

ENHANCING BIOGAS PRODUCTION FROM WHEAT STRAW THROUGH LIGNINOLYTIC FUNGI PRE-TREATMENTS AND CO-DIGESTION WITH PIG SLURRY

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The interest in sustainable biogas production is currently oriented towards the use of agricultural byproducts instead of high-input dedicated crops.

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These byproducts contain large lignocellulosic fractions that could be exploited to increase methane production. A biomass pre-treatment step could facilitate anaerobic digestion by partial lignin removal.

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Biological pre-treatments seem suitable to achieve sustainable biogas production due to low energy requirement, low pollution generation, and simple procedures and equipment.

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Biological pre-treatment can be carried out by Basidiomycetes white-rot fungi which are considered among the most effective biological pre-treatment agents.

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Wheat straw is the most abundant agricultural residue in Europe, the use of straw for the production of biogas represents a sustainable option, since it does not compete with human food resources.

SCREENING TEST



The aim of this study was to carry out a comparison among ligninolytic (white-rot) and cellulolytic (*Trichoderma*) pre-treated wheat straw, for biogas production potential, without or with pig slurry in co-digestion.

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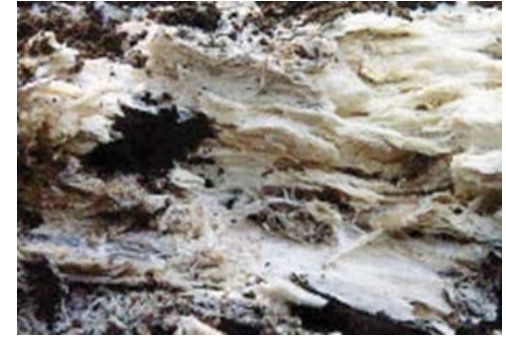
SCREENING TEST



C. subvermispora



C. stercoreus



P. chrysosporium



T. versicolor



P. ostreatus



Trichoderma

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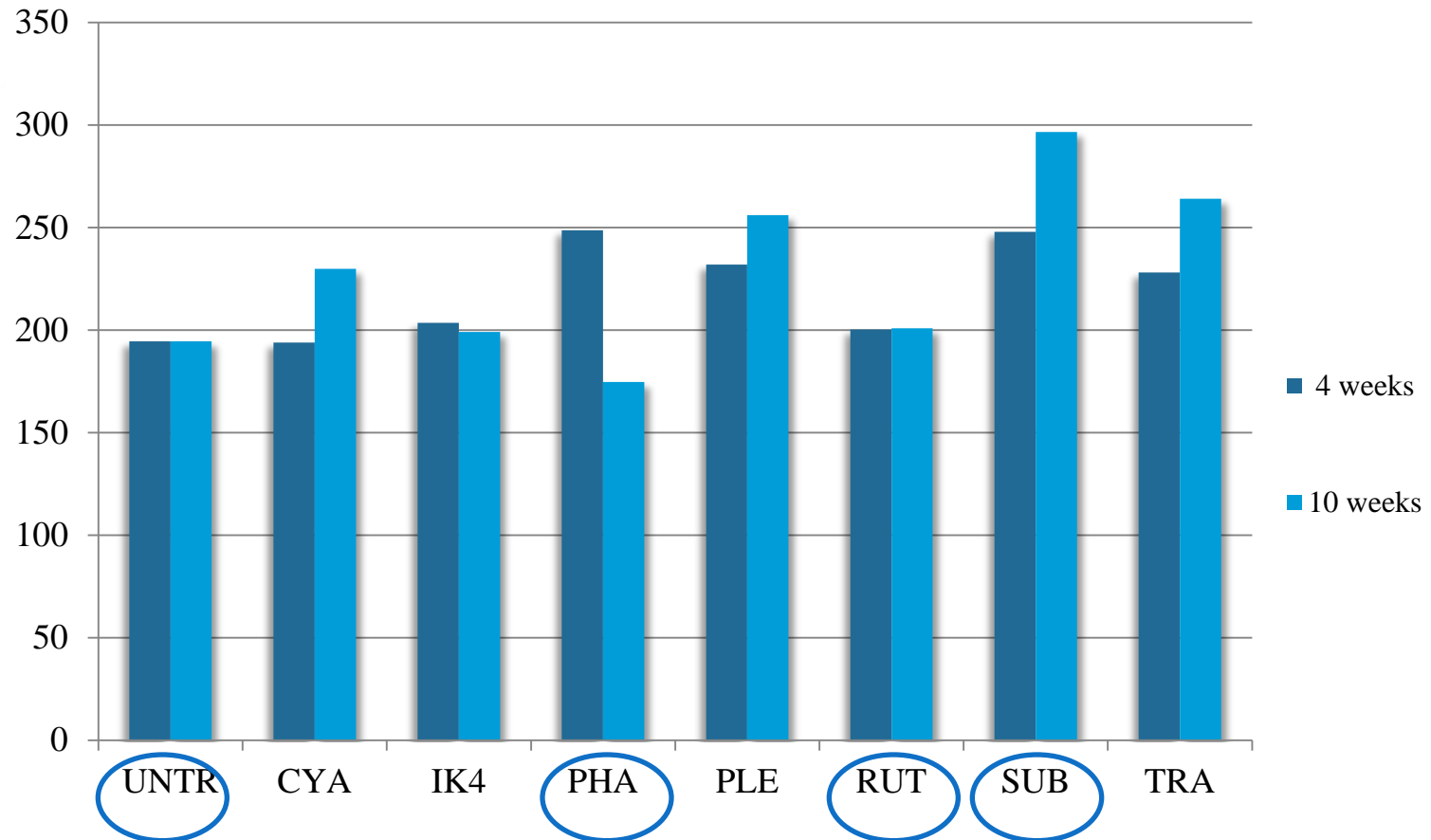
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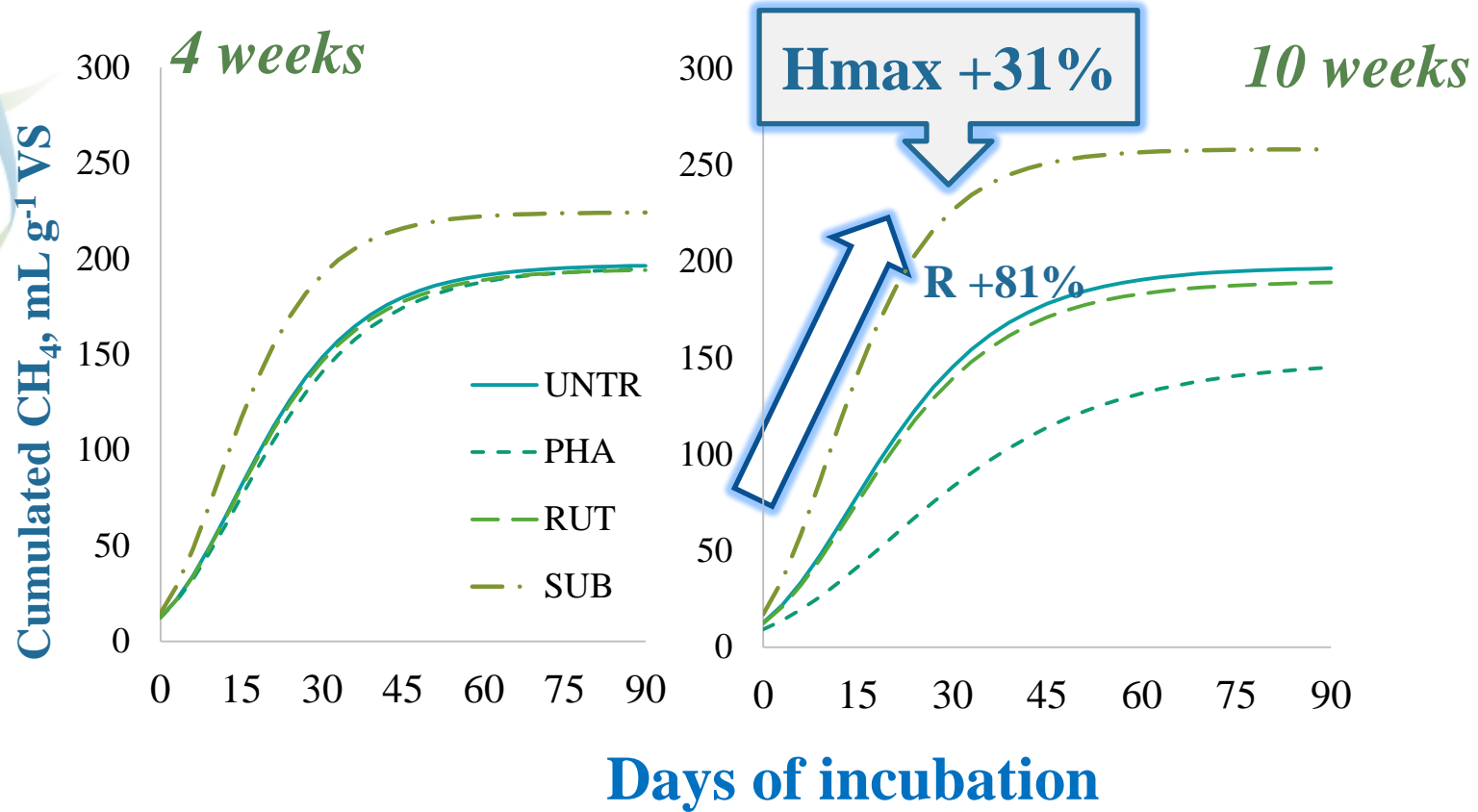
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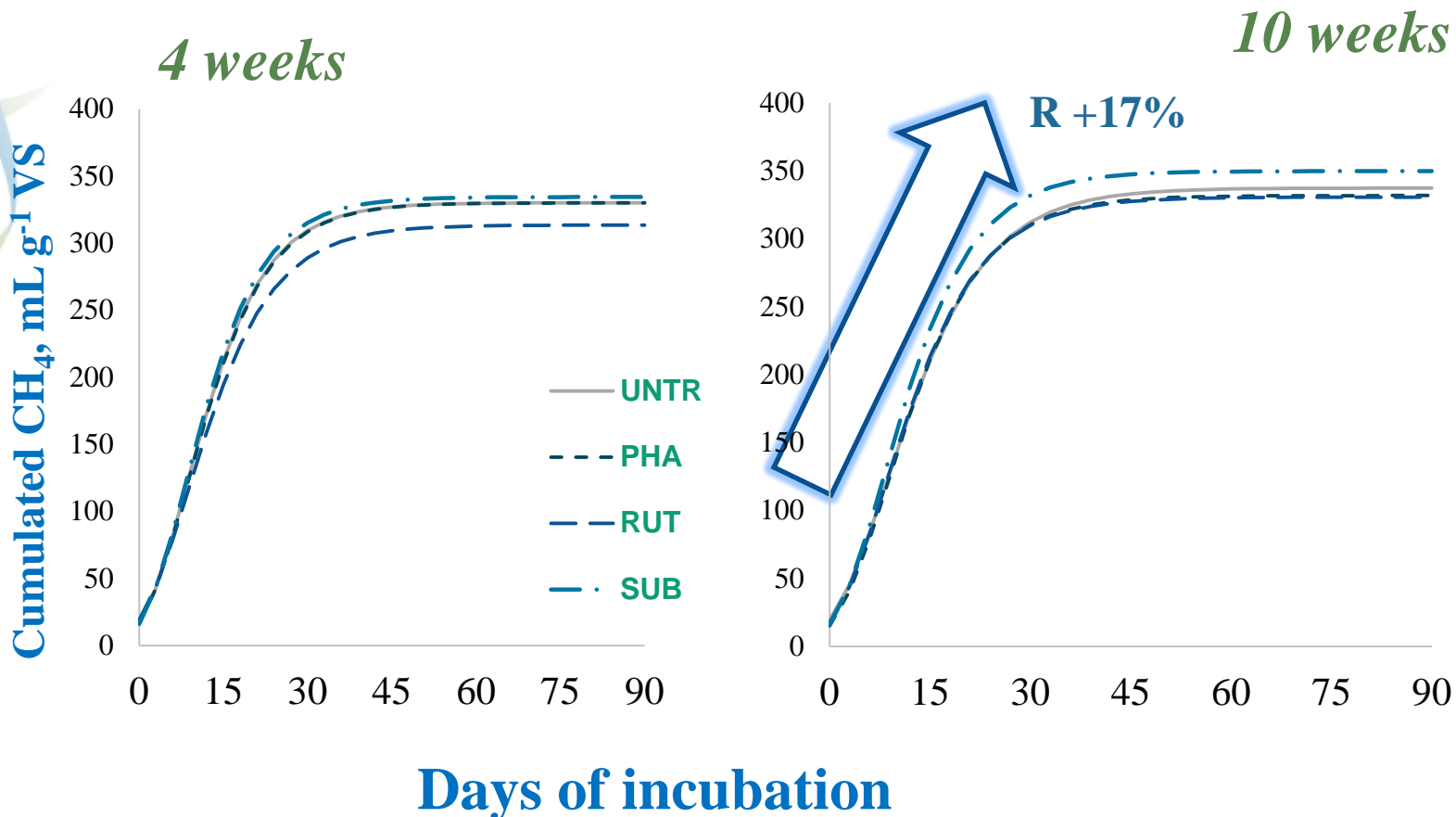
SCREENING TEST



MONODIGESTION



CO-DIGESTION



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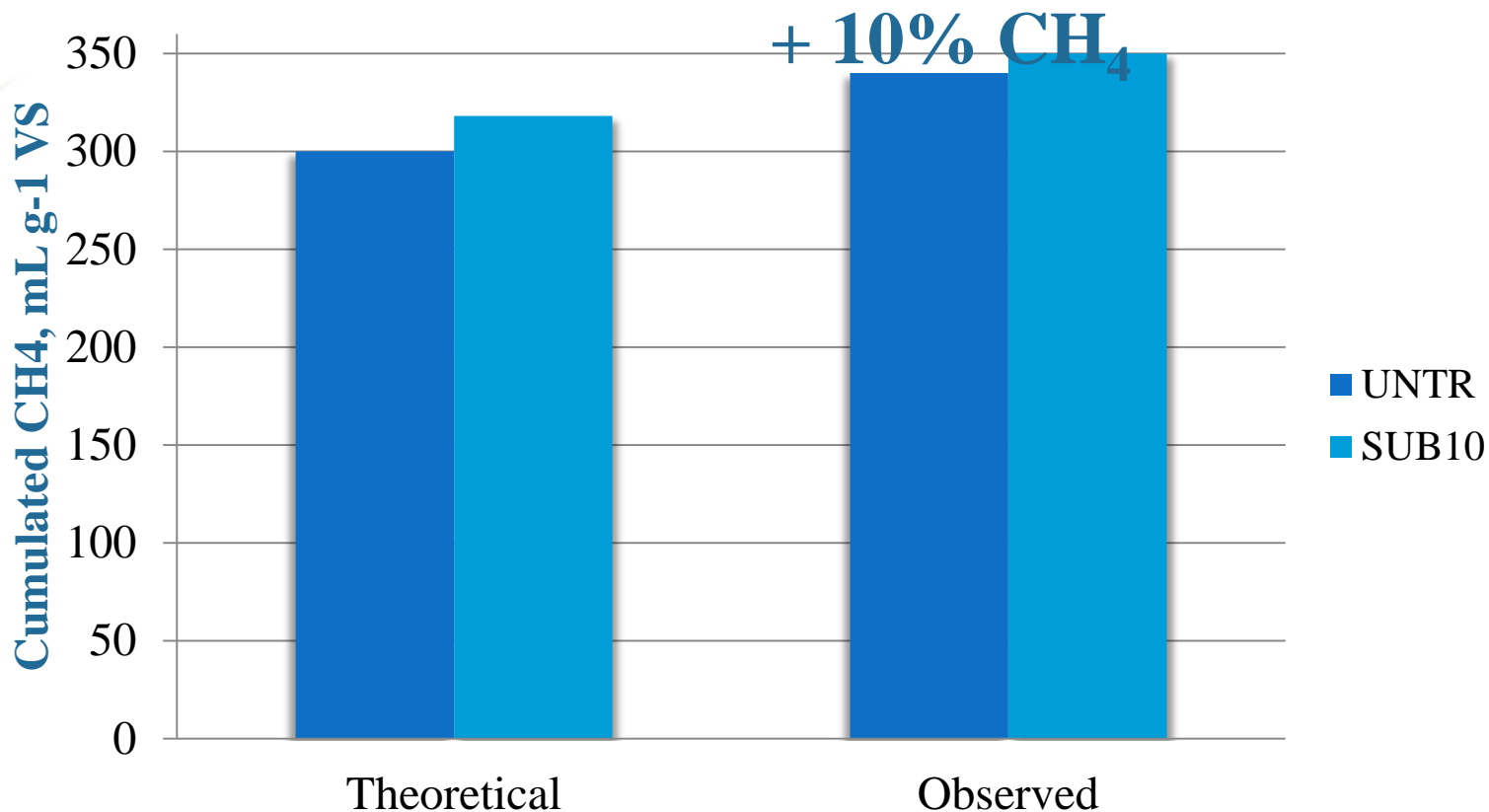
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CO-DIGESTION



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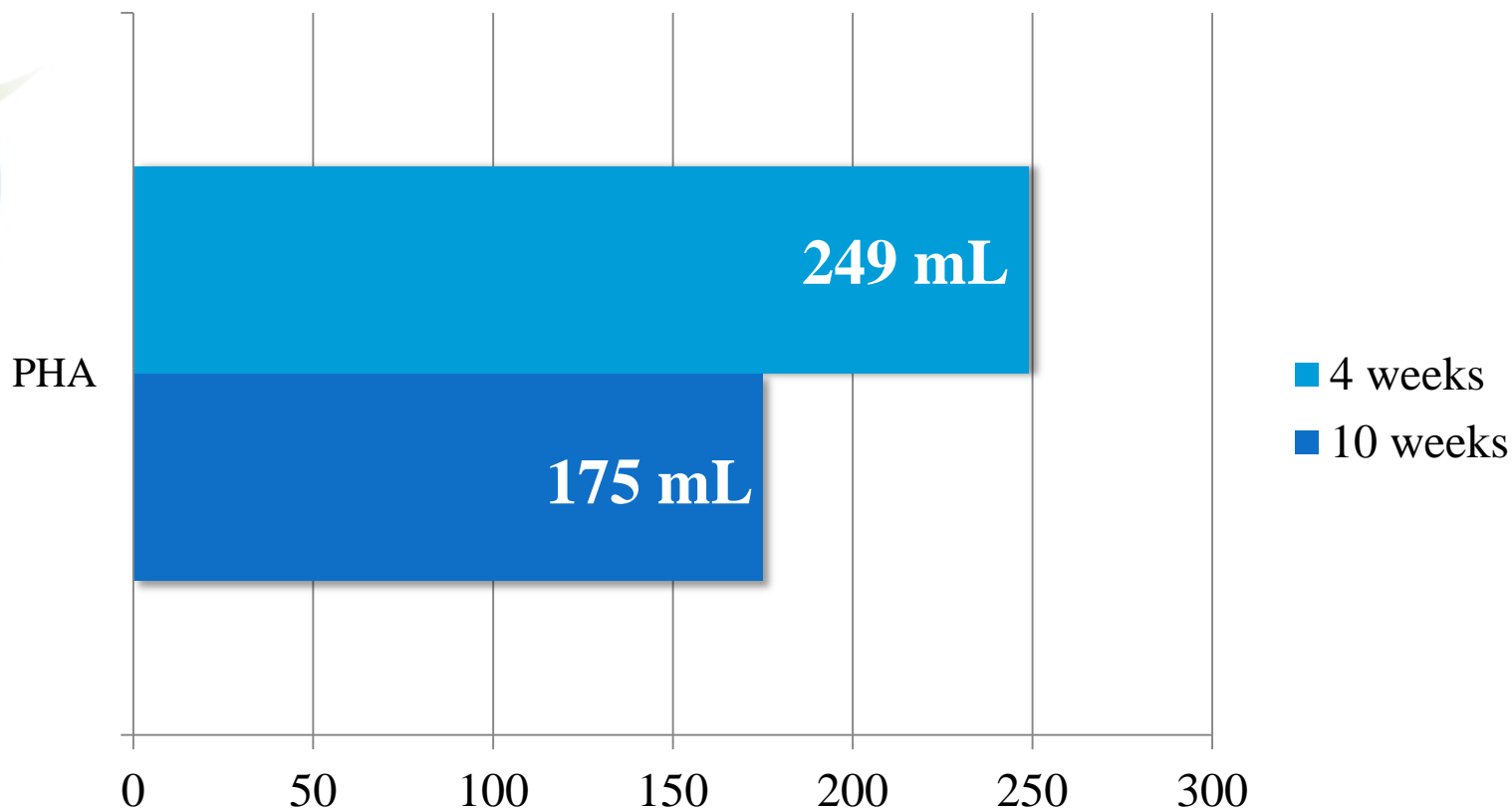
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PHANEROCHAETE



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Methane production in monodigestion was measured after pre-treating the wheat straw with *P. chrysosporium* for **14, 18, 21** and **24** days.

NS : not sterilized straw

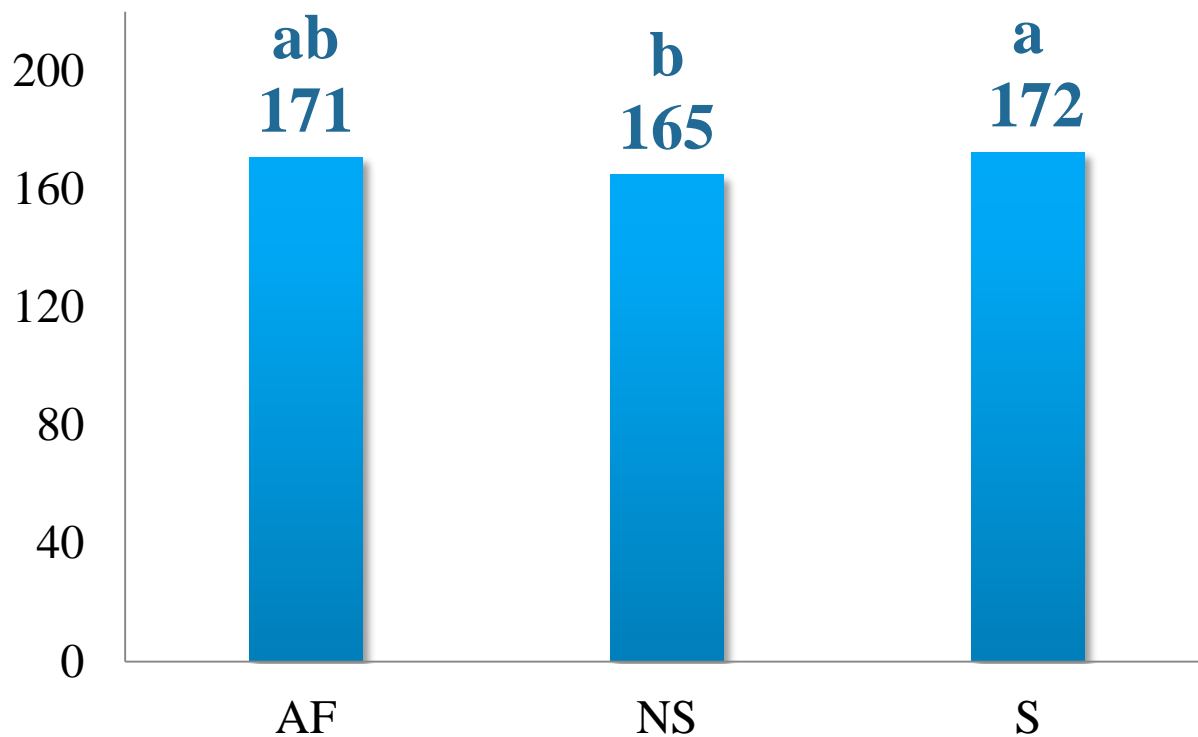
S : sterilized straw

AF : formic acid

PHANEROCHAETE



Hmax (mL CH₄ cumulated)



Wheat straw pre-treatment

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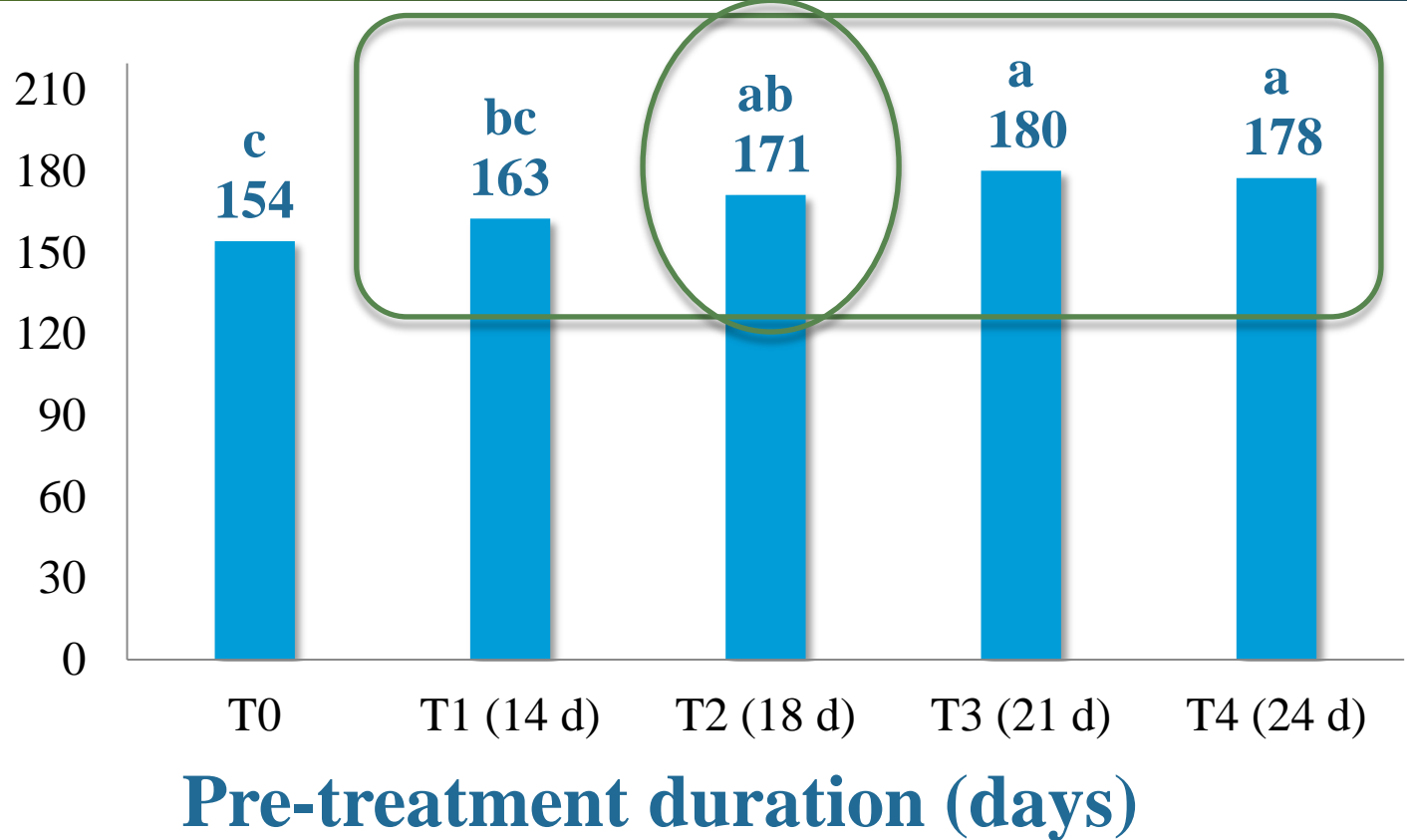
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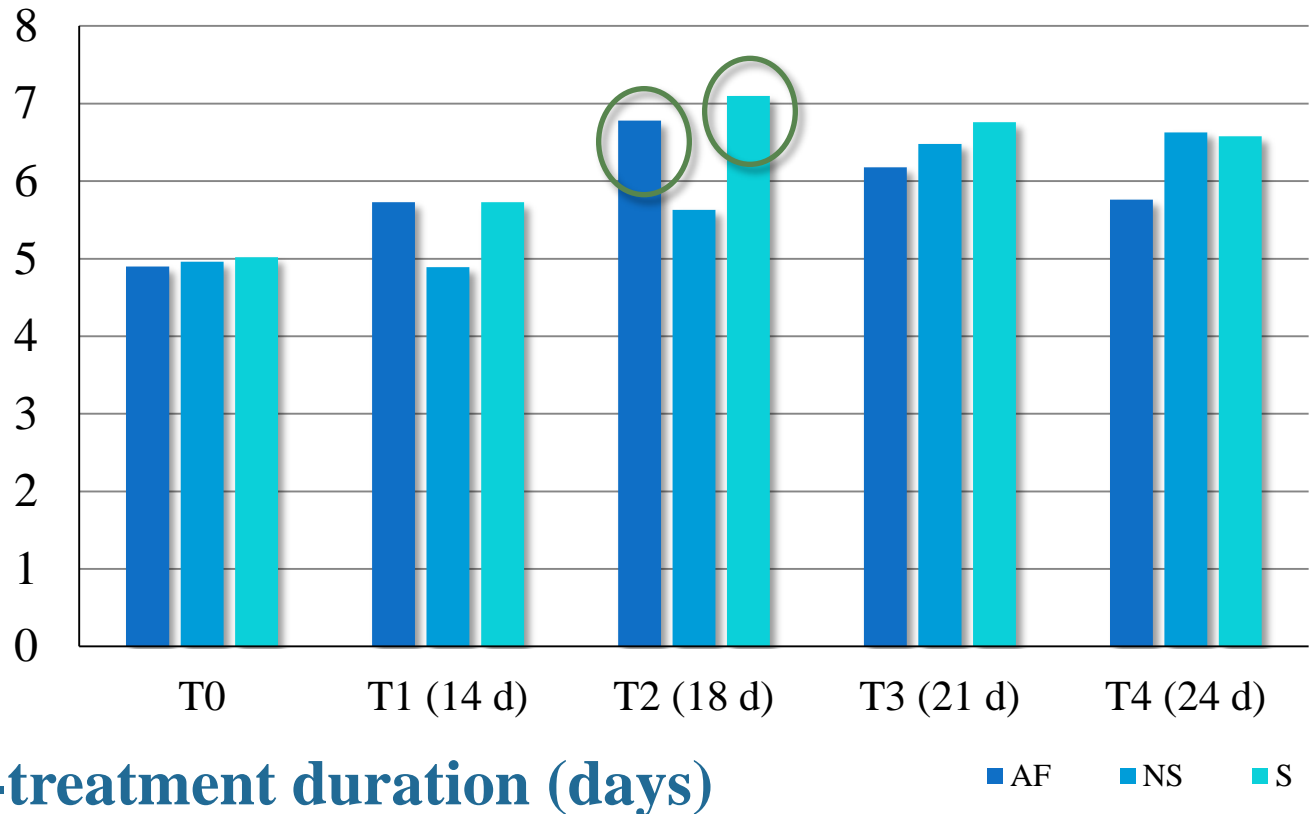
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R (mL CH₄ d⁻¹)



CONCLUSIONS

✓ R

+81% in monodigestion
+17% in co-digestion

✓ CH₄

UP TO +31% in monodigestion

✓ CH₄

+ 12% P.chrysosporium 18 days
+ 17% P.chrysosporium 21 days

CONCLUSIONS



- ✓ NO POLLUTION
- ✓ NO COSTS FOR ENERGY INPUT
- ✓ NO PRODUCTION OF INHIBITORS
- ✓ SINERGY IN CO-DIGESTION

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**THANK
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