

Life Cycle Assessment of Jatropha Based Bioenergy

Case-Studies in India

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A General Background
B Rural Electrification
C Jatropha Biodiesel
D Interpretation/Outlook

Why Jatropha?



- Drought resistant
- Low nutrients/water demand
- Growing on poor soils
- Increasing soil quality
- No food competition

! Wonderplant ?



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2 LCA Case Studies in India

India a lot of wasteland (55 million ha / 33 million ha)

1) Rural electrification, hedge cultivation

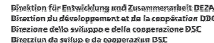
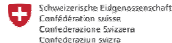


-> Rural development (x1000 villages unelectrified)

2) Jatropha Biodiesel, wasteland cultivation

-> Transportation sector

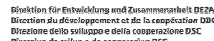
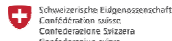
-> Interim Results



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Goals

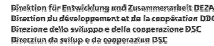
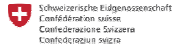
- Is Jatropha based bioenergy really ecofriendly?
- Which processes bear the high environmental impacts?
- What is the GHG mitigation potential?
- Capacity building: Life Cycle thinking



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Case 1

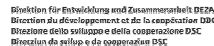
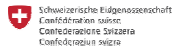
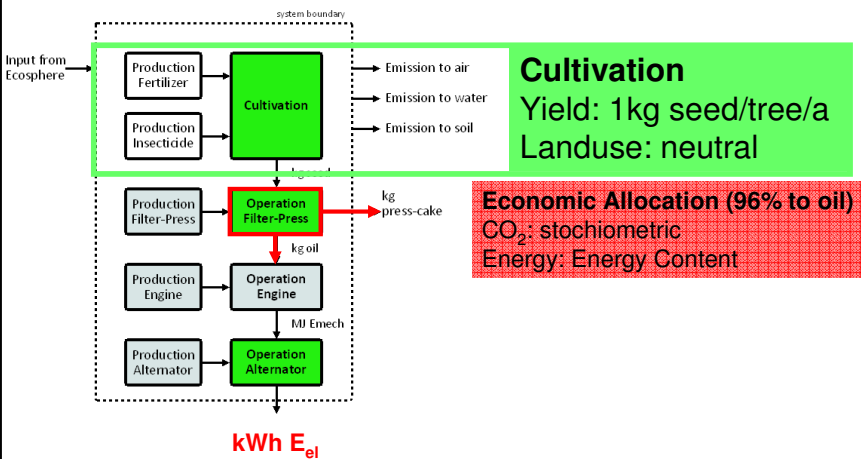
Jatropha based Rural Electrification

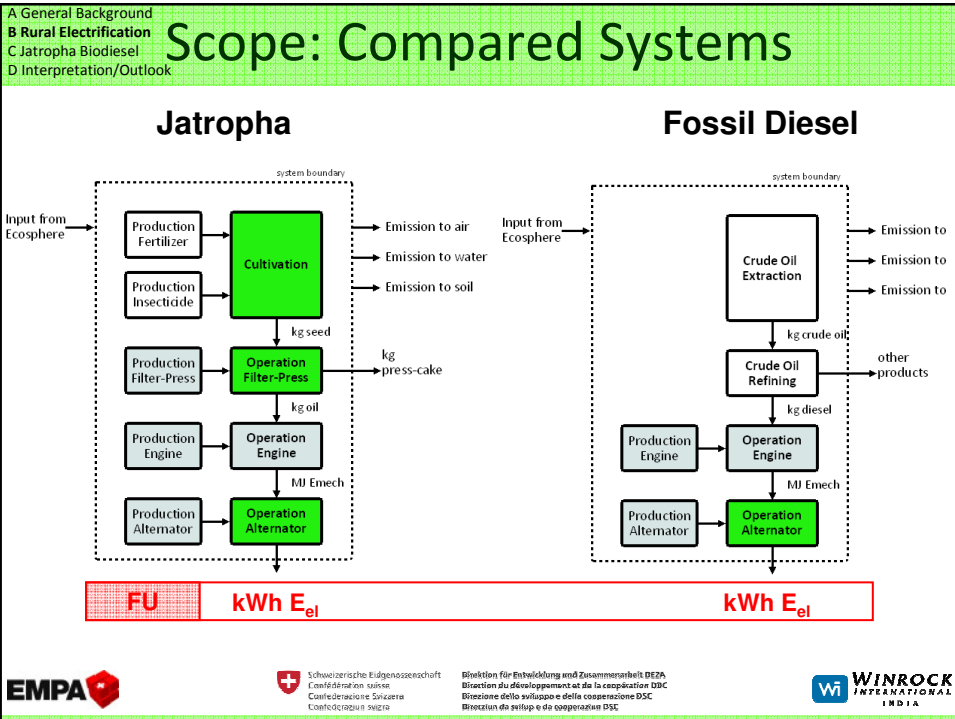


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Scope: Compared Systems

Jatropha





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Scope: Compared Systems

Photovoltaic System:

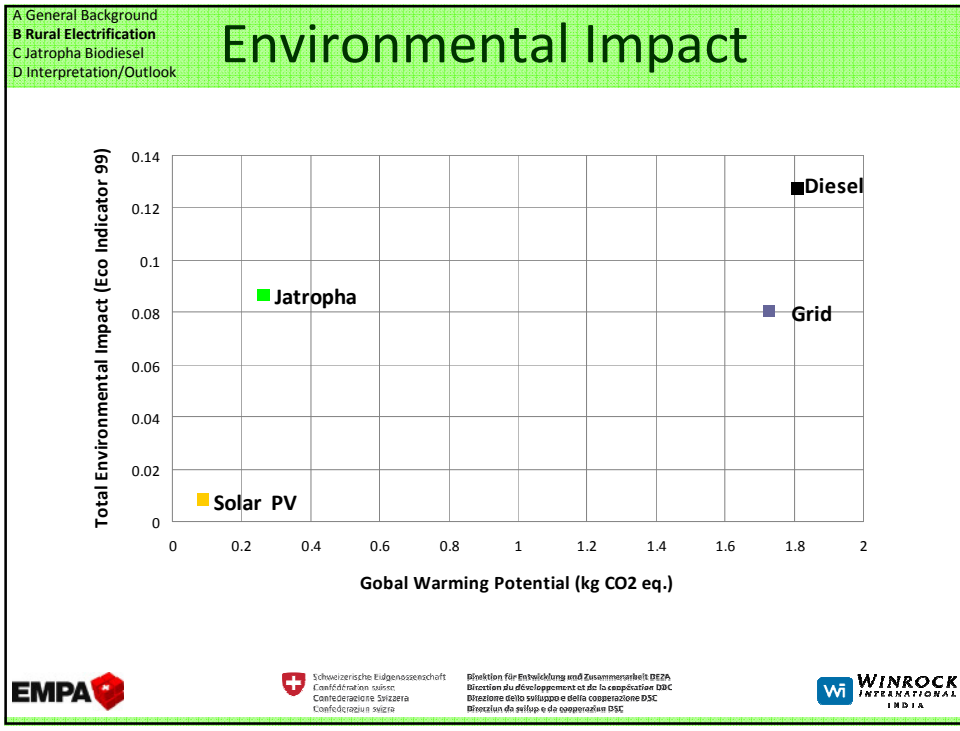
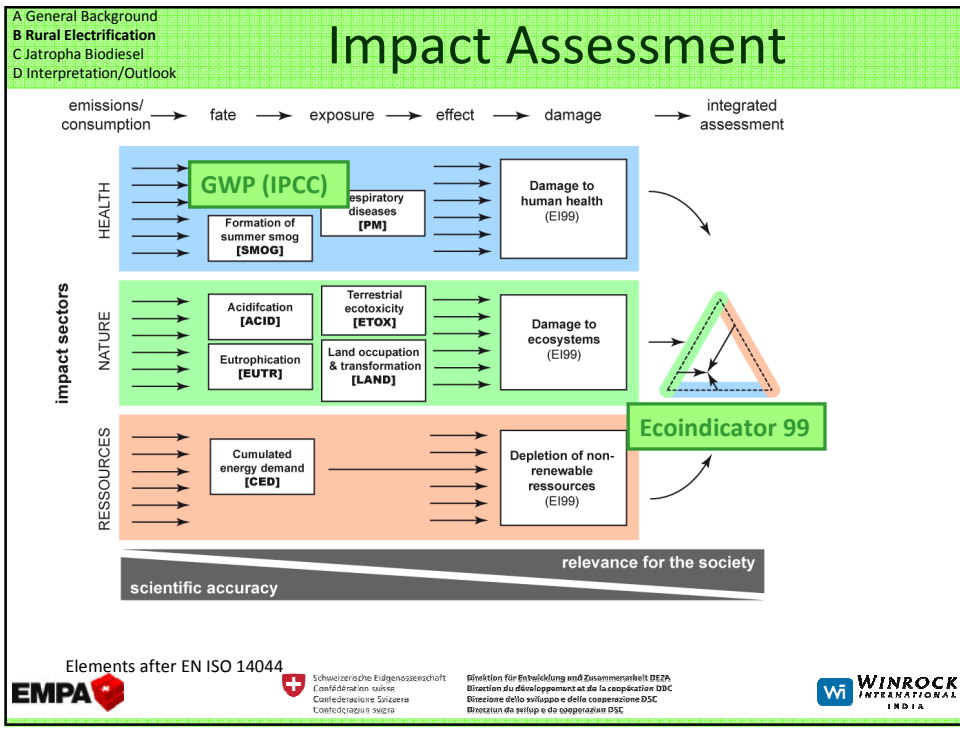
- 4kW photovoltaic panel, multi-Si
- 28 Pb-acid Batteries, tubular (12V,150Ah), recycling: cut-off!
- Inverter, el. Installation, transportation, ...

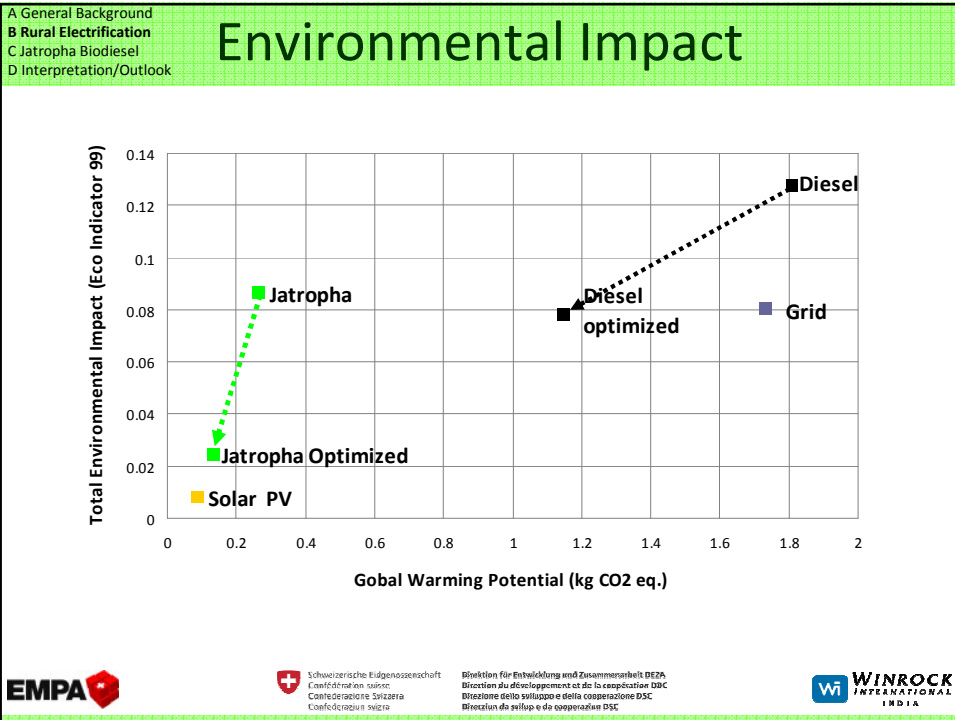
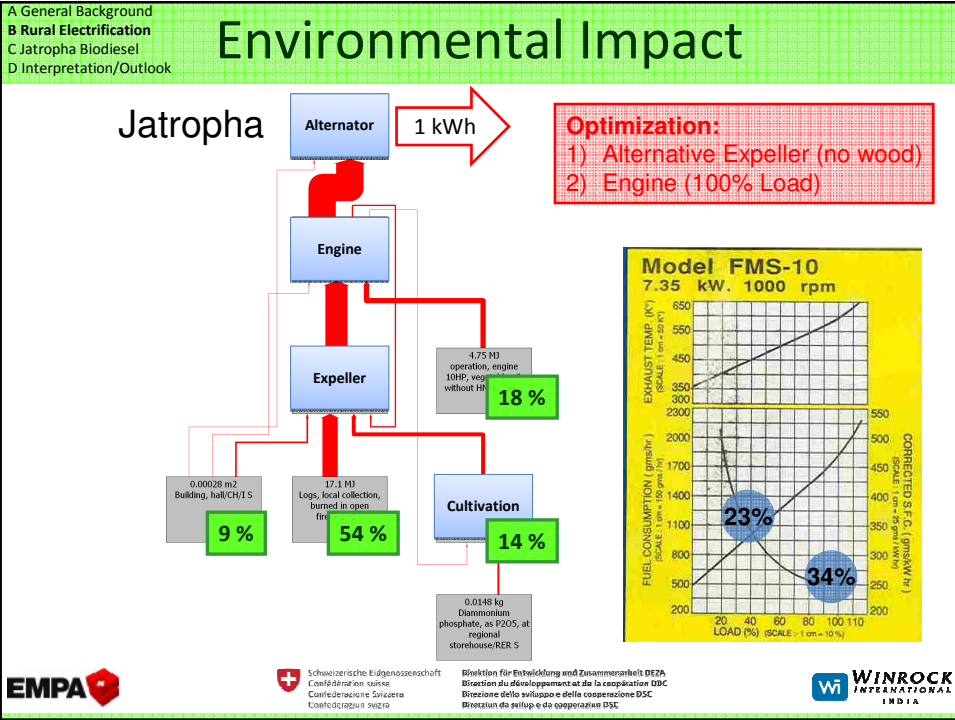
Grid Connection:

- 95 % Hard Coal (Proxy China)
- 5% Hydropower (Proxy non alpine regions)
- Transmission Grid: high, medium, low voltage (Proxy China)

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Direction du développement et de la coopération DDC
Direzione dello sviluppo e della cooperazione DSC
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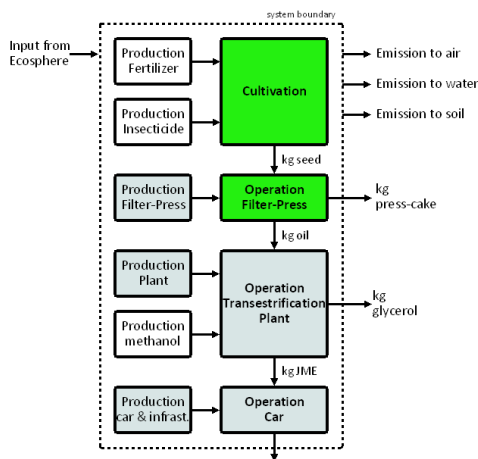




Jatropha Biodiesel

(interim results)

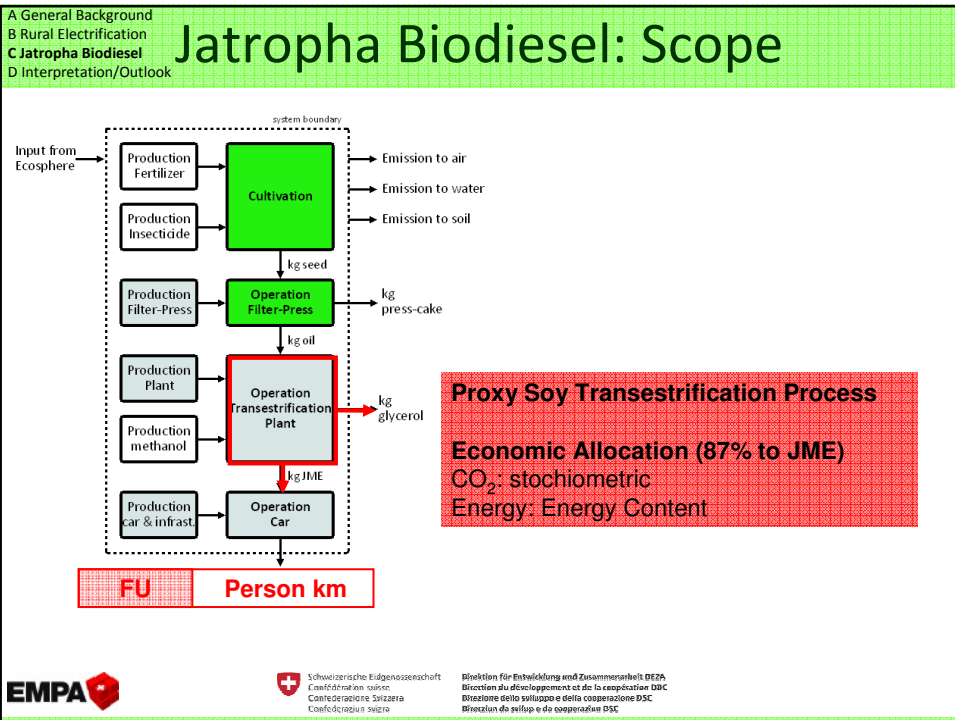
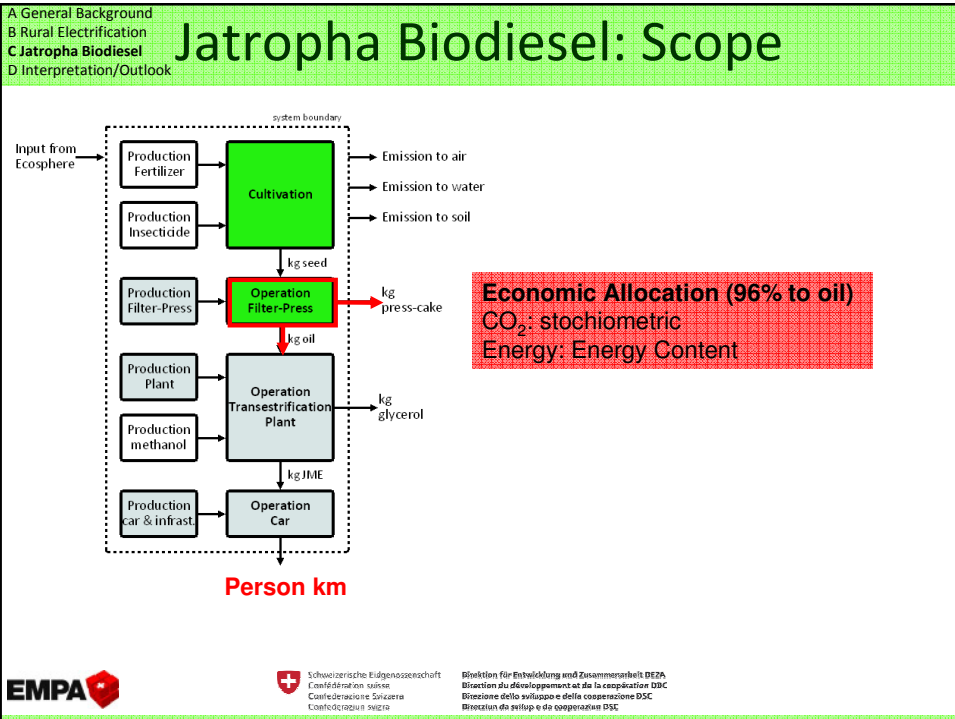
Jatropha Biodiesel: Scope

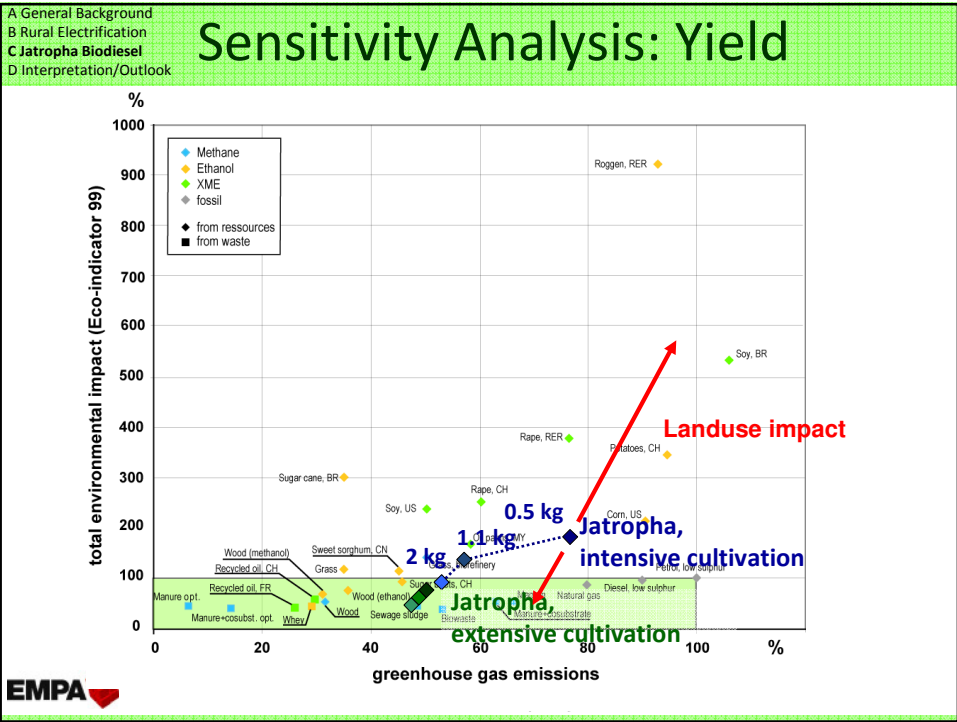
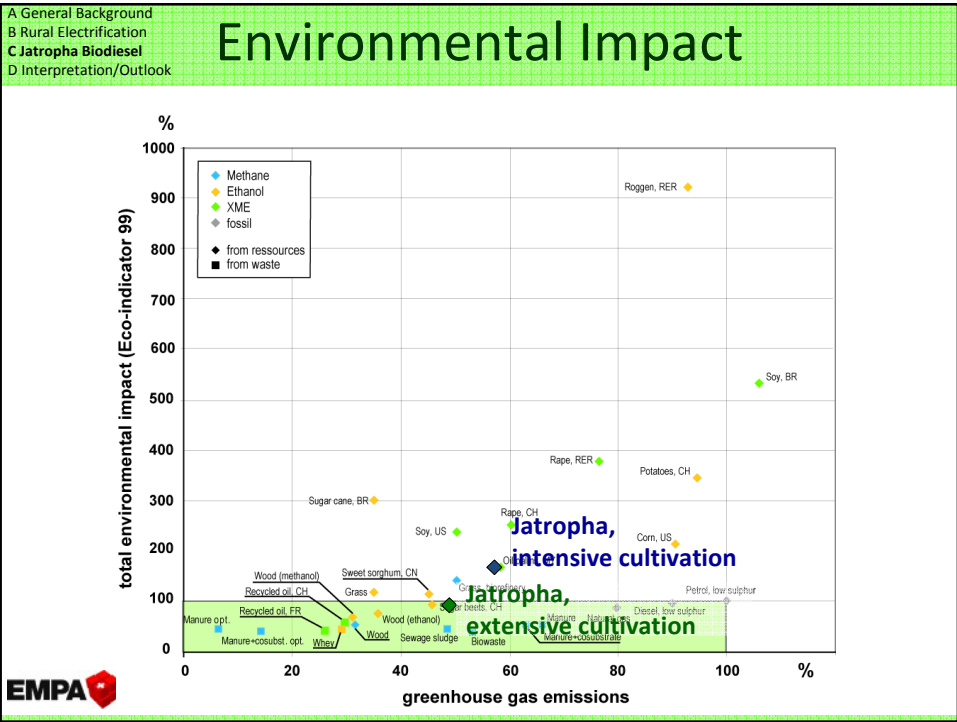


Cultivation:

Parameter	Extensive	Intensive	Unit
Yield	0.75	1.15	kg DJS per tree/year
Area	4	4	m2 per tree
Fertilizer			
Mineral Fertilizer (DAP)	-	0.1	Kg per tree/year
Organic fertilizer	0.1	0.98	Kg per tree/year
Irrigation	-	500	m3/ha/a
		2	times/a

Landuse: neutral

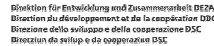
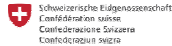




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Limitations of studies

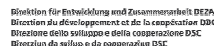
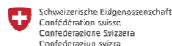
- Improve data on Jatropha cultivation
→ yield, landuse impacts, emissions, toxicity
- Improvement of LCA tools
→ wateruse impact, regionalization LCIA
- Integration of Socio-economic dimension
→ crucial for decision making!



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Interpretation/Outlook

- **Potential as sustainable Bioenergy**
- **Jatropha ≠ Jatropha**
- **Tendency: Extensive > intensive**
- **Focus on local usage!**
 - 0.5% wasteland to electrify 10'000 Ranidehra's





Thank you

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