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PILOT INCINERATOR FOR THE COMBUSTION OF COFFEE-PULP WASTE AND PROCESS ENERGY GENERATION

REPIC congress, 21 June 2011

Initiated by FHNW and cleaner production centere El Salvador

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Problems

- waste management
- reduction of methane emissions
- prevent contamination of drinking water

Introduction

- **calorific value similar to wood chips (coffee pulp 16.98 MJ/kg; wood chips 18.45MJ/kg)**
- **fresh coffee pulp 90 wt% water content after wet processing**

Chemical composition of coffee pulp and wood chips fuel

Parameter	Wood Chips	Coffee Pulp	Unit
Carbon	49.4	44.2	wt% DM
Hydrogen	6.3	6.2	wt% DM
Nitrogen	0.1	2.8	wt% DM
Oxygen	44.1	38.9	wt% DM
Sulfur	0.014	0.173	wt% DM
Magnesium	128	1580	mg/kg DM
Chlorine	1	767	mg/kg DM
Phosphor	199	1480	mg/kg DM
Potassium	630	53800	mg/kg DM
Calcium	671	14300	mg/kg DM

Incinerator for coffee pulp waste

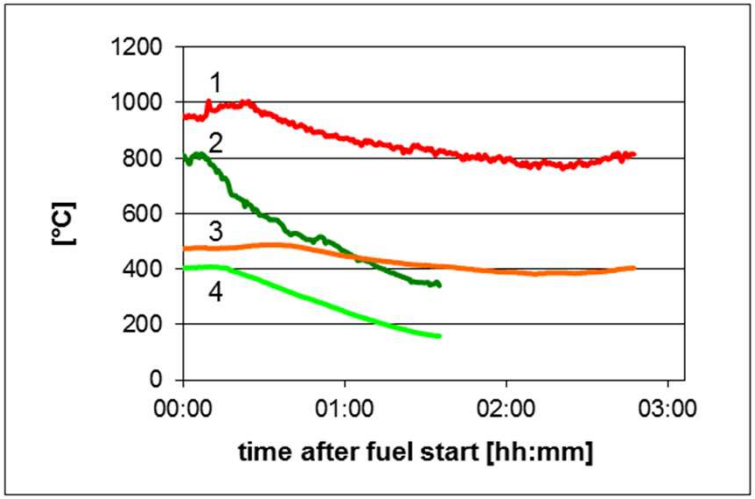
- reduction of production costs (wood fuel)
- production of process energy (coffee bean drying)
- robust and simple construction
- economic viability

Technology

- pre-drying of wet coffee pulp (to 70% wt)
- heat recuperation to preheat combustion air
- water boiler for process energy supply

Results

- **proper functioning of the stove with wood chips at 70 wt%**
- **no stable combustion by testing with coffee pulp**
- **mechanical disturbance of the ember bed improved combustion for a few minutes**



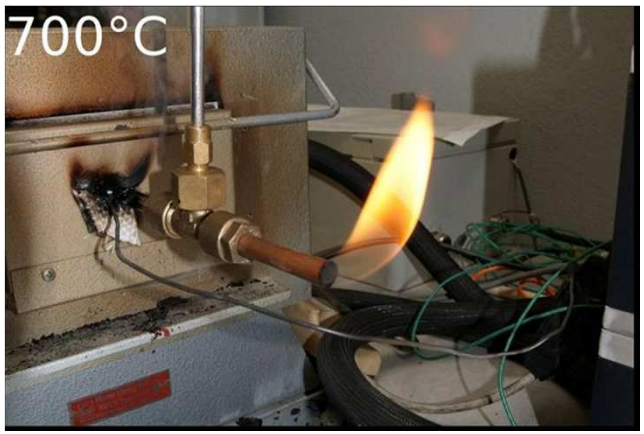
(1) combustion chamber temperature wood fuel
(2) combustion chamber temperature coffee pulp fuel
(3) primary combustion air wood fuel
(4) primary combustion air coffee pulp fuel

Further coffee pulp combustion tests

- coffee pulp in a modern wood pellet combustion chamber (smouldering, smoke, no flames)

- dried coffee pulp mixed with 50 %wt wood pellets for a successful combustion

- stable combustion of gas from dried and pre-heated (700 ℃) coffee pulp



Conclusions

- chemical and/or physical processes prevent stable combustion of coffee pulp (physical structure with good insulation properties)
- processing of coffee pulp (drying, pelletizing, shredding) could improve combustion
- biochar as interesting option

Danke für Ihre Aufmerksamkeit

Förderung: REPIC
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