EFFECT OF STEAM EXPLOSION PRE-TREATMENT ON ENZYMATIC SACCHARIFICATION OF LIGNOCELLULOSIC MATERIAL

Laurence Meyer[1], Nicolas Jacquet[1,2], Caroline Vanderghem[1], Christophe Blecker[2], Michel Paquot[1]

[1] Department of Industrial Biological Chemistry, Gembloux Agro Bio-Tech – Université de Liège, Gembloux, Belgium

[2] Department of Bio-resources valorisation, Gembloux Agro Bio-Tech – Université de Liège, Gembloux, Belgium

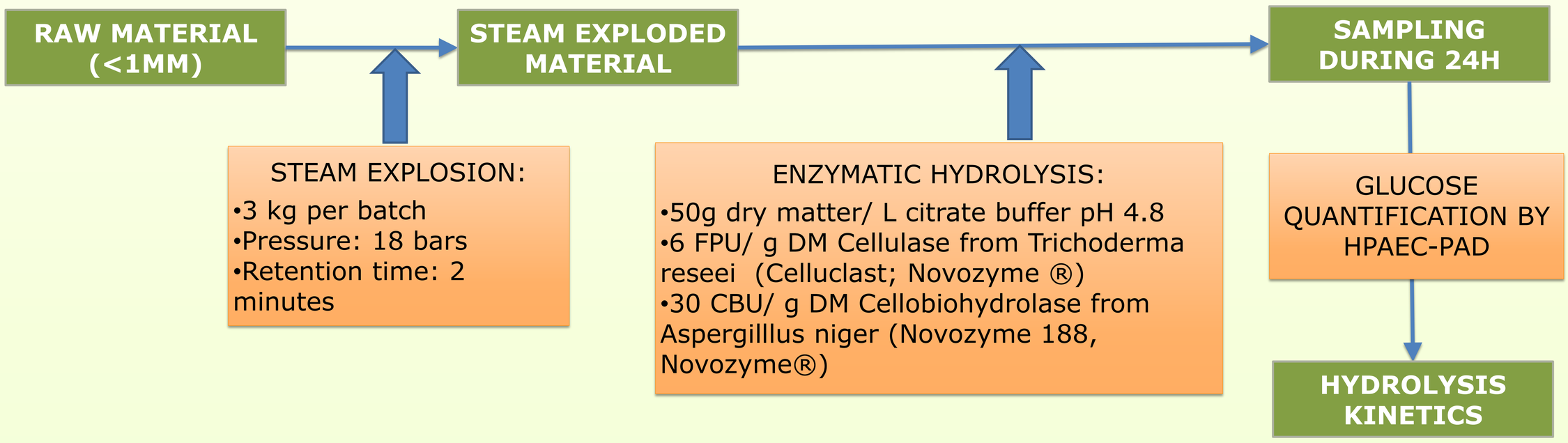
INTRODUCTION AND OBJECTIVES:

•Saccharification of lignocellulosic raw material to produce biofuel requires fractionation of its complex structure by pre-treatment.

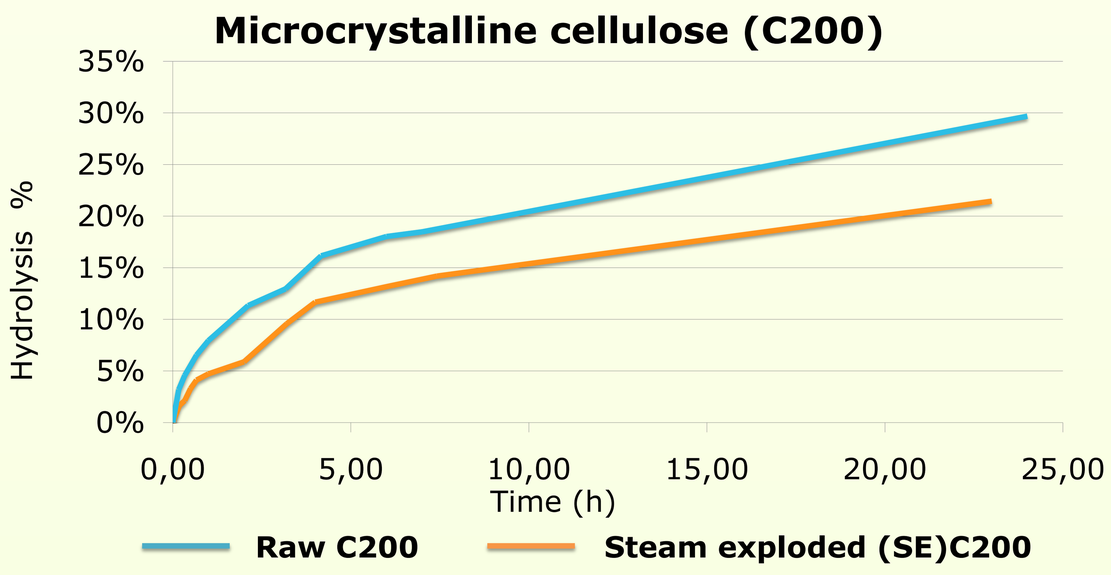
•Steam explosion = thermomechanical process allowing breakdown of lignocellulosic material by steam heating, organic acids hydrolysis and shear stress.

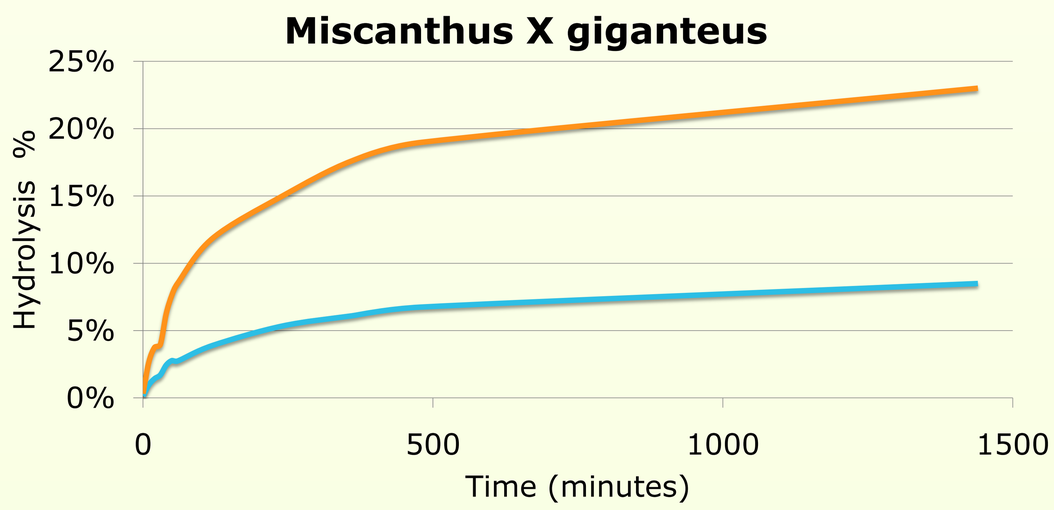
•Aim → study the effect of steam explosion pre-treatment on the enzymatic hydrolysis of microcrystalline cellulose, sugar beet pulp, miscanthus and corn straw.

METHODS:



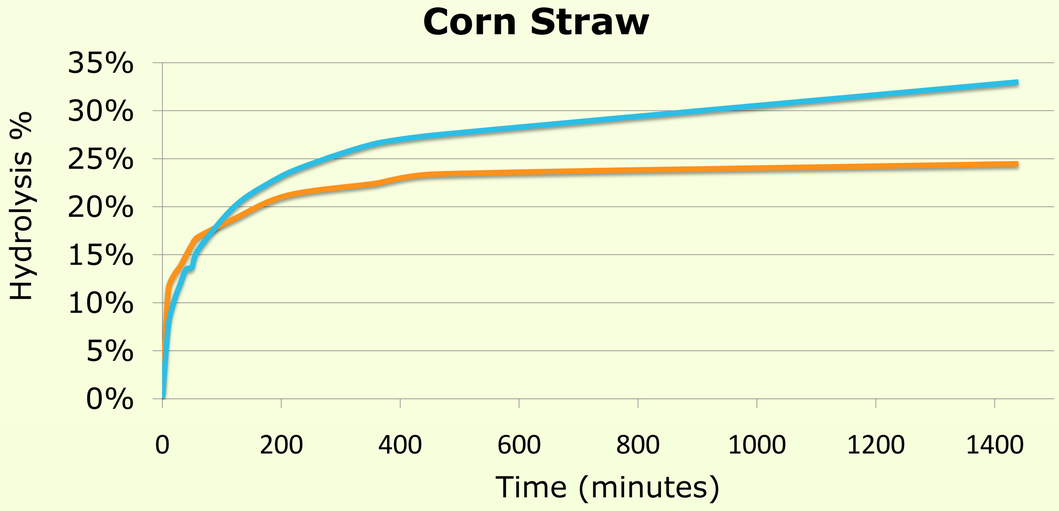
RESULTS:





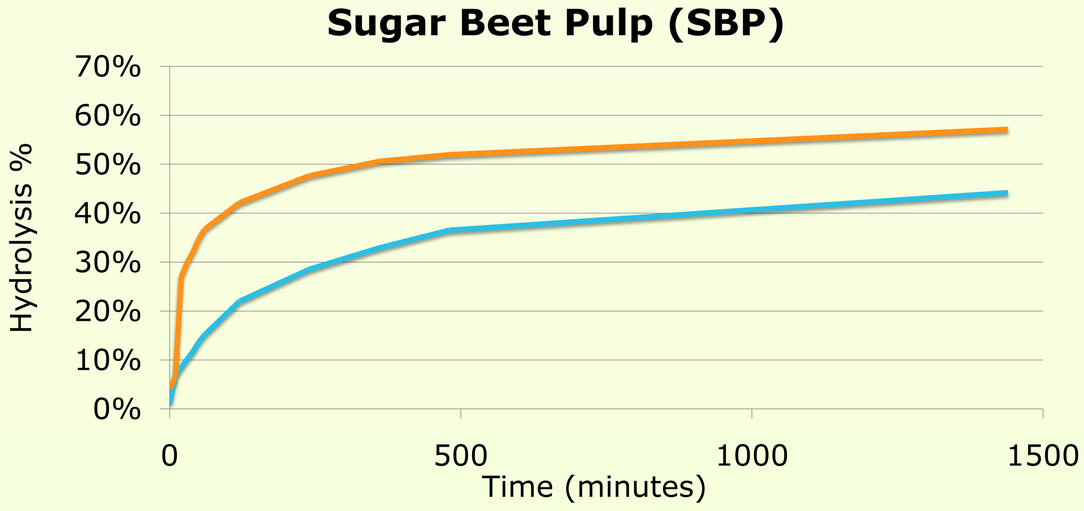
	Raw Miscanthus	SE Miscanthus
Cellulose	51 %	58 %
Hemicelluloses	31 %	12 %
Lignins	23 %	25 %

Corn Straw



	Raw Corn Straw	SE Corn Straw
Cellulose	38 %	54 %
Hemicelluloses	42 %	13 %
Lignins	16 %	18 %

Sugar Beet Pulp (SBP)



	Raw SBP	SE SBP
Cellulose	21 %	54 %
Hemicelluloses	23 %	13 %
Lignins	undetermined	undetermined

→Steam explosion pre-treatment → no positive effect on hydrolysis of pure cellulose.
→Steam explosion pre-treatment → hemicellulose hydrolysis → increases cellulose accessibility to enzyme → increases enzymatic hydrolysis

Acknowledgment: authors are grateful for the financial support of the Walloon Region in the frame of the Lignofuel Program and the Technose program