

BIO-Asie



HTMS BioASIE PROJECT
BIOPROCESS INTENSIFICATION
CHALLENGES RELATED TO TRANSFER LIMITATION

2nd Symposium, SBFT – HUST, 27-30 JUNE 2016

Efficient hydrolysis of fractionated bagasse by fungal secretome

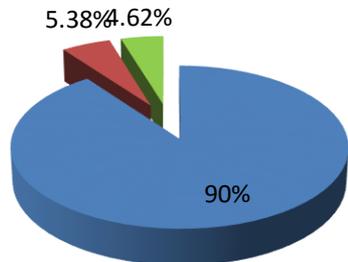
To Kim Anh, Pham Tuan Anh, Le
Tuan, Cao Xuan Bach, Tran Thi
Thanh Tam, Le Thi Phuong Anh



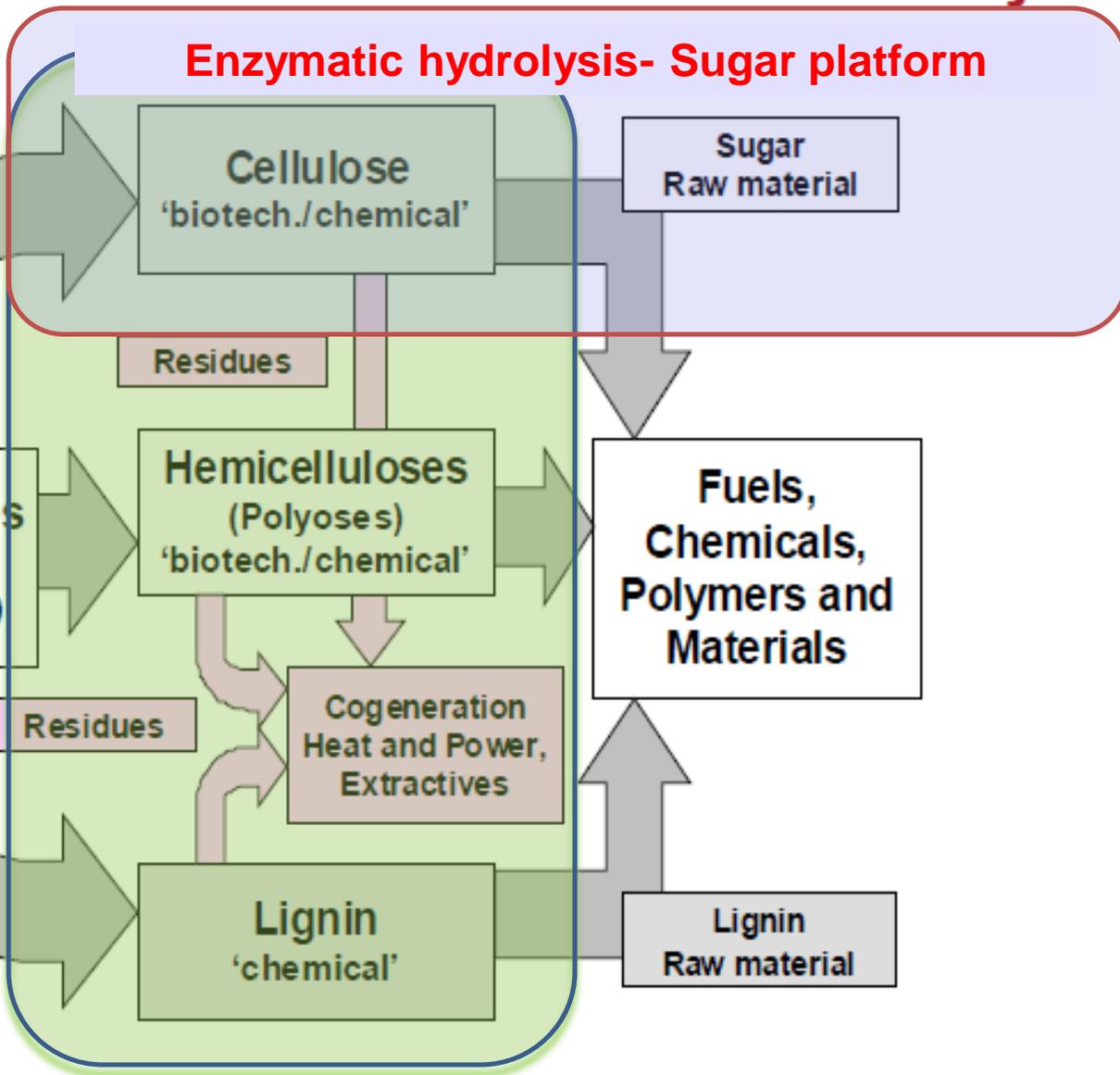
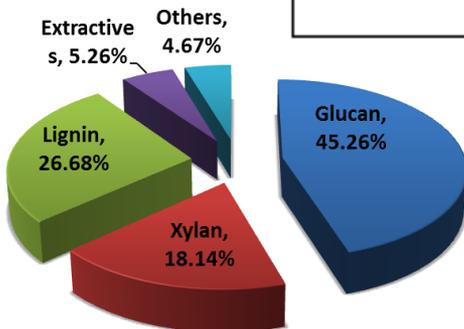
CRDB-School of Biotechnology and Food Technology
Hanoi University of Science and Technology, Vietnam

Lignocellulosic Feedstock Biorefinery

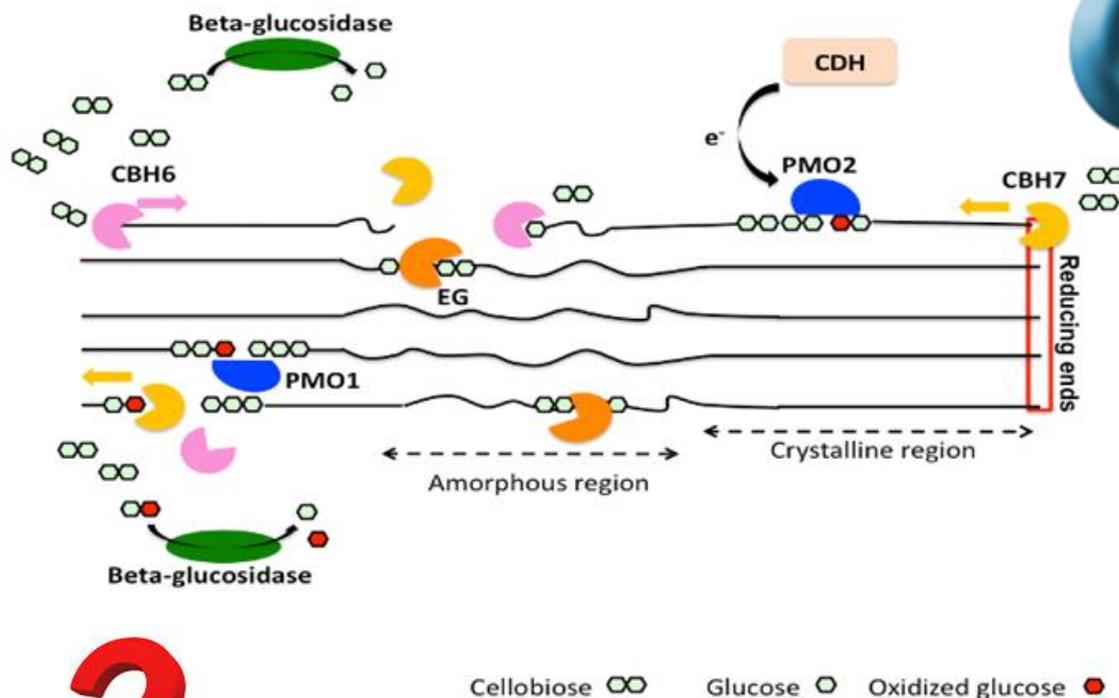
Formic fractionated SGB cellulose



Raw sugarcane bagasse



Complex enzymes involving in lignocellulose conversion



CAZy : <http://www.cazy.org/>

thủy phân cacbonhydrat

- ◆ Glycoside hydrolases (GHs)
- ◆ Glycosyl transférases (GTs)
- ◆ Polysaccharide lyases (PLs)
- ◆ Carbohydrate esterase (CEs)

■ Auxiliary Activities

- Lytic polysaccharide monoxydase
- Cellulose binding modules (CBMs)
- Lignin degradation enzymes



What enzyme complex
What enzyme composition
for a specific substrate and specific
pretreatment?



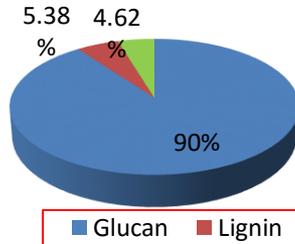
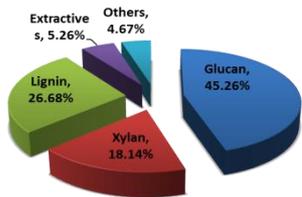
SECRETOME???

INTEGRATED SUGAR PLATFORM



Cutting down downstream processing cost

- Inducing the enzyme system for specific substrate



■ Glucan ■ Lignin

FEEDSTOCK



PRE-TREATMENT



HYDROLYSIS



FERMENTATION



PRODUCT



INTEGRATED ENZYME PRODUCTION



Challenging:

- High volumetric yield for enzyme production
- Specific to the process

Selection of fungal secretome for SGB

SGB



Wood



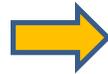
Rice straw



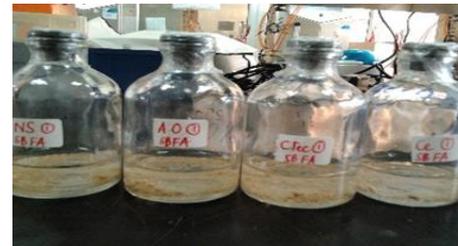
CMC, Avicel



Substrate/
MM
Medium



Culture



Hydrolyze SGB
1,5%S- non glucose
inhibition

Main enzyme
activity



Glucan hydrolysis
efficiency

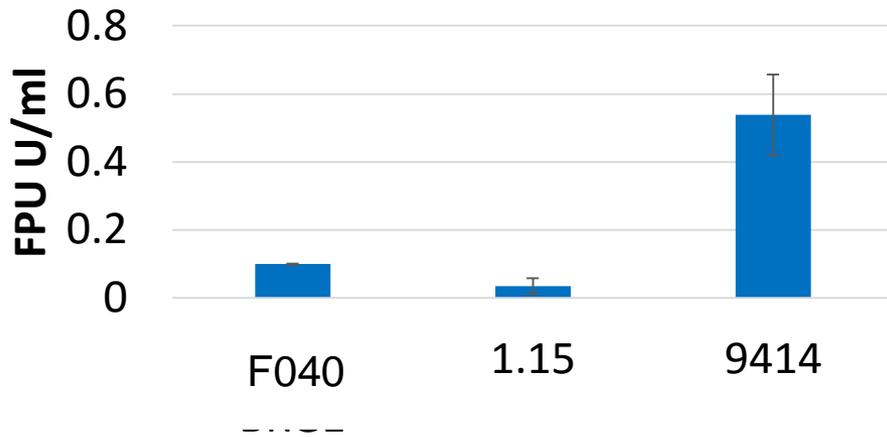
Selection scretome

VTCC - VIETNAM TYPE CULTURE COLLECTION

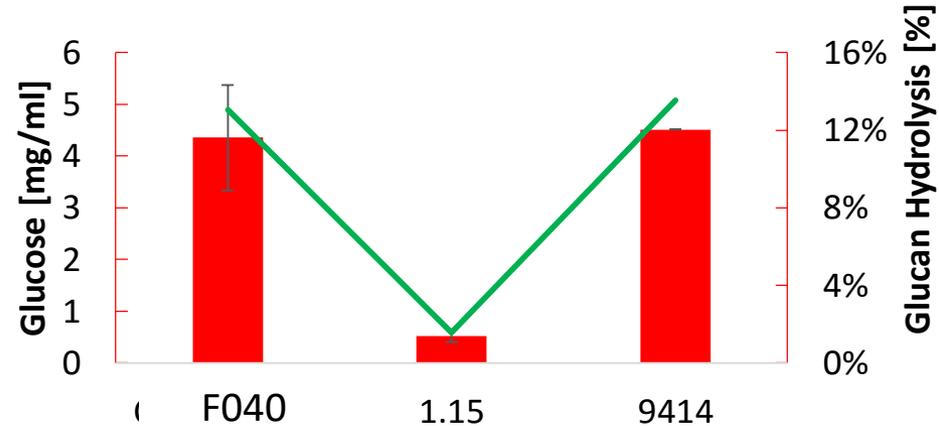


Substrate -induced secretome

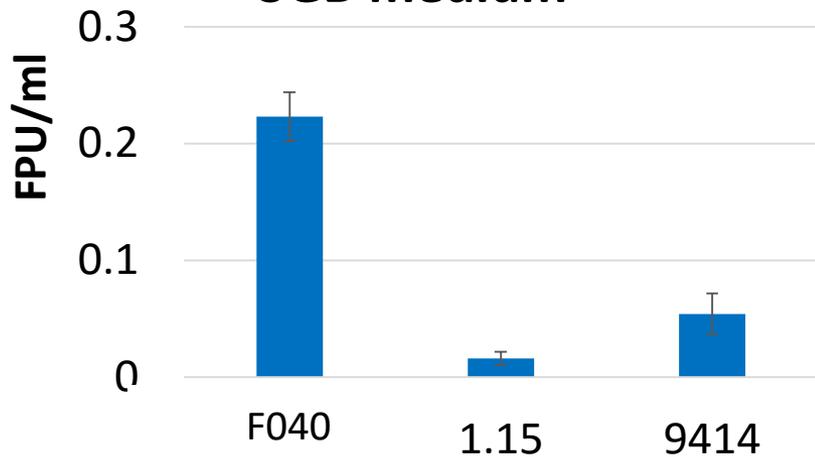
Avicel medium



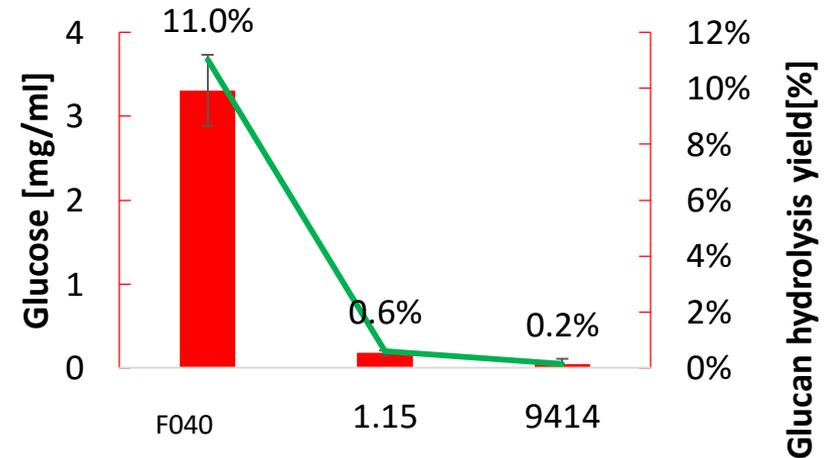
Hydrolyze Avicel, 1 FPU/g



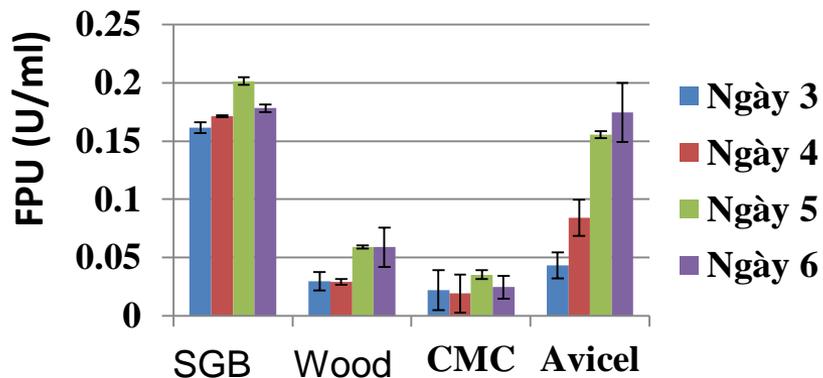
SGB medium



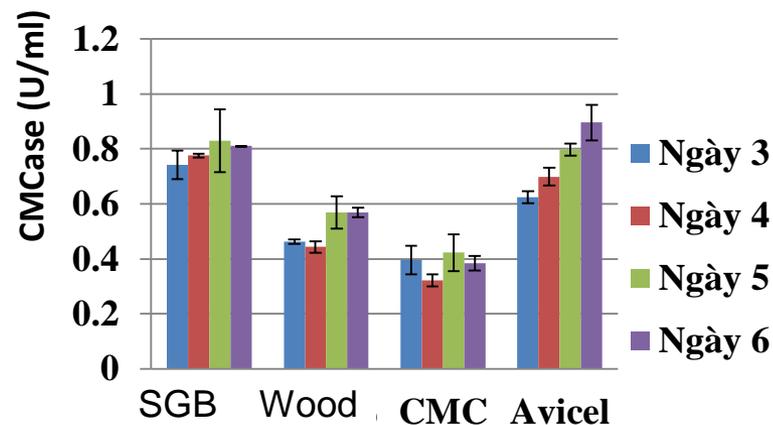
Hydrolyze SGB, (1 FPU/g)



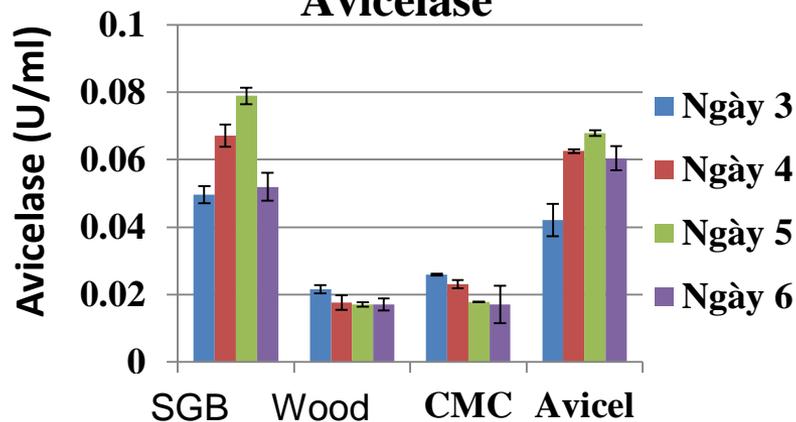
FPU



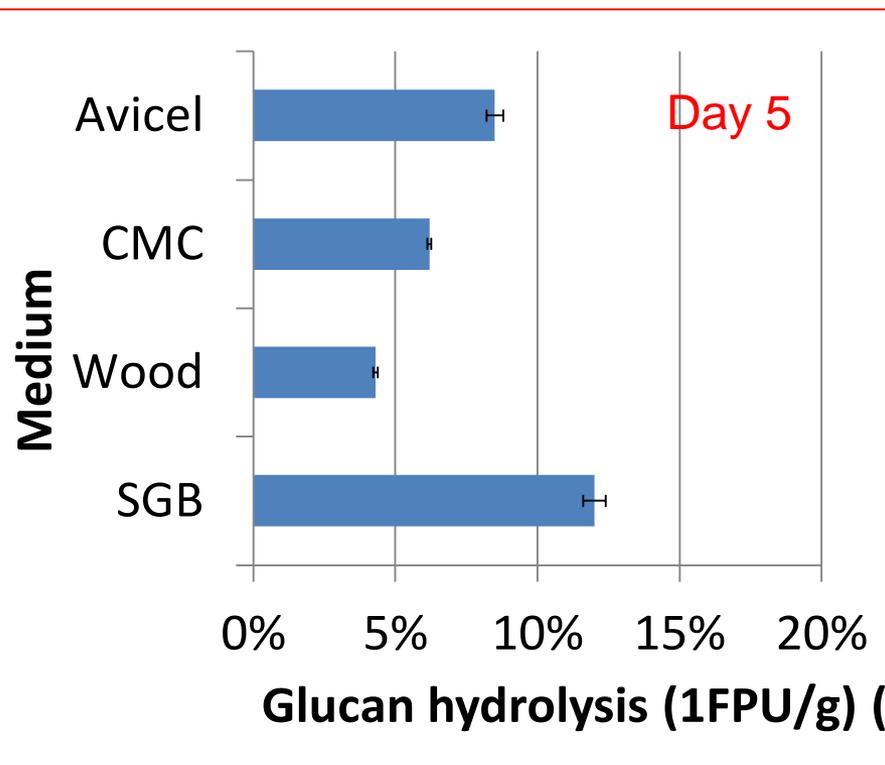
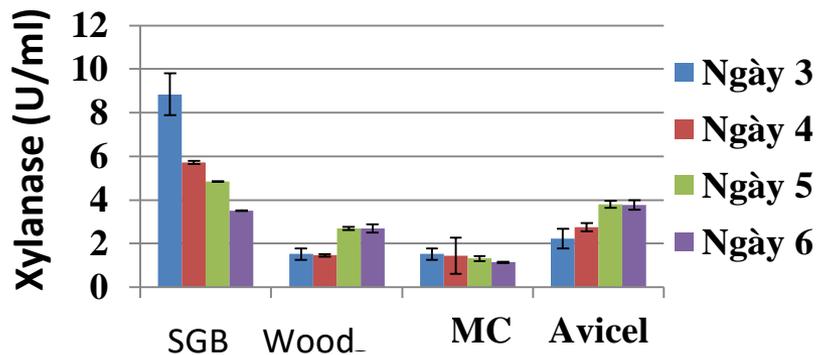
CMCase



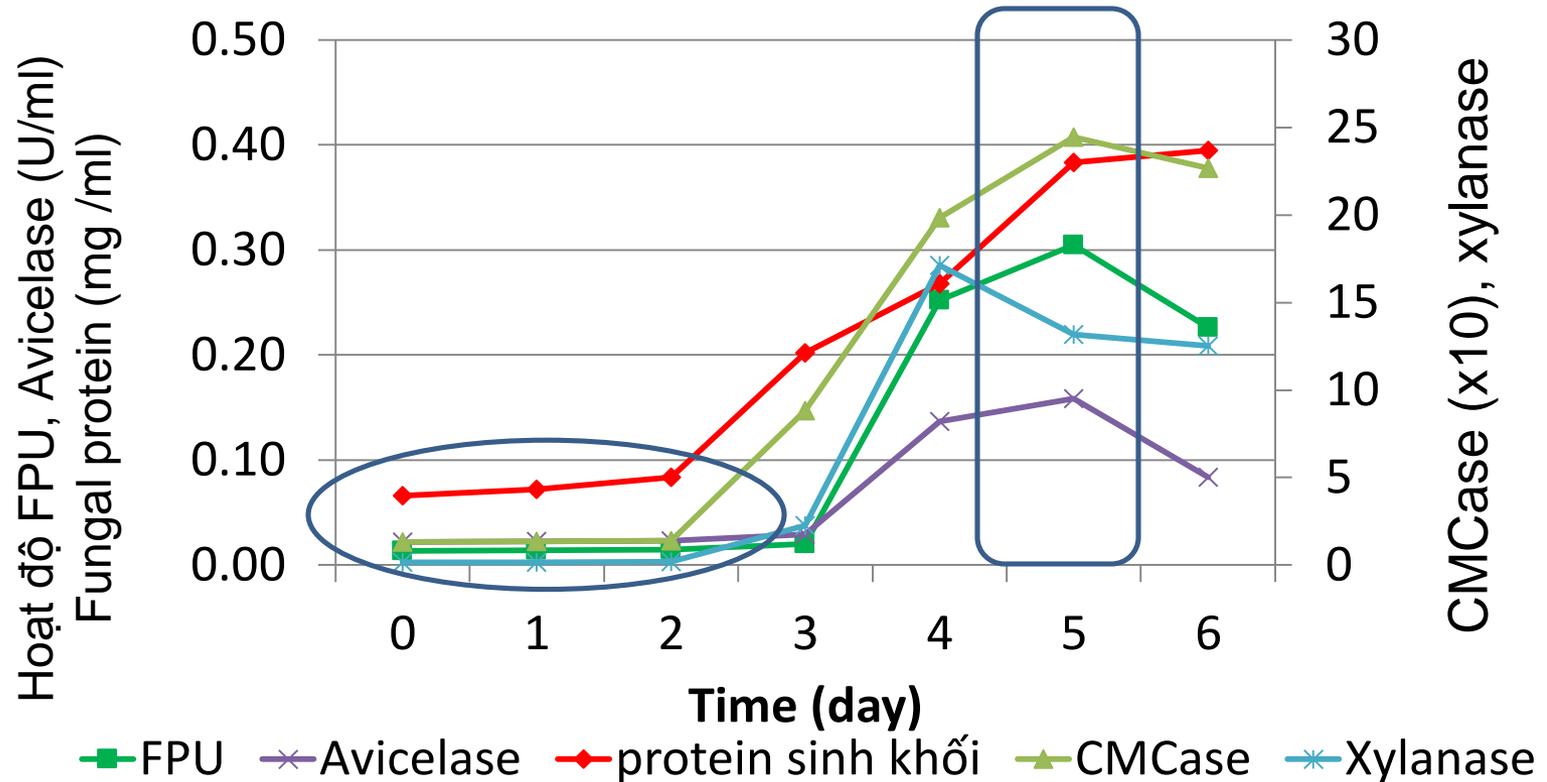
Avicelase



Xylanase

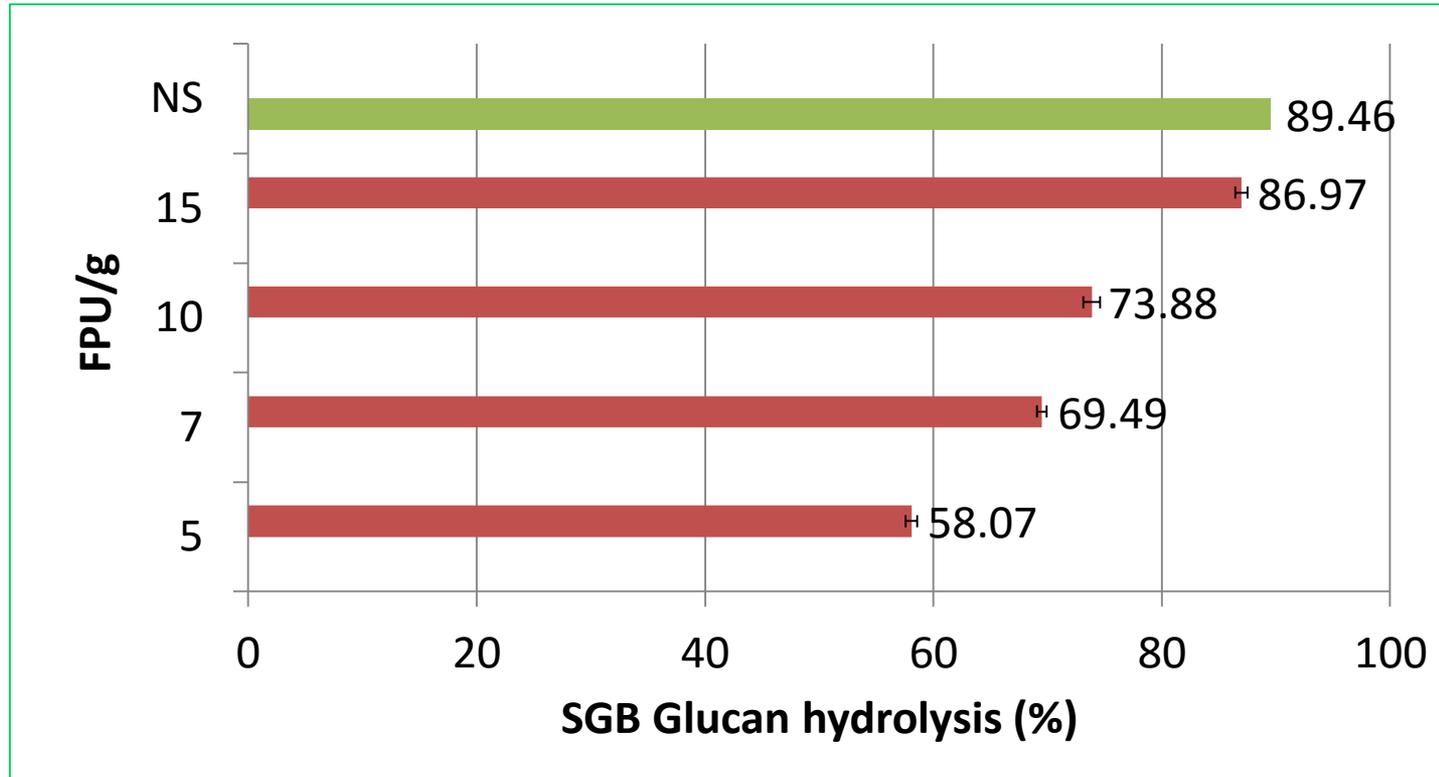


Performance of enzyme accumulation on SGB medium by F040



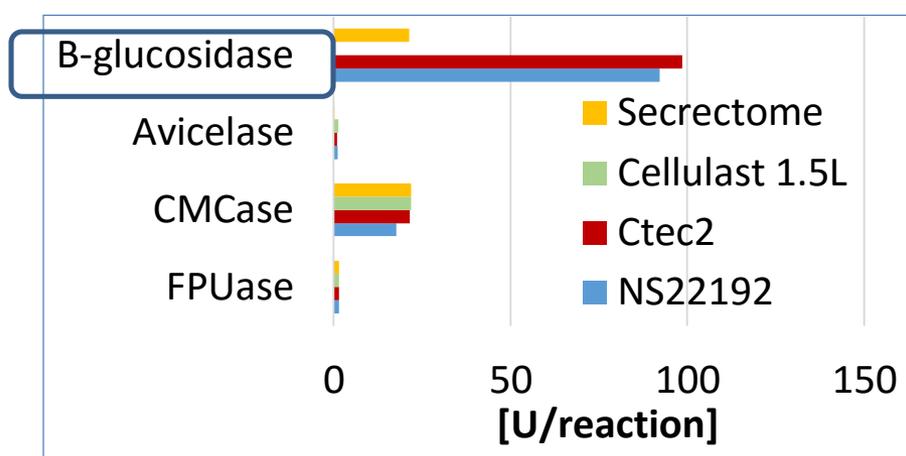
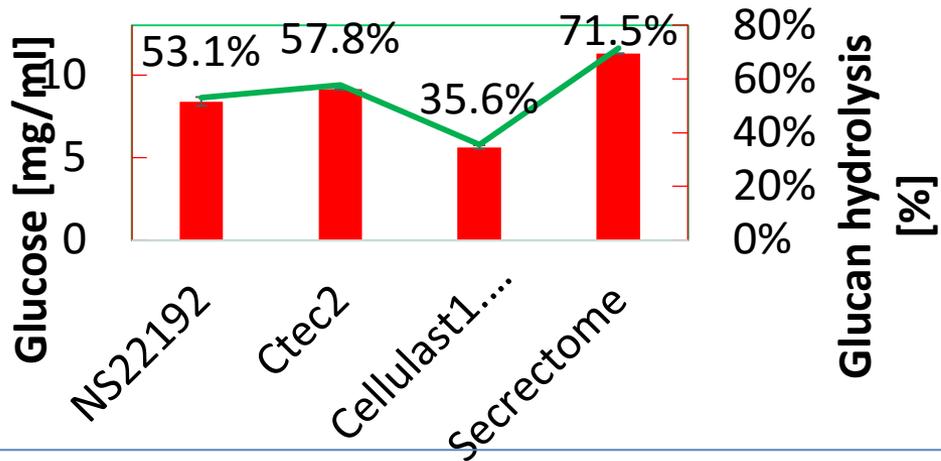
- What moment for right secretom?
- Fermentation control for solid substrate ?
- Acceleration of the enzyme production?

Hydrolysis of SBFA by secretome

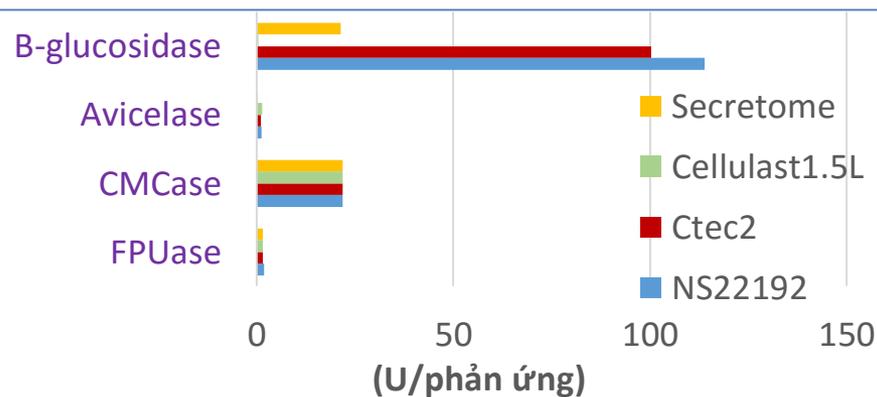
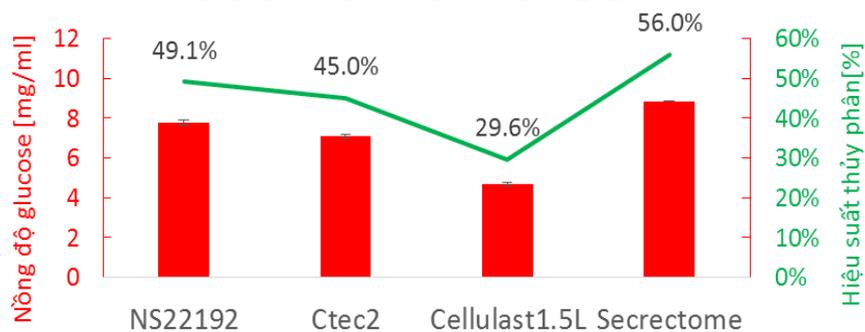


- If there main enzymes playing the role?
- Secretome enzyme/protein profile?

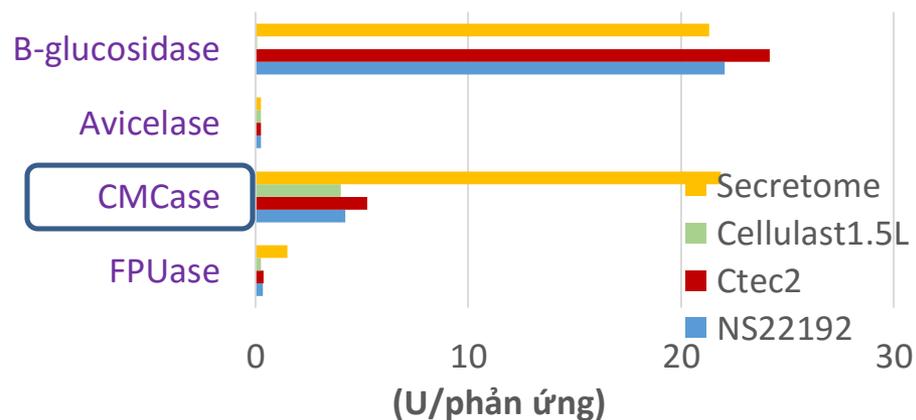
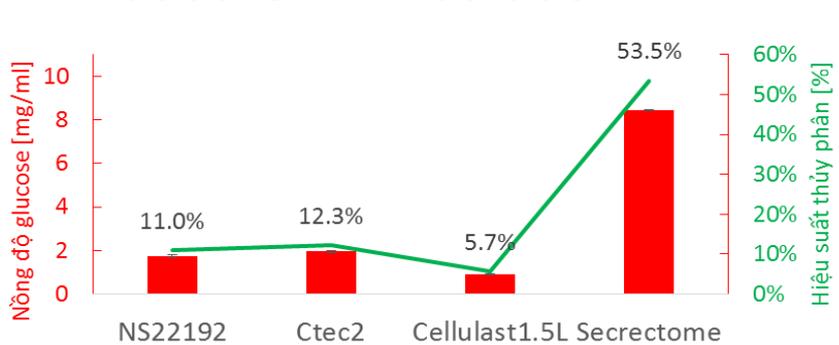
Based on FPU



Based on CMCase



Based on Avicelase



**Thank you very much
for your kind attention**