



CENTRO NACIONAL
DE REFERÊNCIA EM BIOMASSA

HOW MUCH MIGHT BIOGENIC METHANE EMISSIONS AFFECT BIOFUELS GREENHOUSE GASES BALANCE?

AN ANALYSIS FOR THE BRAZILIAN ETHANOL
FROM SUGARCANE

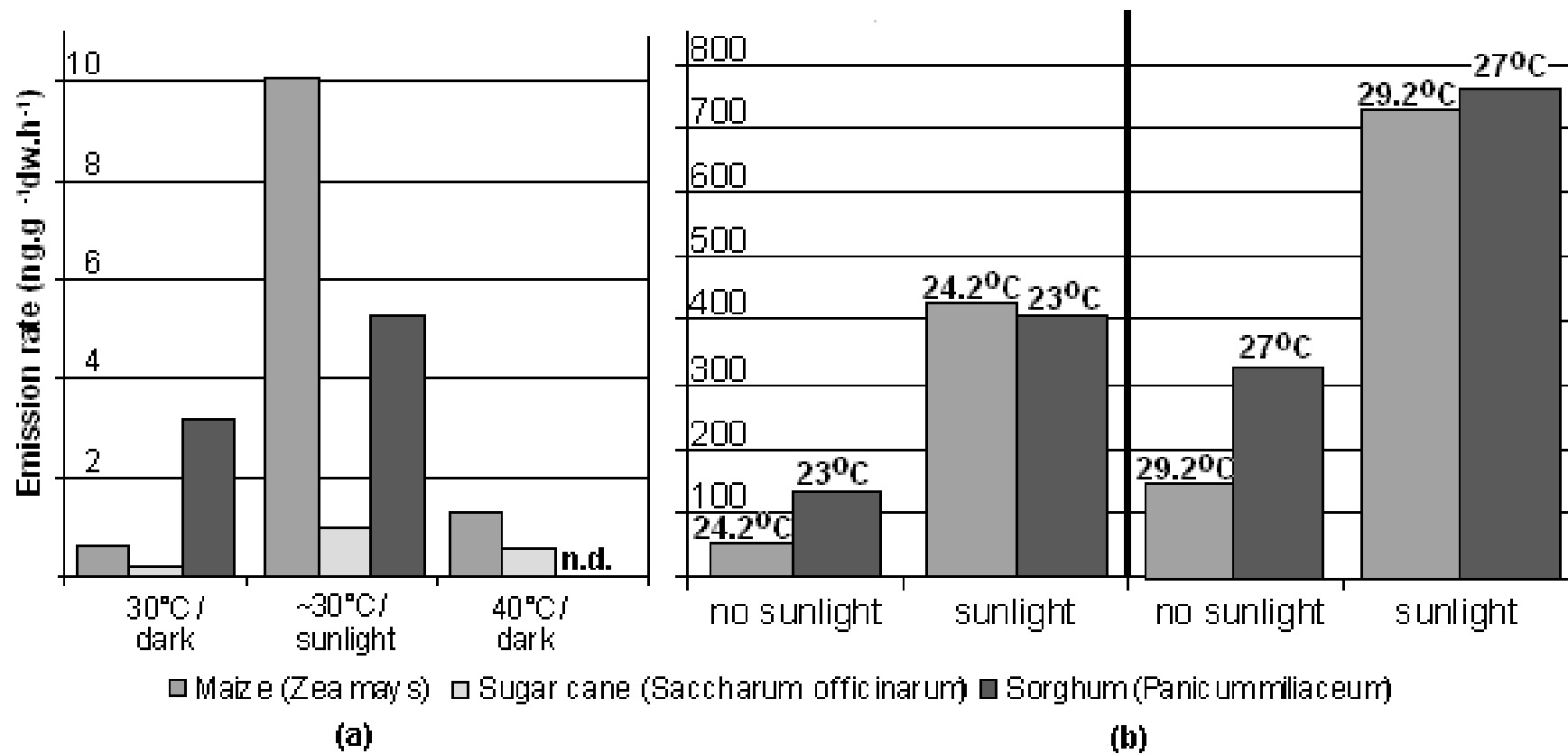


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Motivation of this paper

- Scientific proof that living plants emit methane
 - Though plant emission is a natural phenomena...
 - Agriculture and afforestation are anthropogenic systems
 - Thus, human designed systems to produce biomass must count this emission

Detached leaves and intact C4 plants



Calculations

- Sugarcane and Ethanol figures were assessed from MACEDO et al, 2004
- From KEPPLER et al, 2006
 - The average emission rates for intact plants
 - Sunlight and no-sunlight period lengths
- Sigmoidal shaped curves for dry matter accumulation were considered
- Dry matter contents for stalks and trash were assessed in the Literature
- No co-product was considered

Plant methane emission rates and calculated emissions for sugarcane and ethanol

	ng.g⁻¹(dw).h⁻¹		
Emission rate (KEPPLER et al., 2006)	Min.	Ave.	Max.
Sunlight	198	374	598
No-sunlight	30.7	119	207
Sugarcane	kgCH₄.ha⁻¹.yr⁻¹		
	13.12	30.95	51.18
	kgCH₄.tc⁻¹		
	0.191	0.451	0.746
	kgCO₂eq.L⁻¹		
Anhydrous ethanol	0.0467	0.1101	0.1821
Hydrous ethanol	0.0453	0.1069	0.1767
	kgCO₂eq.MJ⁻¹		
Anhydrous ethanol (6,750kcal.kg ⁻¹ and 791kg.m ⁻³)	0.0021	0.0049	0.0081
Hydrous ethanol (6,300kcal.kg ⁻¹ ; 809kg.m ⁻³)	0.0021	0.0050	0.0083

The Answer!

- 27% increase in the GHG balance
 - However...
 - Uncertainties are High!
- Brazilian Ethanol X Gasoline

	H. Ethanol	Gasoline
kgCO ₂ eq.m ⁻³	496.3	2,820
kgCO ₂ eq.GJ ⁻¹	23.3	87.55

- Only 6% increase in energy basis



Vielen danke!

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