



Symposium on the bioeconomy in Tropical America

Project *Babethanol**

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*Blue-agave bagasse ethanol

**New feedstock and innovative
transformation process for a more
sustainable development and production
of lignocellulosic ethanol
(*Babethanol*)**

**This project has received funding from the
European Community's Seventh Framework
Programme (FP7/2007-2013) under grant
agreement n° 227498**

Participant institutions in the Babethanol project

- 1) Institut National Polytechnique de Toulouse, FRANCE.
- 2) Universidad Nacional Autónoma de México, MEXICO.
- 3) Institut National de Sciences Appliquées, FRANCE.
- 4) Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, SPAIN.
- 5) Valtion teknillinen tutkimuskeskus, FINLAND.
- 6) Università degli Studi di Udine DiSA Dipartimento di Scienze Agrarie ed Ambientali, ITALY.
- 7) Centro Mario Molina para estudios estratégicos sobre energía y medio ambiente A.C., MEXICO.
- 8) Apygec S.A.R.L., FRANCE.
- 9) Consejo Regulador del Tequila A.C., MEXICO.
- 10) Procazucar S.A. de C.V., MEXICO.
- 11) Instituto Interamericano de Cooperación para la Agricultura - Programa Cooperativo para el Desarrollo Tecnológico Agroalimentario y Agroindustrial del Cono Sur URUGUAY, BRAZIL, CHILE, PARAGUAY, ARGENTINA.
- 12) Maguin S.A.S., FRANCE.
- 13) Universidad de Costa Rica, COSTA RICA.

Babethanol objectives

- Developing of a process that ensures better enzyme hydrolysability of cellulose.
- Lowering the requirements for energy, water, chemical products, detoxification and waste treatment, relative to current processes.
- Performing life-cycle assessment of this new process.
- Building a catalogue of potential residual agro-industrial biomasses.

Biotechnological strategy

Cellulose in residual lignocellulosic fibre



Fermentable sugars



Ethanol

Four basic feedstocks:

Barley straw (Spain)

Blue-agave bagasse (Mexico)

Oil-palm empty fruit bunch (Costa Rica)

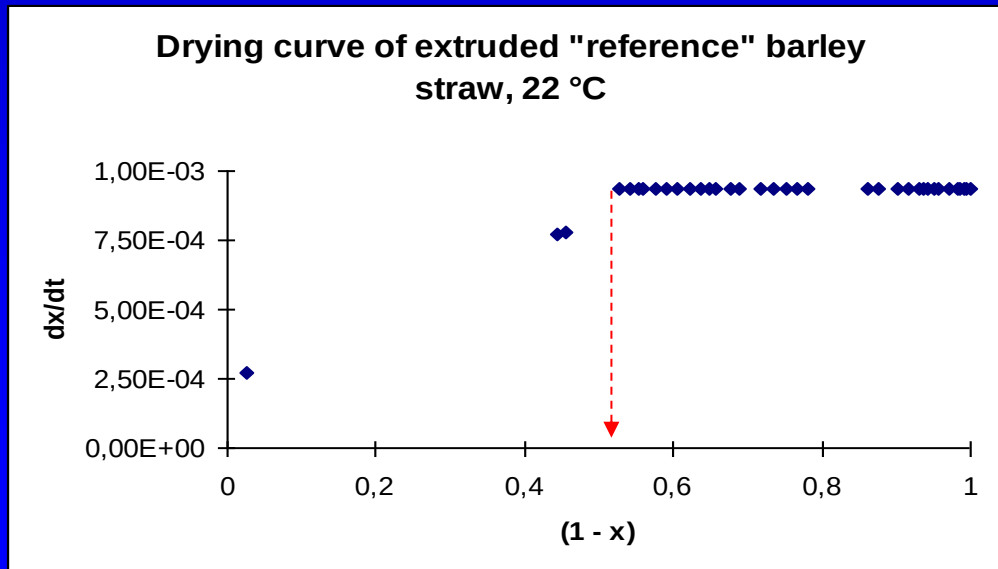
Sweet-corn cob (France)



Coopesilencio, R. L., Quepos

Rôle of the Biomass Laboratory in the Babethanol project

- Effect of pre-treatments on biomass cellulose crystallinity (X-ray diffractometry).
- Effect of pre-treatments on biomass dynamical porosity.
- Physical characterisation of raw lignocellulosic biomasses from South America.



Raw material

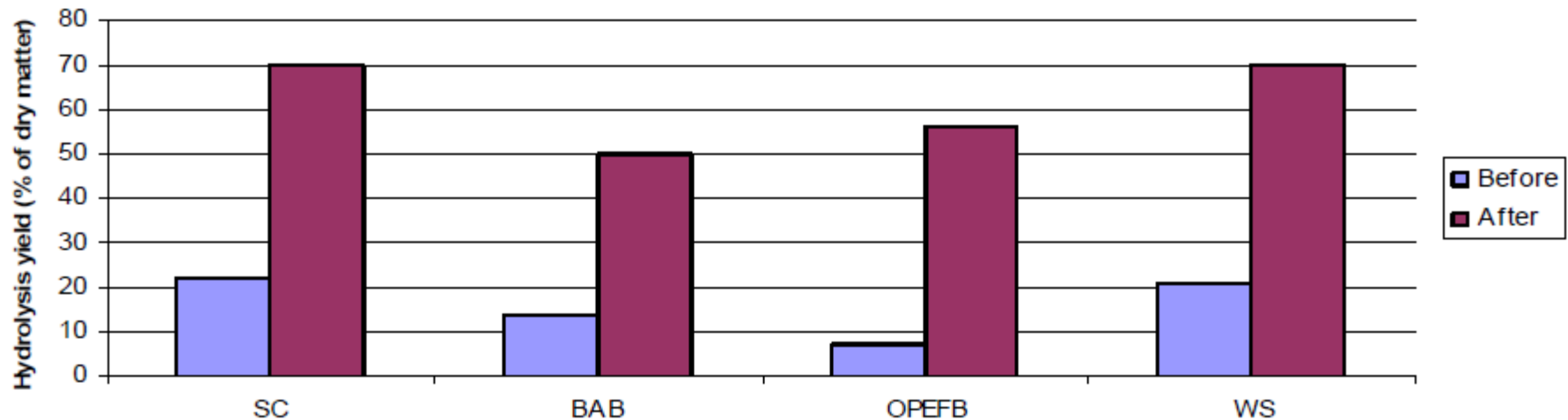
$$x_c = 0,34$$

Extruded material

$$x_c = 0,47$$

Effect of pretreatment on cellulose enzyme hydrolysability

Hydrolysability before and after optimal thermo-mechanico-chemical treatment for each matter



Outcome



- One step closer to more efficient production of lignocellulosic ethanol at commercial level.
- Papers at technical meetings.
- Papers in scientific journals.
- European patent of process, extended as valid in the United States of America. Patent publication expected by January 2014.
- A new project is being prepared for final scaling of the process and search for investors.
- Collaboration between research groups from different countries.
- Inventory of potential residual agro-industrial biomasses suitable for production of second-generation ethanol.

3rd International Cellulose Conference, Sapporo, 2012

Thermo-mechanico-chemical treatment effect on evolution of various lignocellulosic biomasses compositions and cellulose characteristics in order to produce second generation bioethanol

Brault, J.^{1 2}, Vandenbossche, V.^{1 2}, Hernández-Meléndez, O.³, Mata-Segreda, J. F.⁴, Castellón, E.⁴, Rigal, L.^{1 2}, Vilarem, G.^{1 2}

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**2nd Congress on Nanotechnology - 10th Seminar on
Exploitation of Agricultural Residues, San José,
2012**

**Evaluation of the diffusivity of liquids in porous
materials through drying kinetics**

Castellón, E., Ulate-Segura, D. G.; Mata-Segreda, J. F.

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Thanks for your attention

