



BIOFUELS: IS THIS A SOLUTION OR A PROBLEM?

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World Fuel Ethanol Production



Source: F.O.Licht

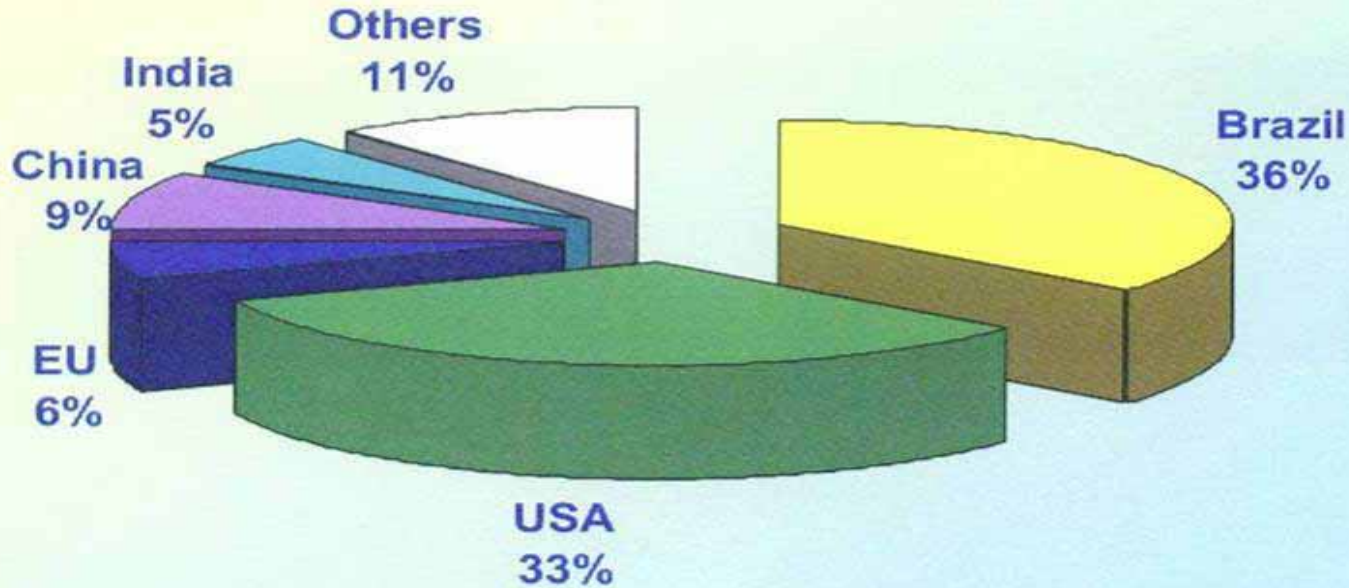
Ethanol from cellulose will add significant volumes



Ethanol World Production



42.2 billion liters (2004)

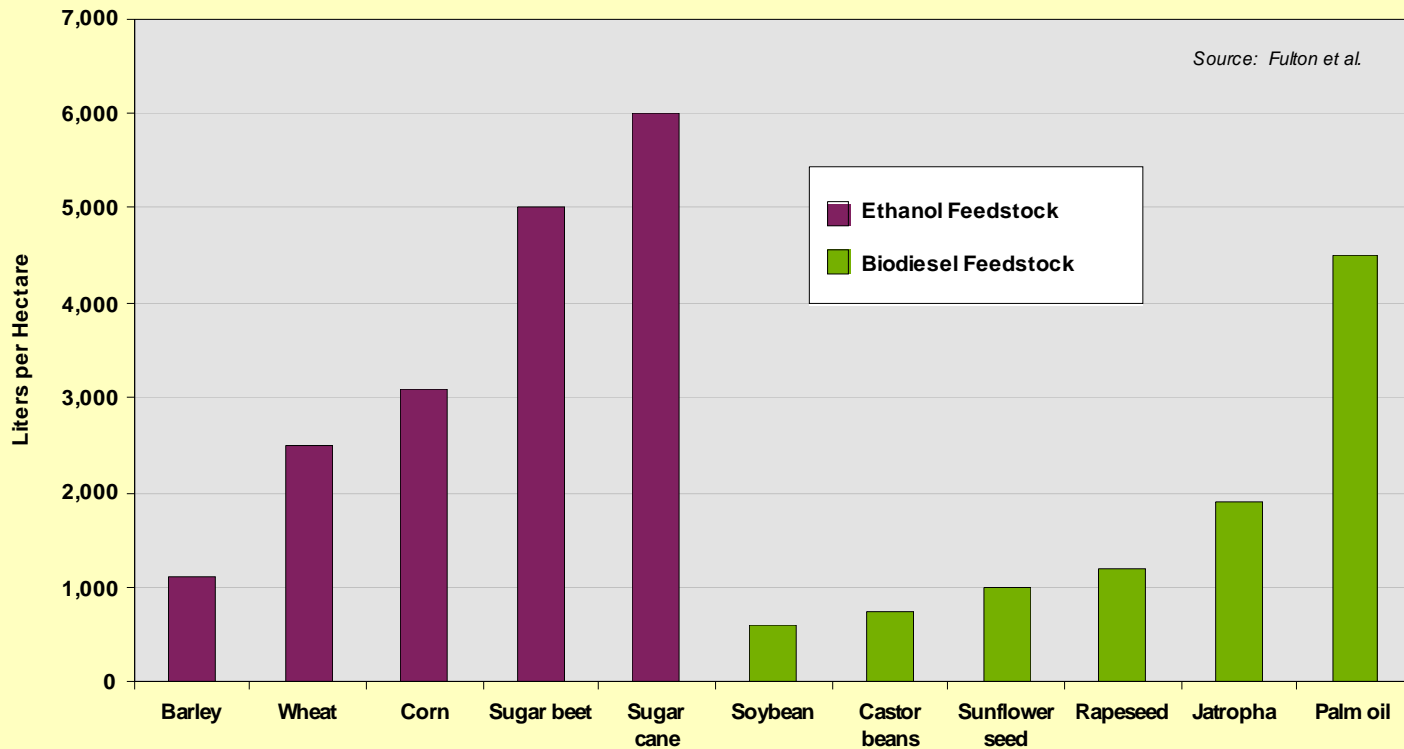


Fonte: FO Licht

Includes all types of Ethanol: potable, synthetic, from biomass, of different values qualities and end usage;

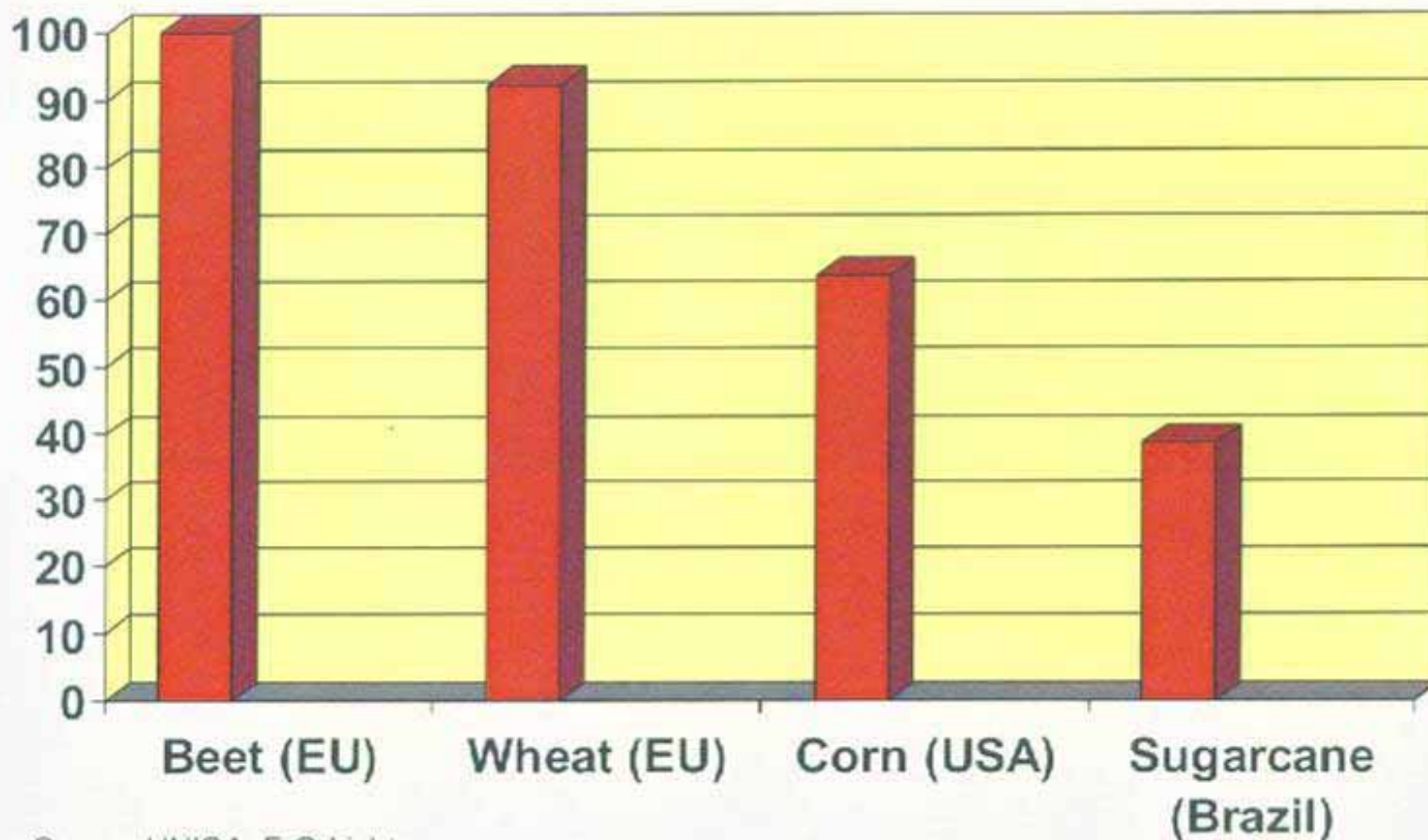


Biofuel Yields of Selected Ethanol and Biodiesel Feedstock



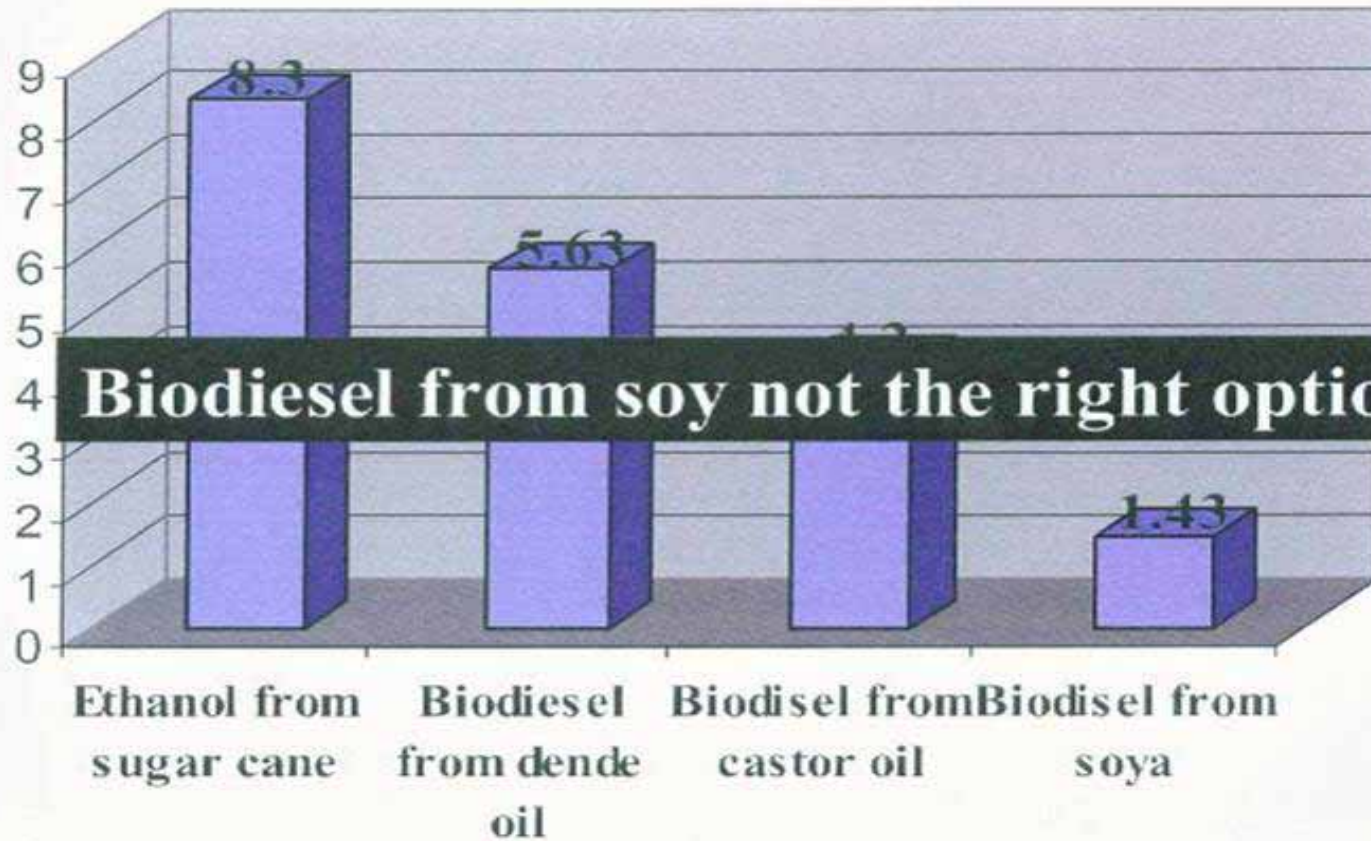
Cost of ethanol in Brazil 40 % of EU beet-ethanol

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Source: UNICA, F.O.Lights

ENERGY BALANCES OF BIOFUELS



Source: Macedo, 2004



Conventional Biofuels – Limiting Factors

- **High food and feed prices**
 - rapeseed oil and sugar prices
- **Other competing uses**
 - Biomaterials and food
- **Expansion of cropland onto sensitive areas**
 - Brazilian cerrado; rainforests in Indonesia and Malaysia; Conservation Reserve lands in the U.S.
- **Overstressed water supplies**
 - Fossil aquifers in northern China, across India, and the western corn/soy belt in the U.S.



Sugar & Ethanol Plant in Brazil



Brazil Has Land To Expand Production

	Million hectares
Brazil	850.0
Total arable land	320.0
Cultivated land:	
all crops	60.40
Sugar cane	5.4
Sugar cane for ethanol	2.7
Available land with potential for agriculture expansion	90.0
Each additional million kl of ethanol requires:	0.15

SCENARIO DISCUSSION

Brazilian sugarcane cultures

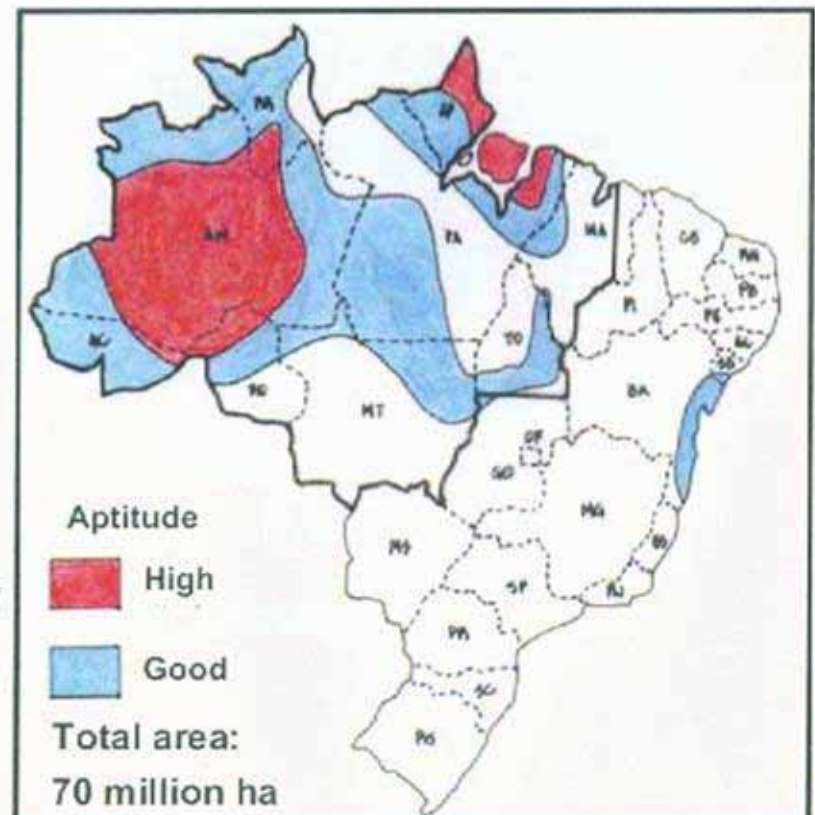


Potential biodiesel production

Considering just 10% of oil palm suitable areas in Northern Brazil, it could be produced more than 52 million m³ of biodiesel, about the current Brazilian diesel demand.

Suitable areas for oil palm cultivation

(MCT, 2003)



Cellulosic Biofuels Potential Theoretically Huge

- Germany: 25% petroleum displacement by 2030 with home grown cellulosic biofuels, (even with strict conservation priorities)
- U.S.: 30% of our petroleum displacement 2030
- A U.S. city of 1 million people generates enough municipal solid waste to produce 150 million liters of ethanol per year
- Energy crop breeding: yields could double or triple after they benefit from focused breeding efforts





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