

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



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## 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 CH<sub>4</sub> in particular.

## METHODOLOGY

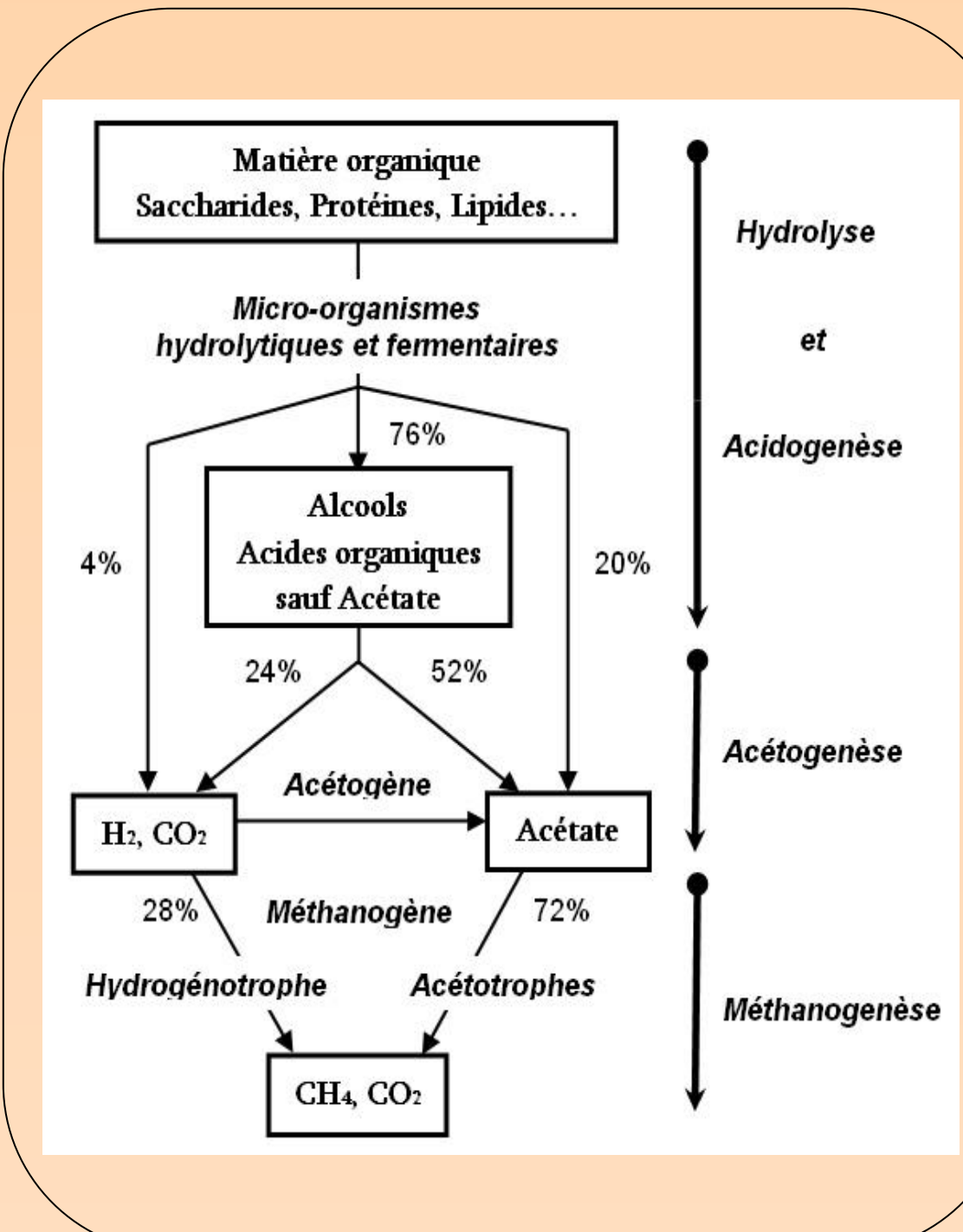
The investigations carried out have involved chemical analysis on solid, liquid and gaseous samples from each morphological part (MP) during the fermentation process

Sun and air-dried MP (± 1 mm 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

125 million tons of banana fruits

250 million tons of discarded balicebiom with a potential of 316 m<sup>3</sup> CH<sub>4</sub>/ton DW

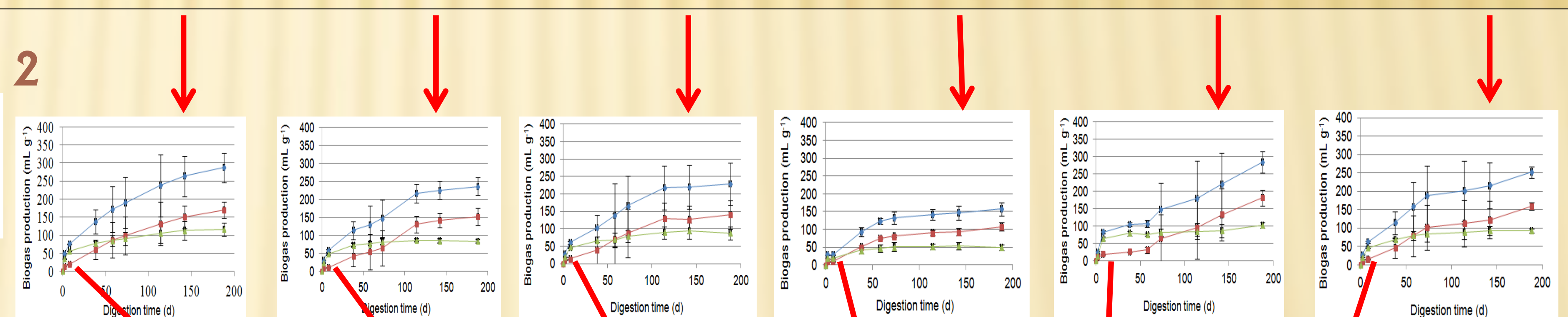


## RESULTS 1

	Bulbs	Leaf sheaths	Petioles-midribs	Leaf blades	Rachis stems	Floral stalks
% of balicebiom DW:	11	11.	17	40.	7	13
C/N:	45	5	55	5	28	21
m <sup>3</sup> CH <sub>4</sub> /ton DW:	150	57	130	18	162	144

## RESULTS 2

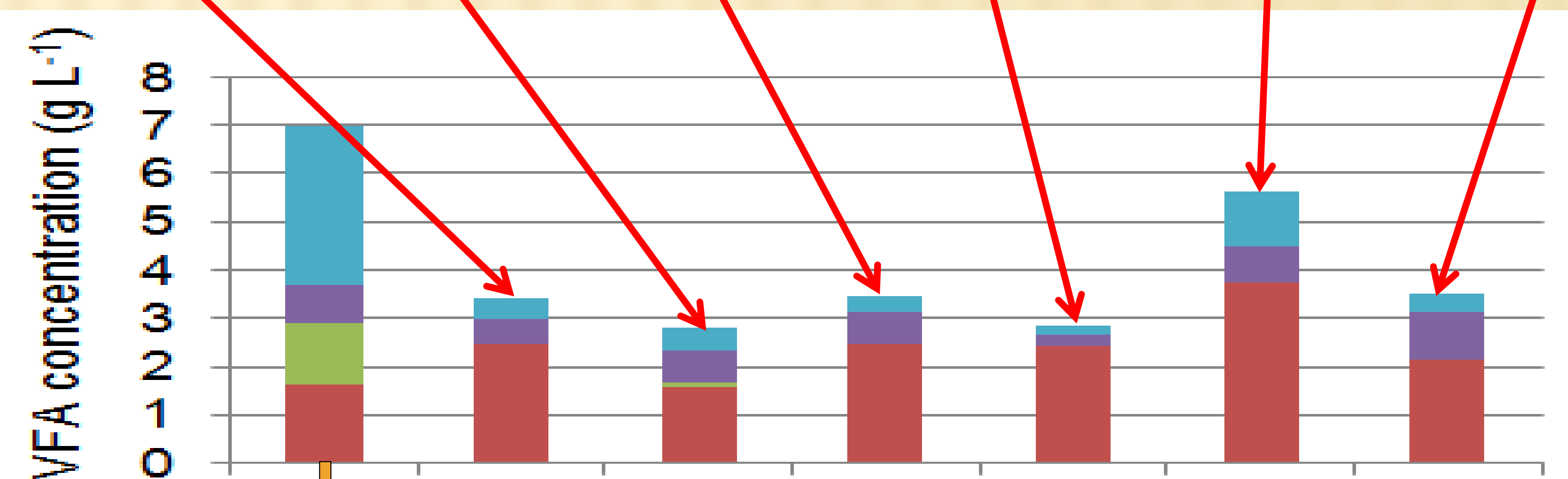
Biogas production during 188 d



## 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 (about 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.
- Pretreatments 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 CH<sub>4</sub>.