

Wastes of banana 's lignocellulosic biomass: a sustainable and renewable source of biogas production



Irénée Kamdem^a, Serge Hiligsmann^a, Caroline Vanderghem^b, Igor Bilik^a, Michel Paquot^b, Philippe Thonart^a

^aWalloon Centre of Industrial Biology (CWBI), Université de Liège, Bd du Rectorat, 29, B40-P70, 4000 Liège, Belgium

^bUnité de chimie biologique industrielle, Faculté Universitaire des Sciences Agronomiques de Gembloux, passage des Déportés 2, 5030 Gembloux, Belgium



INTRODUCTION

As a renewable energy source in a context of sustainable development, discarded banana's lignocellulosic biomass (balicebiom) could be used efficiently to produce biogas in general and CH₄ in particular.

METHODOLOGY

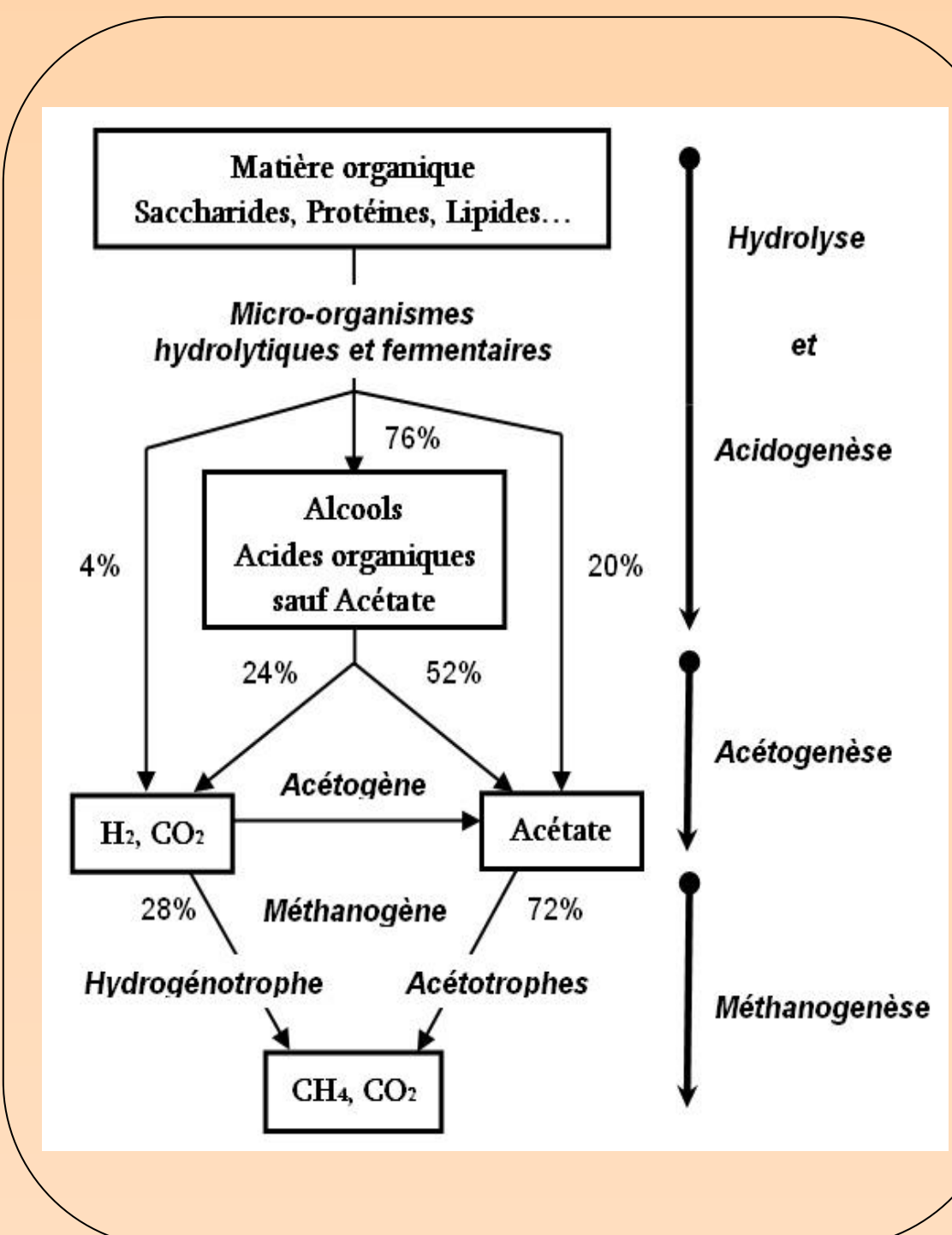
The investigations carried out have involved chemical analysis on solid, liquid and gaseous samples from each morphological part (MP) during the fermentation process

Sun and air-dried MP (± 1mm of diameter)



organic matter and nitrogen analysis

Biochemical Methane Potential (BMP) essay



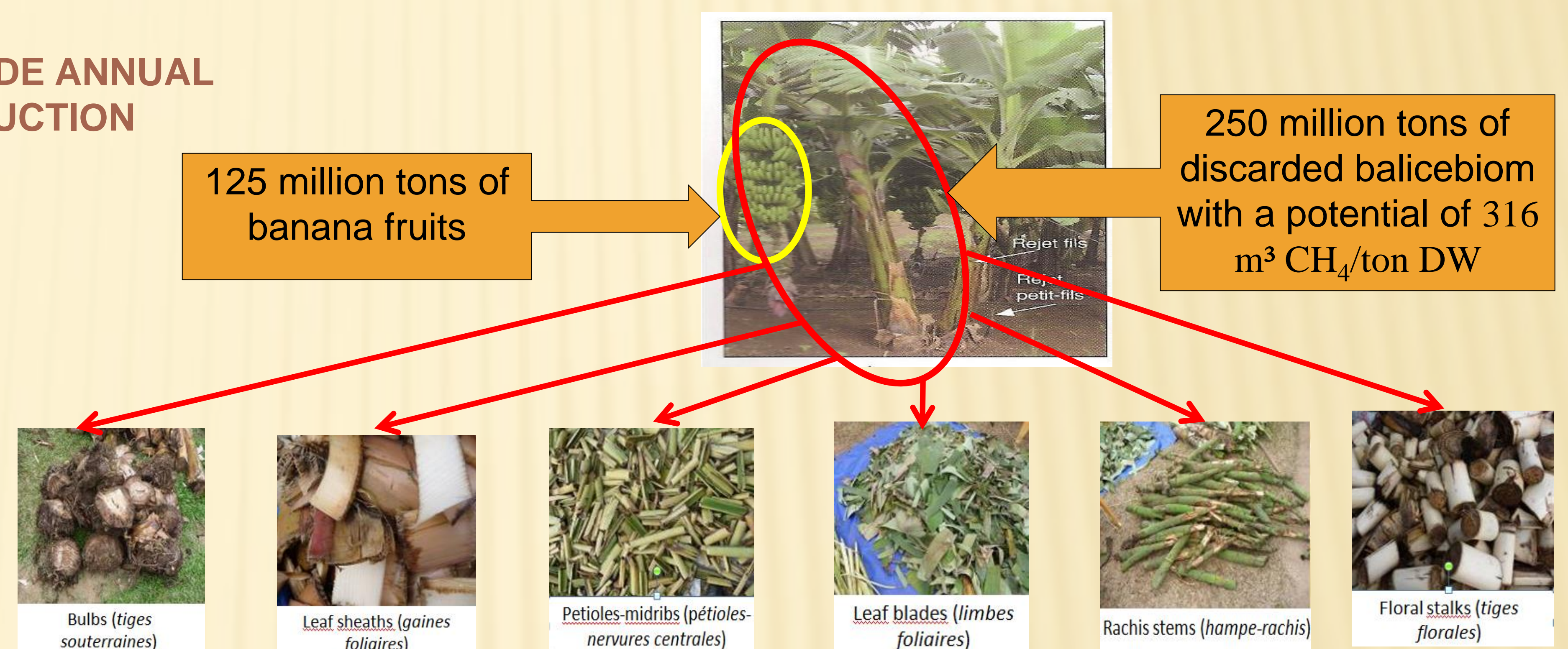
Volatile fatty acid (VFA) analysis using HPLC

Biogas analysis using KOH equipment replacement procedure



Electricity estimation and valorization

WORLDWIDE ANNUAL PRODUCTION

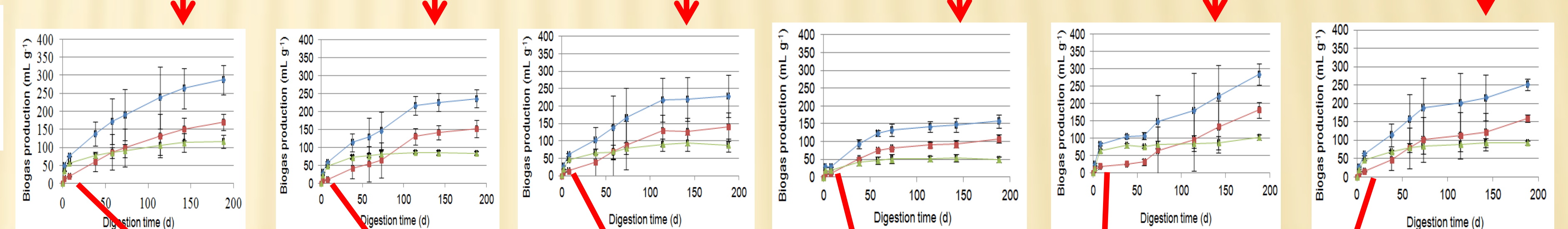


RESULTS 1

	11	11.5	17	40.5	7	11
% of balicebiom DW:	11	11.5	17	40.5	7	11
C/N:	45	57	55	18	28	21
m ³ CH ₄ /ton DW:	150	140	130	98	162	144

RESULTS 2

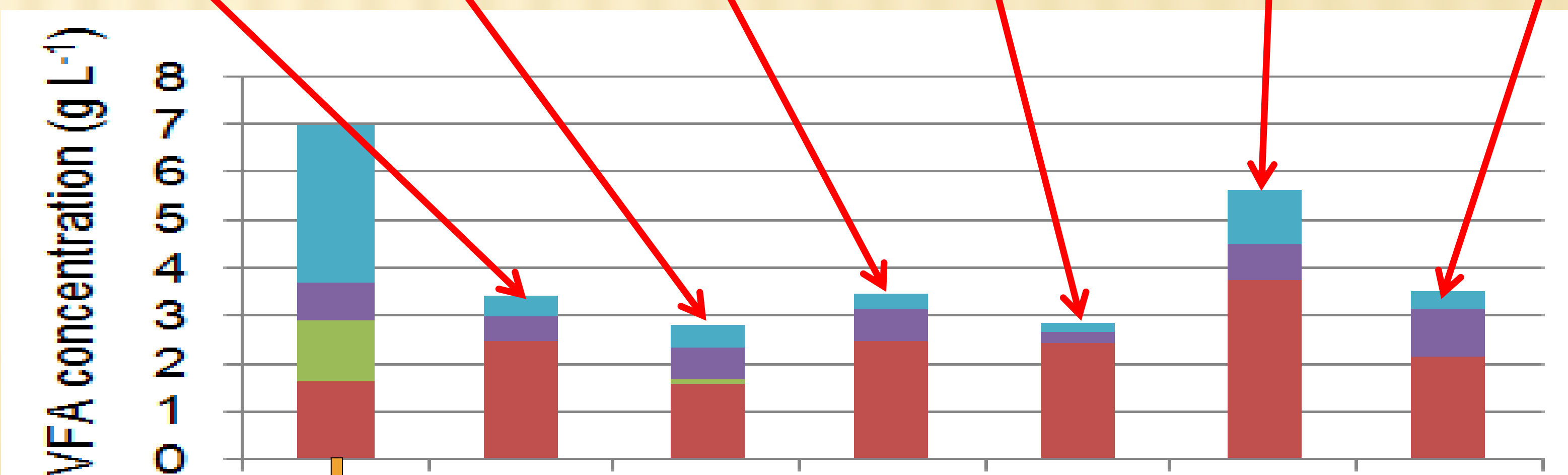
Biogas production during 188 d



RESULTS 3

VFA concentrations after 14 d

Butyrate, Ethanol, Glucose, Propionate, Acetate



CONCLUSIONS

Our results show that:

- An efficient transformation of balicebiom into a clean energy vector, biomethane is possible.
- An agro-industrial banana producing company such as CDC-Del Monte in Cameroon could generate an important income from this energy (bout 10 million kWh which would be worth 0.8–1.6 million € in the current market).
- Further studies need to be performed to improve the biogas productivity.
- Pre-treatments and co-biomethanation of all the six MPs studied in this work need to be investigated in order to reduce the digestion time and to optimize the production of CH₄.