

TERMITES AS A TOOL TO IMPROVE LIGNOCELLULOSE BIOMASS VALORIZATION: ANALYSIS OF INTERMEDIATE OLIGOSACCHARIDES PRODUCED BY *RETICULITERMES SANTONENSIS*

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TERMITOFUEL PROJECT :

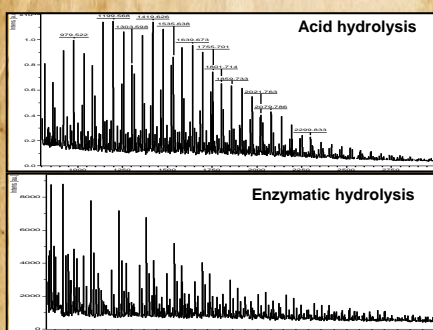
Use of termites as a tool to improve lignocellulose biomass valorization: study of enzymatic complex in termites and its common symbionts by proteomic, genomic and metabolomic approaches.

PARTNERS :

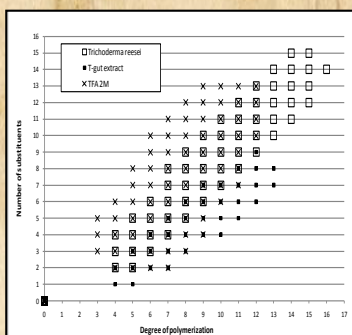
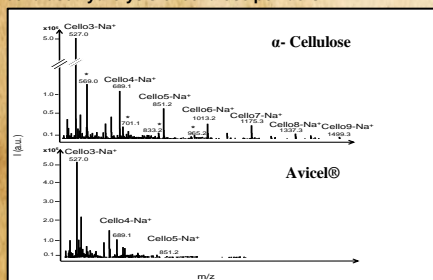
- Bio-Industries Unit (BIO) → MICROBIOLOGY
- Microbiology and Genomics Unit (BAM) → GENOMIC
- Functional and Evolutionary Entomology Unit (EFE) → PROTEOMIC
- ✓ Mass Spectrometry Unit (LSM) → METABOLOMIC

MALDI-TOFMS ANALYSIS:

Mass spectra of CM-oligomers obtained from acid or enzymatic hydrolysis of carboxymethylcellulose (CMC) :



Mass spectra of celldextrins obtained from *T. reesei* cellulase hydrolysis of cellulose powders:

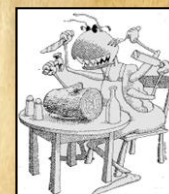
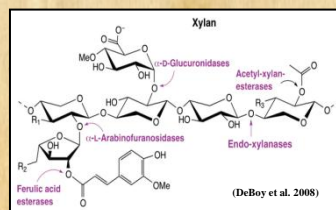
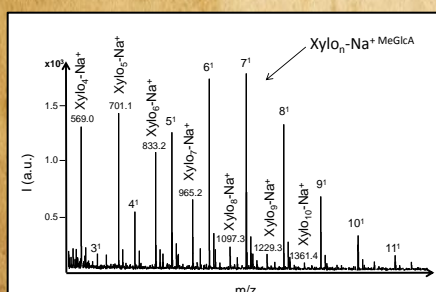


The hydrolysis products are classified according to their degree of polymerization and number of substituents. Specific enzymatic or acid hydrolysis patterns are reported and compared. CM-oligomers are produced when testing gut extracts of *Reticulitermes santonensis* but higher selectivity is observed compared to the pattern obtained with a commercial cellulase of *Trichoderma reesei*, used as reference.

Hydrolysis of crystalline cellulose substrates were tested with termite gut extracts and no celldextrins were detected by MALDI-TOFMS although hydrolysis profiles were obtained with CMC in the same conditions. CMC is a derivative soluble substrate that has been preferably used for termite studies, mostly because of its high solubility. However, CMC is not well representative of naturally occurring cellulose. The use of derivative cellulose substrates is appropriate to recognize an enzymatic activity and evaluate its selectivity which should be of interest for specific applications



Mass spectrum of xylo-oligosaccharides obtained from *Reticulitermes santonensis* hydrolysis of Xylan:



Enzymatic activity on xylan seems to be the predominant source of oligosaccharides from termites. Xylooligosaccharides production is of interest for industrial applications. Moreover, analysis of intermediate degradation products is important when studying a cellulolytic activity as some compounds can be involved in retro-inhibition mechanisms, undergo post cleavage modification or induce enzyme gene expression. This study is of interest for comprehension of the mechanisms involved and identification of specific enzymes.

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