



Title	Assessment of the Jatropha production for African development based on the actual situation of local livelihood : A case study of Niger, West Africa
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**Assessment of the *Jatropha* production  
for African development based on the  
actual situation of local livelihood. A  
case study of Niger, West Africa**

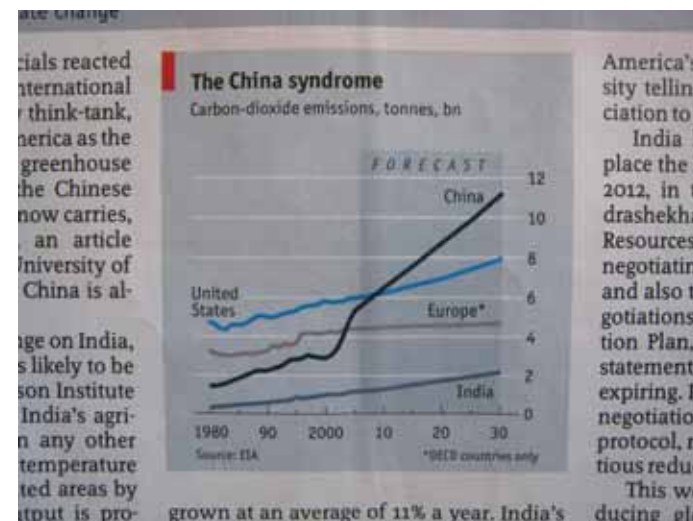
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# Context of Biofuel

- ✓ **Global warming**, increase of surface temperature on land and water cause by **GHG**
- ✓ Increase **crud oil price** (100USD/barrel=75,000JPY/kL/2007)
- ✓ Augmentation of **energy consumption** along with the economic growth in **India** and **China**
- ✓ Growth of **inflation** in commodities supply



The Economist June 7<sup>th</sup>, 2008

# Context of Biofuel (cont'd)

- ✓ Biofuel production by conventional staples like corn, wheat grain and sugar for **bioethanol**, rape seeds, soybeans and palm oil for **biodiesel**.
- ✓ Augmentation of agric- production as a feedstock than **provisions**
- ✓ Growth of **inflation** in commodities supply

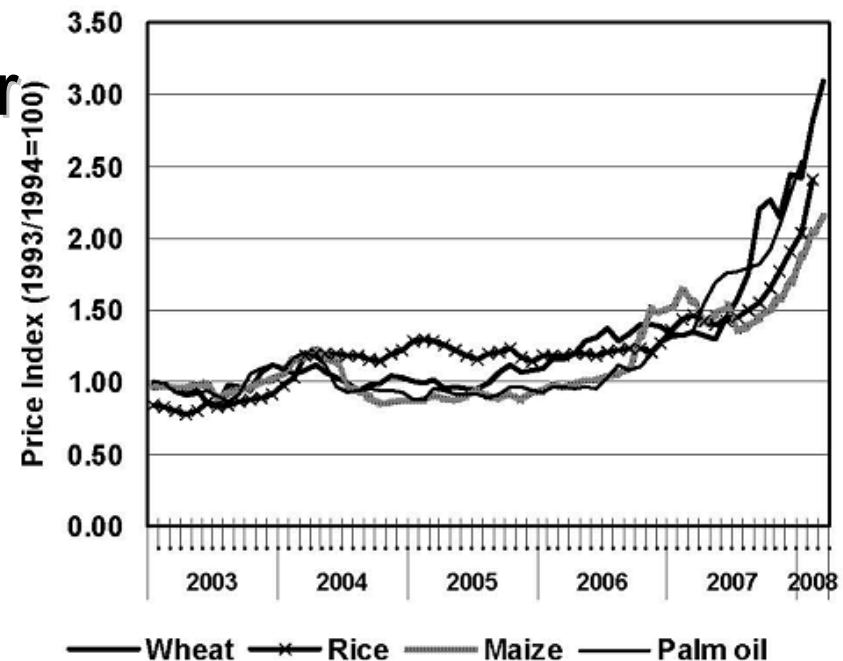


Fig. 1. Price index of major crops (1993/1994=100)

# *Mitigation of inflation*

- ✓ Shifting from Bioethanol (low nenergy output) to BDF (high energy output)
- ✓ Quality improve of LCA on palm oil processing
- ✓ Utilization of non-edible oils for feedstock (Jatropha, Castor bean, Neem, Pongamia, Meswak, Mahua, etc)



# *BDF feedstock; Jatropha curcas*

- ✓ A shrub originated from **Mexico and Central America**
- ✓ **Non edible** and high adaptability to **degraded lands of arid and semi-arid environments**
- ✓ Its height reaches up to **5 meters.**
- ✓ **300 mm to 1,000 mm average rainfall** necessary for *Jatropha* growth
- ✓ Well adapted to **marginal soils with low nutrient content**



# *Jatropha in African development*

## **J. production**

- High adaptability to arid and semi-arid environment
- No conflict with food consumption
- High quality oil

## **Af countries**

- Population explosion
- Expansion of degraded land
- Deep rooted poverty



**Poverty alleviation  
through Jatropha**

# *Jatropha production in African*

- ✓ **Swaziland, Madagascar, South Africa, Zambia** (D1 Oils)
- ✓ **Nigeria** (Viscount Energy of China)
- ✓ **Ghana** (BD1 of S. Africa)
- ✓ **Kenya** (Bio-energy Int'l of Switzerland)
- ✓ **South Africa** (Alco Group of Belgium)
- ✓ **Ivory Coast** (21<sup>st</sup> Century Energy of the USA)
- ✓ **DRC** (MagIndustries of Canada)
- ✓ **Tanzania** (BAFF, SEKAB of Sweden, WILMA of the USA, etc)



# *Gap in *Jatropha* production*

- **Few studies** have been conducted so far on the *Jatropha* production in Africa and debates have just started on whether *Jatropha* brings benefit or not in terms of **agricultural development** because the **self-sufficiency in food production** within Africa is still a **challenging** issue. Hence, **research** on this feedstock should be enhanced to assess its potential and sustainability.

# *Hypothesis in Jatropha for Africa*

- ✓ Degraded land in arid and semi-arid environment is identified as **a suitable area for *Jatropha* production** but **may not be always available for its production** due to local livelihood highly depending on a marginal land. A **judicious approach** with a **sustainable manner** should be taken by researches in order to avoid aggravating the poverty in the poor.

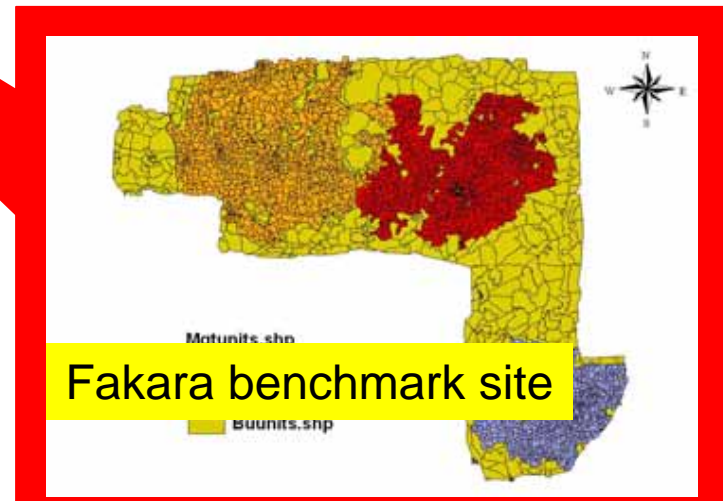
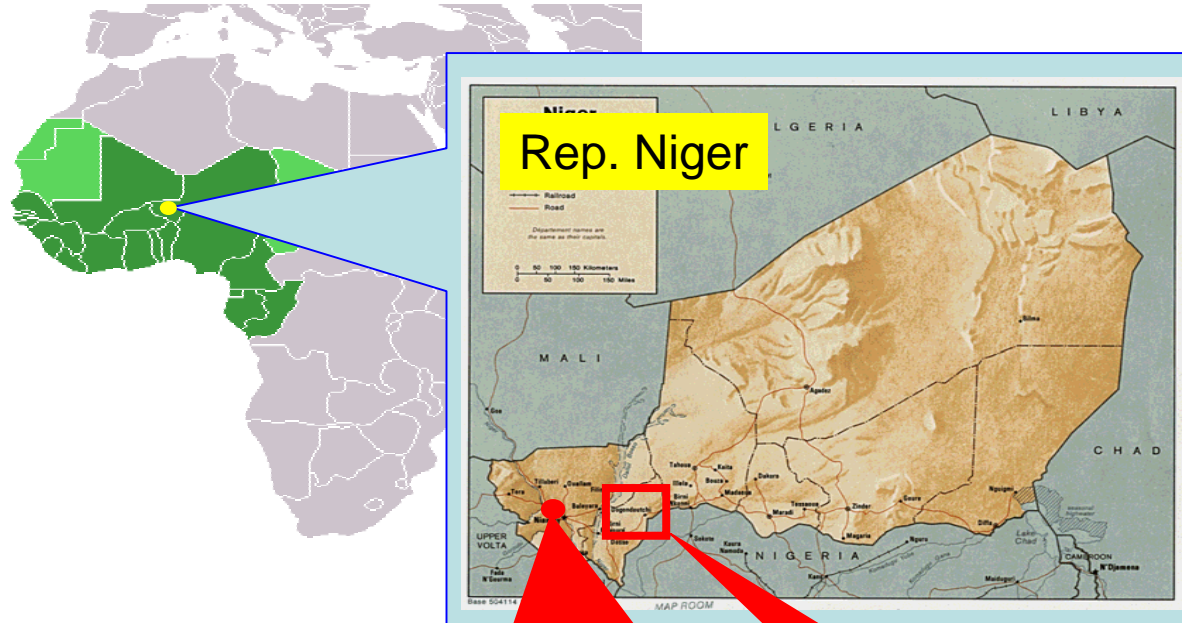
# *Approach*

- ✓ **Assess** the possibility of *Jatropha* production by **local farmers in the Sahelian** villages through the results from a case study on **sociological and economical situation** of their **agricultural systems**

# *Materials & Method*

- ✓ A case study, carried out in the on-going **JIRCAS-ICRISAT collaborative research project** in Niger.
- ✓ A **candidate area** for *Jatropha* cultivation and its potential production were assessed for **three villages** in the project site through obtained results from the **socio/economical analysis** of the benchmark site by the project activities.

# JIRCAS-ICRISAT project



# Local land management

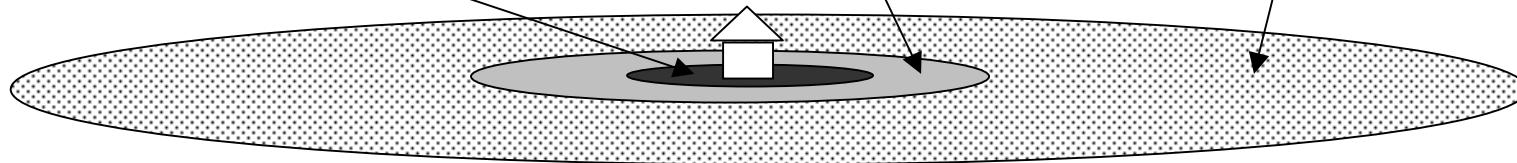
Recycling (16%)  
500-999m



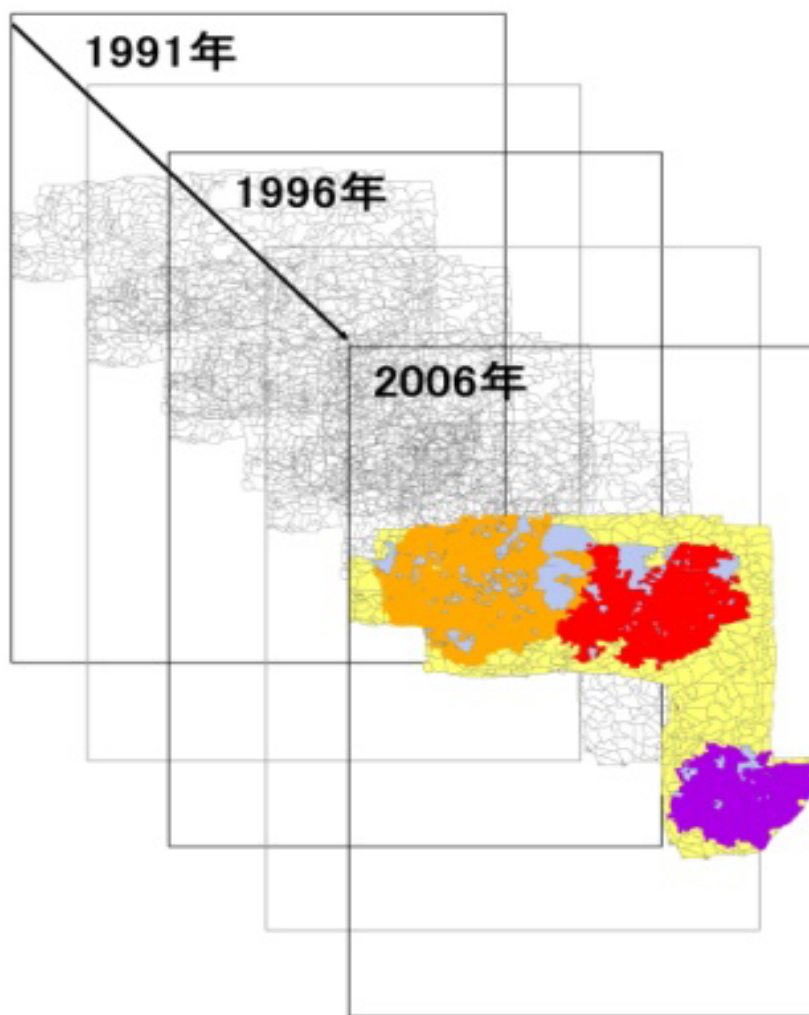
Corralling (18%)  
1000-1999m



No fertilized  
(Fallow system ,66%)  
2000m< from residence

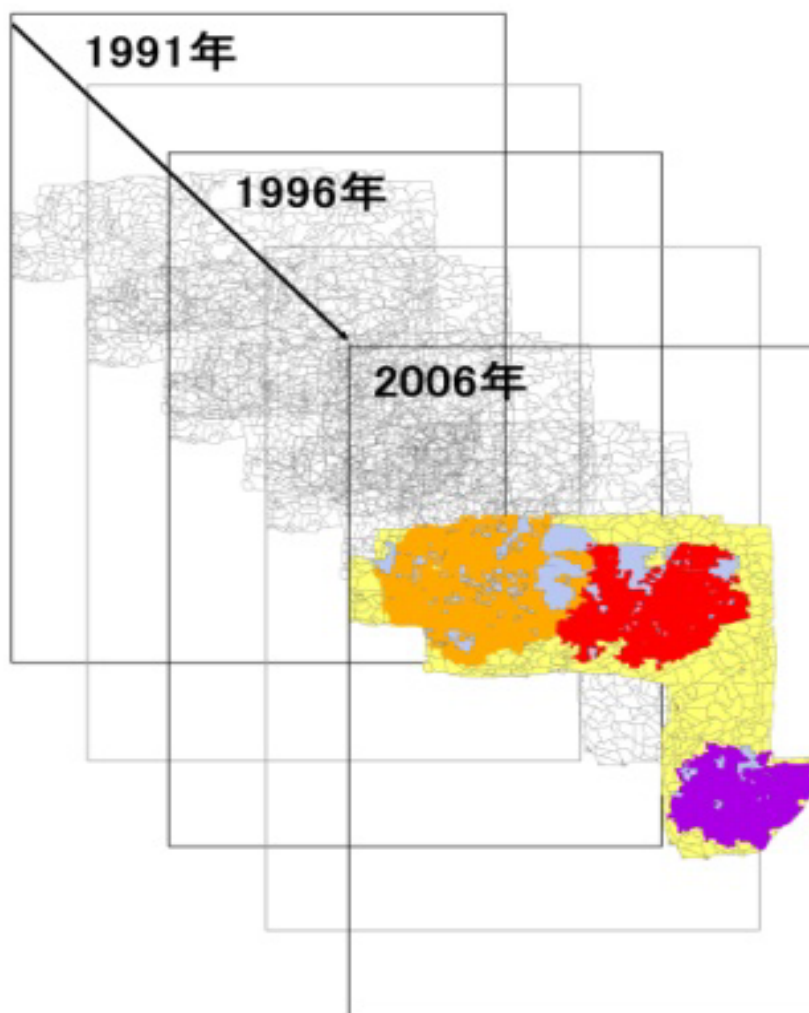


# Identification of area for *Jatropha* production



	Fakara total	
	ha	%
Recycling	818	6
Corralling	2246	16
No fertilized	7080	52
Plateau	3513	26

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# *Suitable land for Jatropha*



# *Suitable land for Jatropha*



## ***Role of fallow land for local households (Top 5 in 35 plant spices)***

Scientific name	Family	Recognition (%)	Other utilization			
			food	forage*	medicine	materials**
<i>Cenchrus biflorus</i>	Graminaceae	94.3	0	91.7	2.8	0
<i>Cassia mimosoides</i>	Caesalpinieae	57.1	0	52.8	44.4	47.2
<i>Eragrostic tremura</i>	Graminaceae	48.6	0	47.2	47.2	47.2
<i>Alysicarpus ovalitolius</i>	Papilionaceae	45.7	0	44.4	33.3	2.8
<i>Sida cordifolia</i>	Malvaceae	37.1	0	0	19.4	30.6

\* for rain season only, \*\*local mat, fence, roof

# Nutrient balance

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	Area	Input	Output
	ha	N kg/ha	
Recycling	818	26.4	18.9
Corralling	2,246	43.8	20.0
No fertilized	7,080	0.1	16.2

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## *Evaluation of food security in local households*

per capita	2001	2002	2003
Average production	275 kg	278 kg	254 kg
Consumption-production gap	70 kg	67 kg	91 kg

## *Suitable land ≠ Available land*

- ✓ Fallow land is considered as a marginal land due to its **extensive management**, nevertheless it has an important role for local households through providing **food and other purposes** from natural vegetation.

# *Win-win situation in production*

- ✓ In the benchmark site, **borders** of farmlands are the places not directly involved in crops production and demarcated with **indigenous vegetation** like *Andropogon gayanus* or *Combretum glutinosum*.
- ✓ In **Mali**, *Jatropha* was planted as **a hedge** by GTZ in the 1990's and currently producing **0.8 kg/tree per meter hedge**.
- ✓ So **borders of farmlands** could be one of the better candidate areas for the exploitation of *Jatropha* production.

# ***Demarcation in farmland***





# *Estimated production*

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	Total length of borders	Estimated production*
	km/village	t/village
Banizounbou	429	343
Tchigo Tegui	359	287
KoDey	175	140

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\*Estimation of yield was applied with 0.8 kg/tree (Henning, 2002)

# Conclusion

- ✓ The majority of Fakara's households are still facing **food deficit** and increasing crop production is still top priority. **JIRCAS-ICRISAT project** can contribute to this task through technology generation and dissemination.
- ✓ However, it is also necessary to enhance **economy for poverty alleviation** and thus income generating activities is needed.
- ✓ *Jatropha* can be one of the better candidate crops when an **appropriate orientation** in local system and this could **avoid any conflict** with local food production.
- ✓ Further research on the productivity of **Jatropha in African environment** should be carried out for better incentive to local farmers.

# Vicious situation in Africa





***Thank you!***