

Valorisation of wheat bran into surfactant molecules

D. Gérard ^{1,2}, C. Rémond ^{1*}, H. Rakotoharivonina ¹, C. Rotholo ¹, R. Plantier-Royon ², M. Muzard ², C. Sarazin ³, E. Husson ³, I. Gosselin ³, M. Araya Farias ³, M. Deleu ⁴, L. Debatty ⁵, W. Dejonghe ⁶, Y. Satyawali ⁶, S. Serlet ⁷

¹ UMR FARE-Chaire AFERE URCA-INRA, Reims, France, ² ICMR, URCA-CNRS, Reims, France, ³ GEC, UPJV, Amiens, France,

⁴ LBMI, Gembloux AgroBioTech, ULiège, Gembloux, Belgique, ⁵ VALBIOM, Gembloux, Belgique, ⁶ VITO, Mol, Belgique, ⁷ INAGRO, Rumbek-Beitem, Belgique

* Contact: caroline.remond@univ-reims.fr

Enzymatic fractionation of wheat bran into sugars

Wheat bran, an abundant co-product from milling industry and from 1st generation biorefinery



Wheat bran

Xylans
Cellulose

Enzymatic hydrolysis

Cellulases, hemicellulases



-  Xylose
-  Glucose
-  Arabinose
-  Oligosaccharides

Optimisation of hydrolysis conditions:

- Pretreatment of wheat bran (destarching, ionic liquids)
- Various enzymes and different combinations of enzymes
- Different reaction conditions (enzyme and wheat bran loading...)

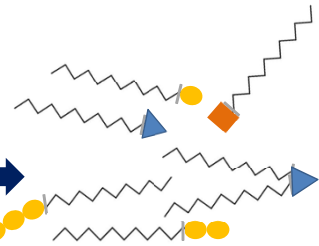
Enzymatic production of surfactants

C5 and C6 sugars

Esterification
/transesterification

Lipase

Fatty acid/fatty acid ester



C5 and C6
based-surfactants

Optimisation of esterification/transesterification conditions:

- Water control
- Nature of fatty acid/fatty acid ester
- Enzyme loading
- Nature of solvent, co-solvent
- C5-C6/fatty acid or fatty acid ester ratios


Wheat bran
(carbohydrate)



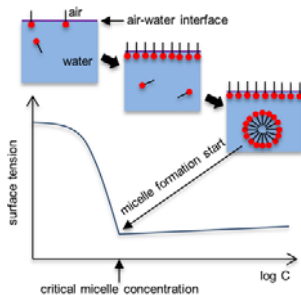

Surfactant
molecules




Applications
with high added value
Detergents, Cosmetics,
Physicochemical agents,
Food additives

Purification and characterization of surfactants

- Purification of C5 and C6-based sugar esters
- Determination of their structure
- Characterization of their physico-chemical properties: Critical Aggregation Concentration (CAC), surface tension decrease, stability...



Technology transfer: economic feasibility, environmental impact

- Scaling-up
- Development of continuous process in membrane reactor
- Life cycle analysis

