Production of Cellulases and Xylanases from *Trichoderma reesei QM9414* using microalgae biomass as substrate

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1. INTRODUCTION

Fossil fuels crisis → Alternative energy sources + biorefinery approaches → **BIOFUELS**

MICROALGAE from WASTEWATER TREATMENT: Attractive biomass; several applications + green processes; ↑ nutrients (N, P); **Nutrients valorisation**

ENZYMATIC HYDROLYSIS → Key issue → **ENZYME COST** → compromise the economical feasibility of the process

2. AIMS

- Implementation of the **biorefinery** concept ⟹ **valorising** the microalgae biomass produced from agro-food industry **wastewater treatment**, as:
  - ✓ **Substrate** for enzyme production. ⟹
  - ✓ Biofuel production through enzymatic hydrolysis.

- Production of cellulases and xylanases ***Trichoderma reesei QM9414***:
  - ✓ **Microalgae** biomass, as substrate.
  - ✓ **Solid-state fermentation (SSF)**.

3. MATERIALS and METHODS

Raw materials


Microalgae biomass


Sugarcane bagasse


Wheat bran


Trichoderma reesei QM 9414

A. <u>First Screening:</u>

1) **PRE-Inoculum**: 50mL PDA. 28ºC. Adding 50 mL of water after 7 days.

2) **SSF**: 5 g of sterilized raw material + 10 mL saline solution or water + 1mL of PRE-Inoculum. 28ºC, 5 days.

Test	Raw materials	Ratio	Saline Solution
Control	Sugarcane bagasse + Wheat Bran	1:1	✓
1	Microalgae		x
2	Microalgae		✓
3	Microalgae + Sugarcane bagasse	1:1	x
4	Microalgae + Sugarcane bagasse	1:1	✓

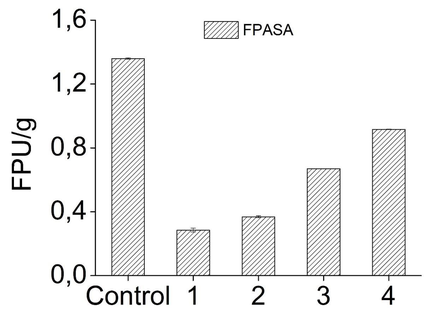
3) **Enzyme extraction and activity measurement**.

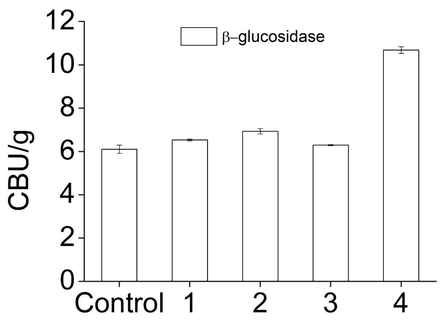
B. <u>Enzymes evolution: Effect of time and raw materials ratio.</u>

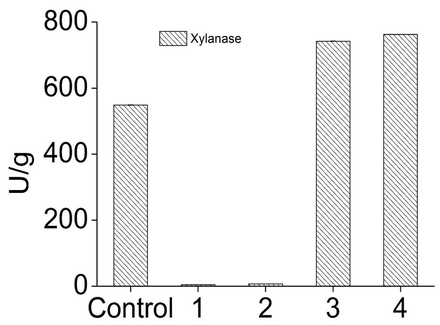
- Sample **3**: **microalgae: sugarcane bagasse** (1:1 and 3:1) **without saline solution**.

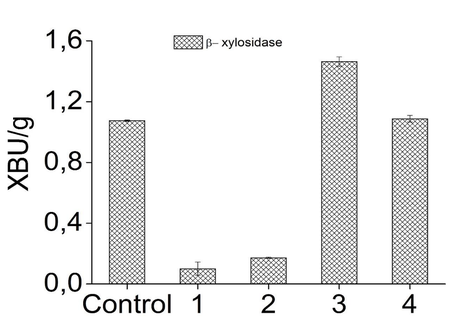
4. RESULTS

A. <u>First Screening:</u>





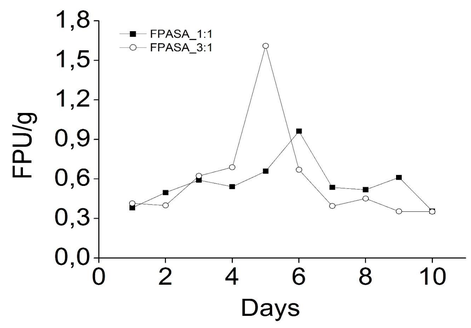


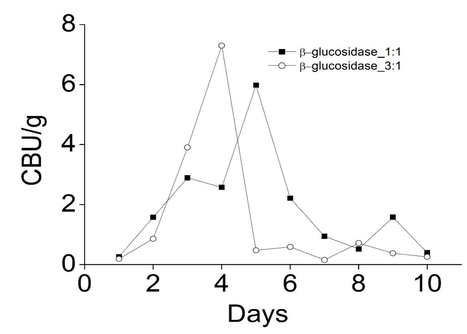


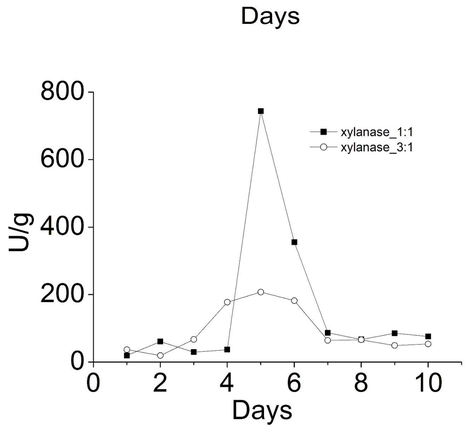
COMPROMISE OF ENZYMES ACTIVITIES

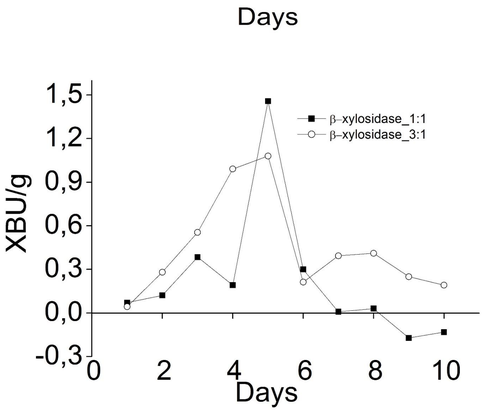
The election is **3 - microalgae + sugarcane bagasse**

B. <u>Enzymes evolution:</u>









5. CONCLUSIONS

- Microalgae are an adequate substrate for the enzyme production, but mix with other biomass. Saline solution is not required.
- High influence of the raw material, type and ratio, on the specific activity of each type of enzyme.

6. ACKNOWLEDGMENTS

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7. LITERATURE

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