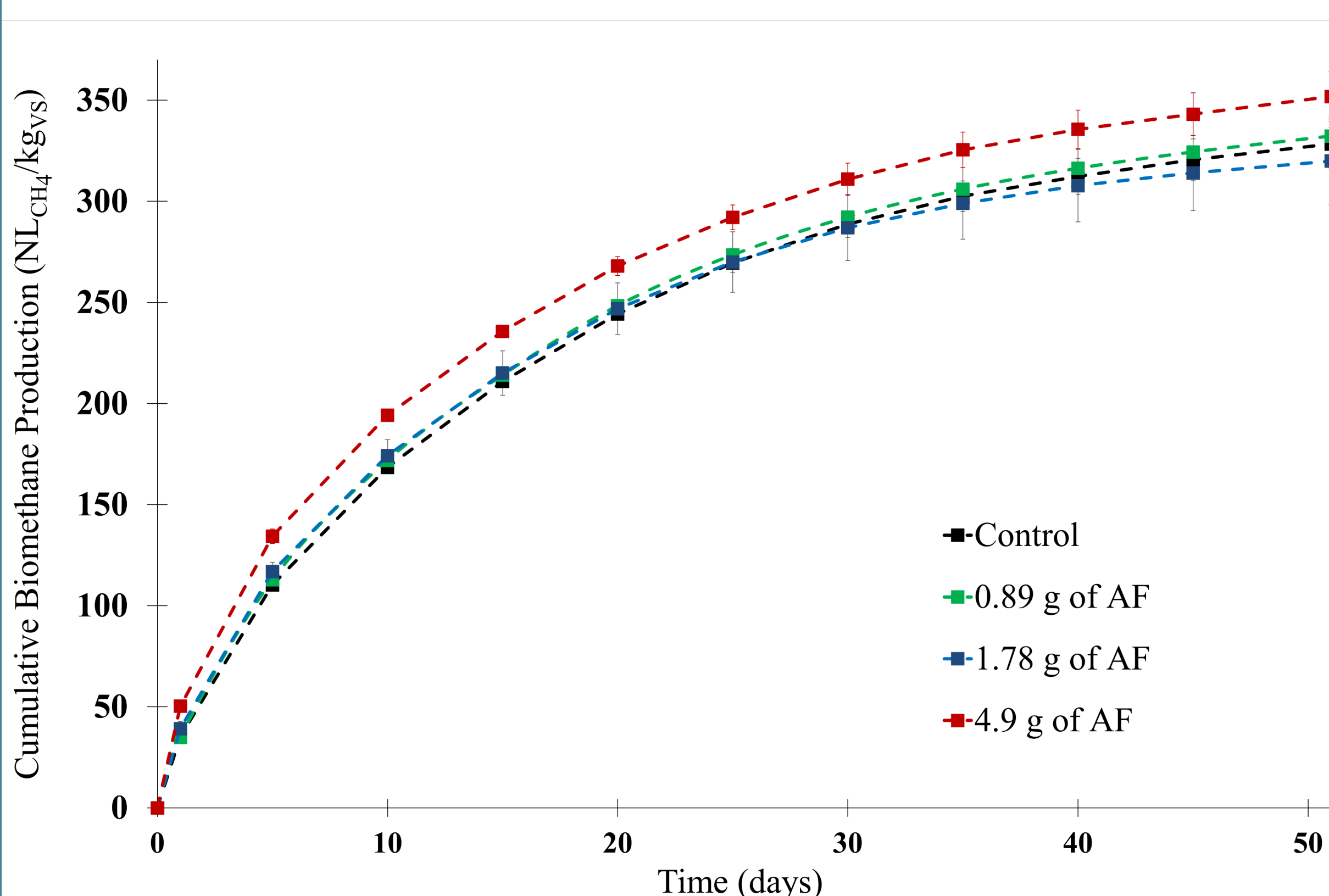
- Lignocelluloses are the largest reservoir of renewable energy on the earth<sup>1</sup>
- Anaerobic fungi (AF) can mechanically and enzymatically attack lignocelluloses<sup>2</sup>
- AF have been shown to increase hydrolysis rates and biogas production<sup>3</sup>
- The present work is a first study using *Feramyces austinii*, a recently isolated AF<sup>4</sup>, for AD enhancement

## METHODOLOGY



## RESULTS

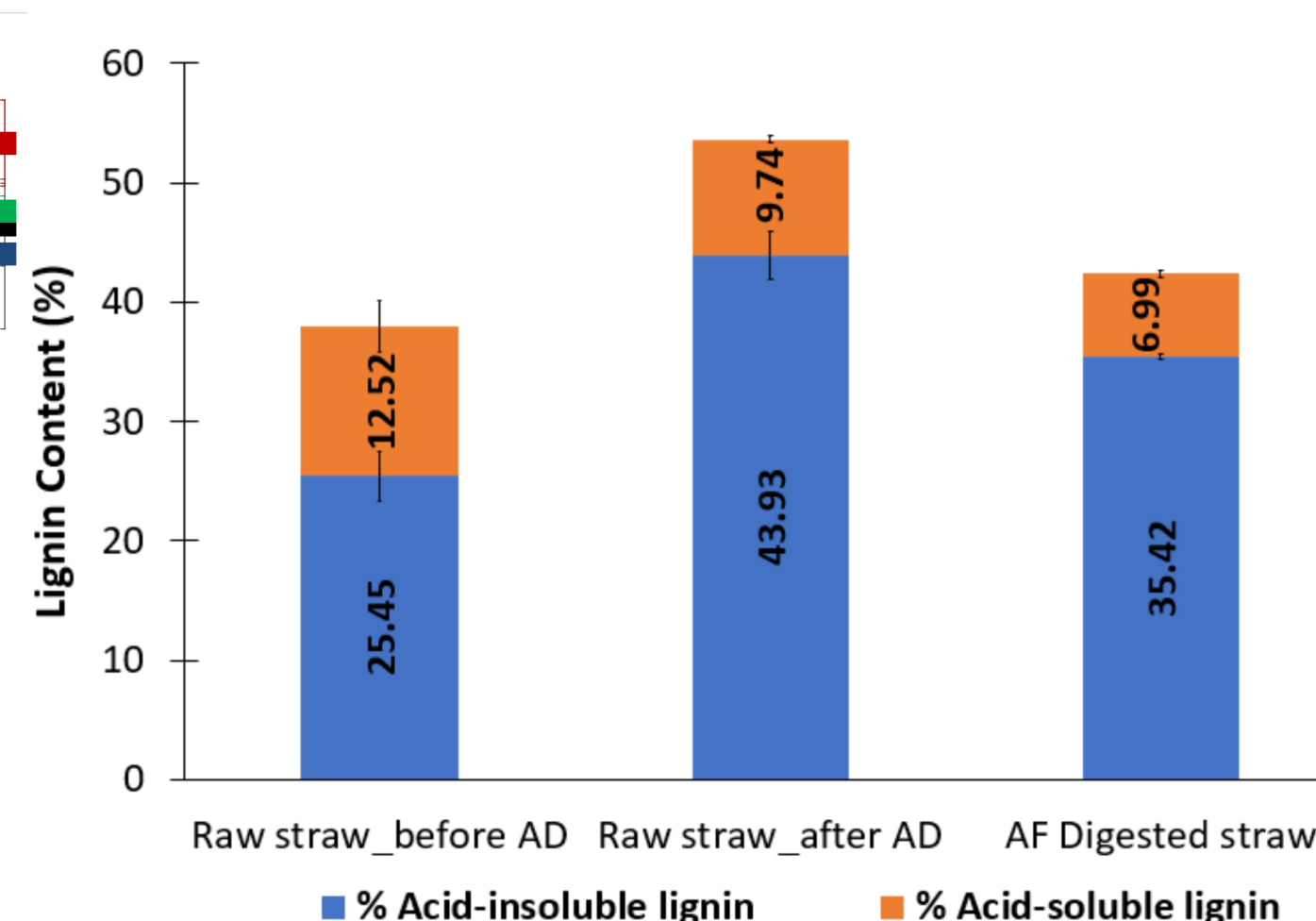
### Biomethane Potential (BMP) Test



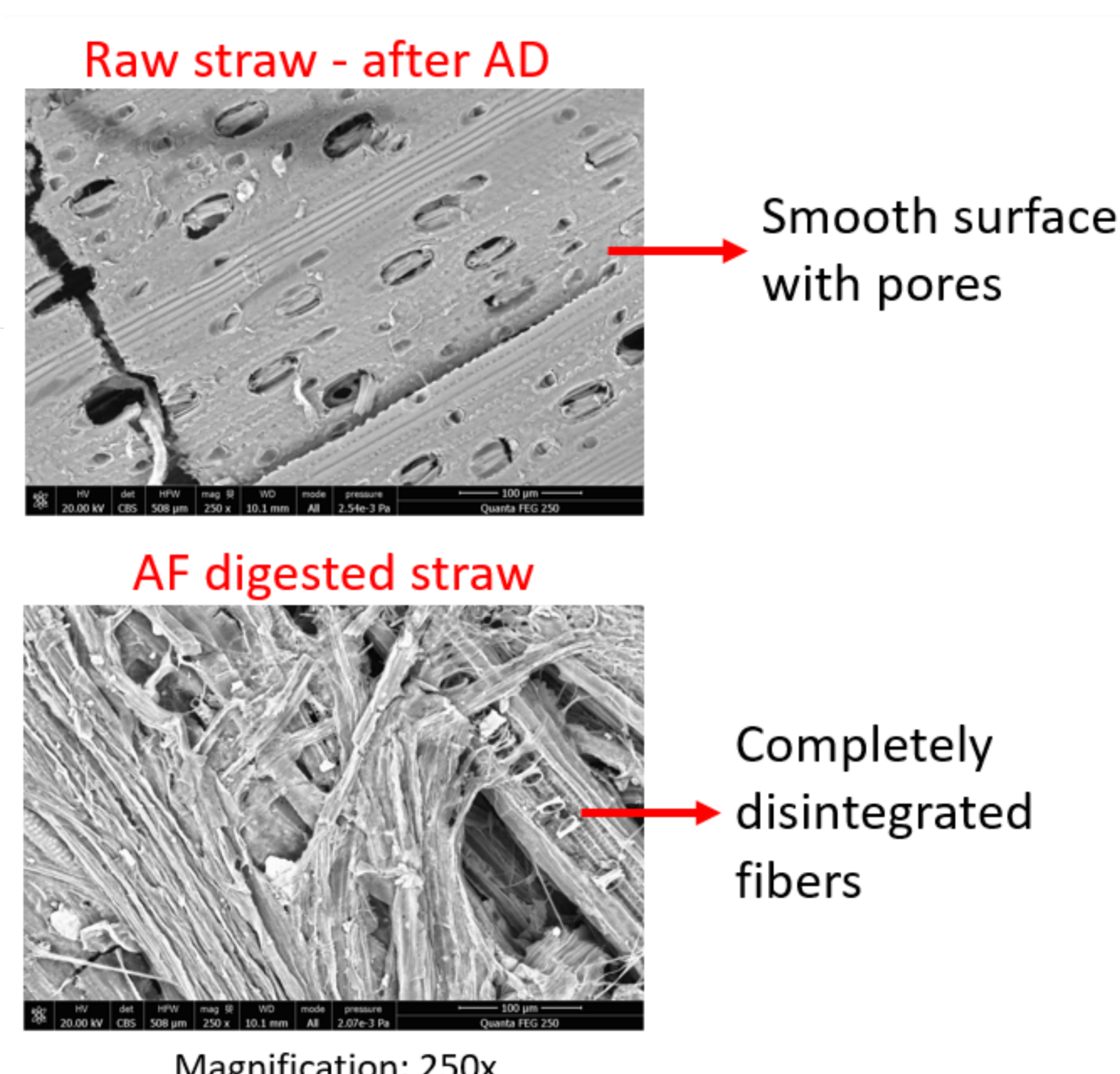
First order equation (Scilab software)  
 $V(t) = V_{max} (1 - e^{-kt})$

Sample	k (d <sup>-1</sup> )	V <sub>max</sub> (NL <sub>CH<sub>4</sub></sub> /kg <sub>VS</sub> )	R <sup>2</sup>
Control	0.077	316.3	0.995
0.89 g of AF	0.078	318.7	0.996
1.78 g of AF	0.086	305.7	0.994
4.9 g of AF	0.094	323.3	0.989

### Lignin content (NREL method<sup>5</sup>)



### Scanning Electron Microscopy (SEM)



## CONCLUSION

- 4.9 g of *Feramyces austinii* improved BMP by 7.2% and hydrolysis kinetics by 22%
- Kinetics were improved with increasing fresh mass of *Feramyces austinii*
- A very low ratio of AF/Inoculum (4.9 g of AF/ 375 g of inoculum) is sufficient for bioaugmentation of AD
- Significant modification to the straw surface was observed through SEM
- Feramyces austinii* was able to modify lignin content, possibly through mechanical or enzymatic pathway
- Large-scale production of AF is challenging and should be further studied

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