



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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SUSTAINABLE AGRICULTURE
FOR FOOD, ENERGY AND INDUSTRY 2008**

"Sustainability on Food, Feed, Fiber, Water, Energy: Science, Technologies, Recycle-oriented Society and Global Governance"

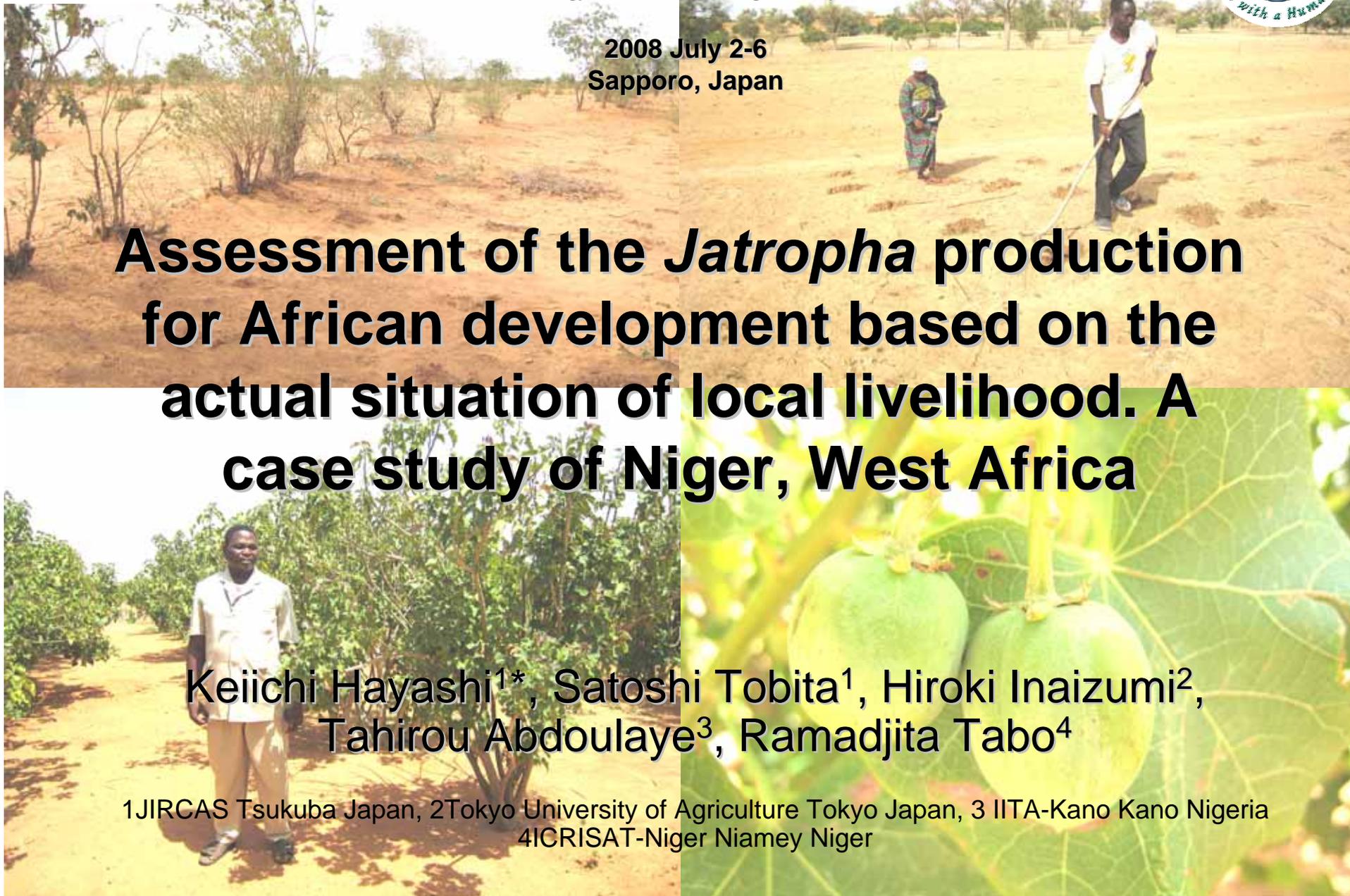


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**Assessment of the *Jatropha* production
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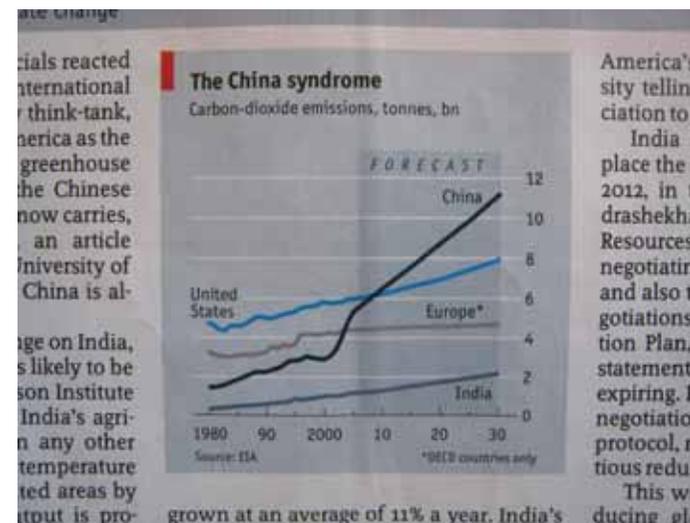
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Context of Biofuel

- ✓ **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 7th, 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

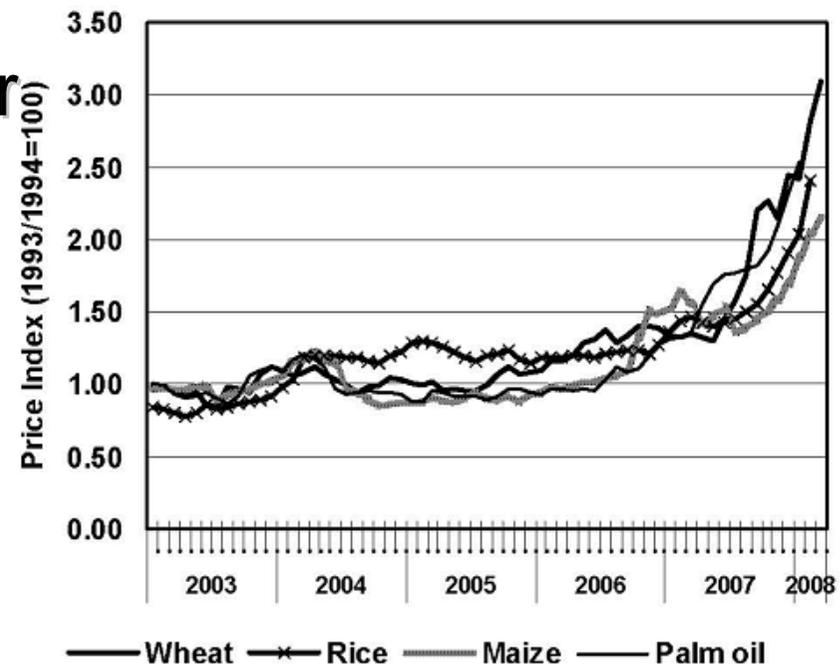


Fig. 1. Price index of major crops (1993/1994=100)

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**



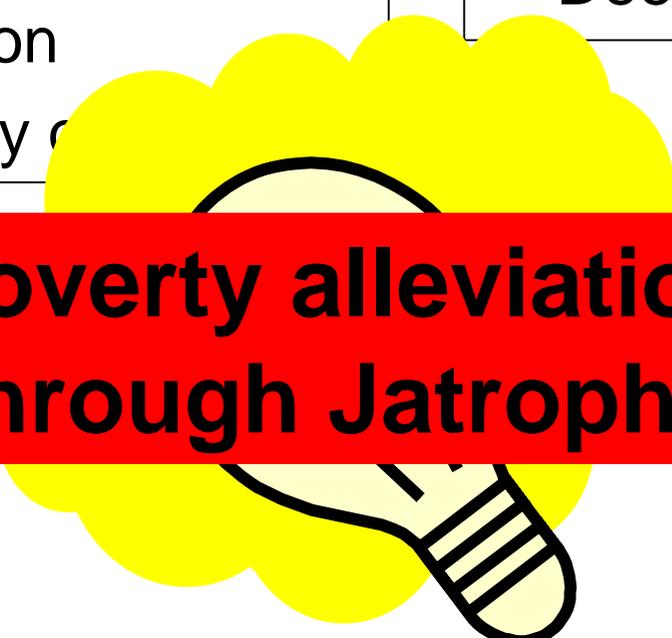
Jatropha in African development

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** (21st 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.

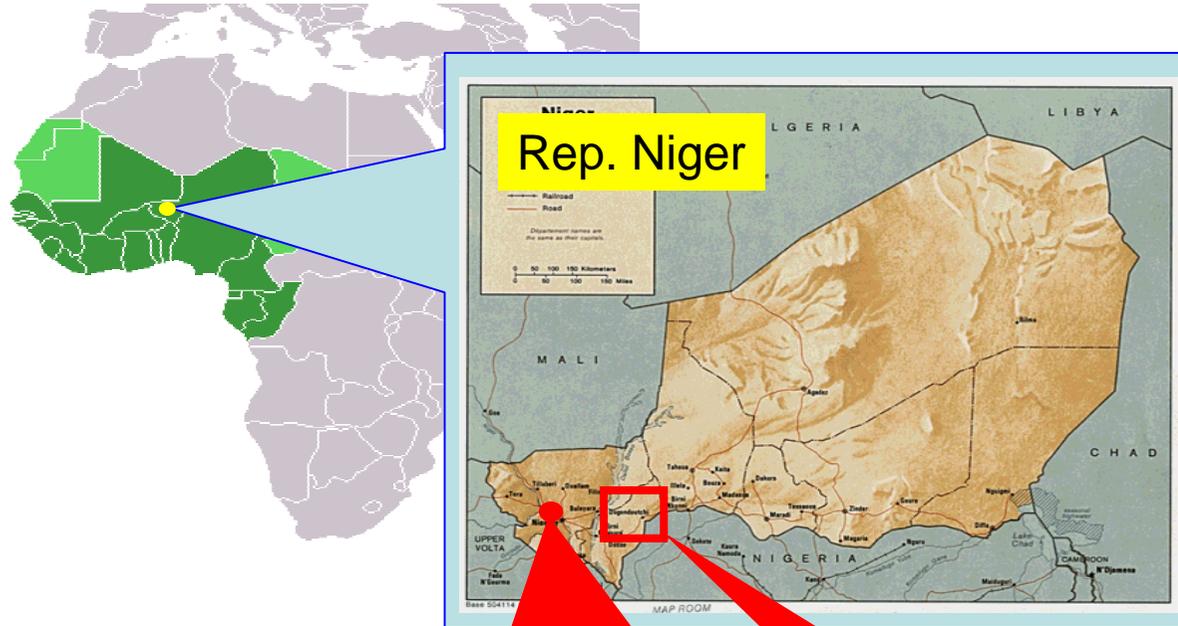
Approach

- ✓ **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**

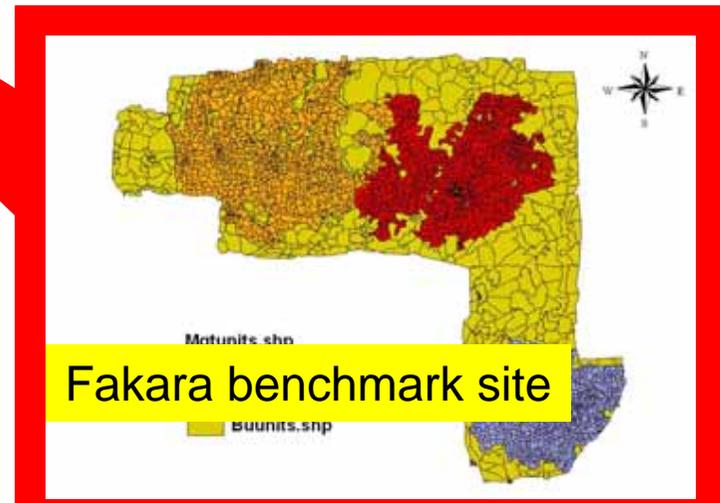
Materials & Method

- ✓ 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



ICRISAT-Niger



Fakara benchmark site

Local land management

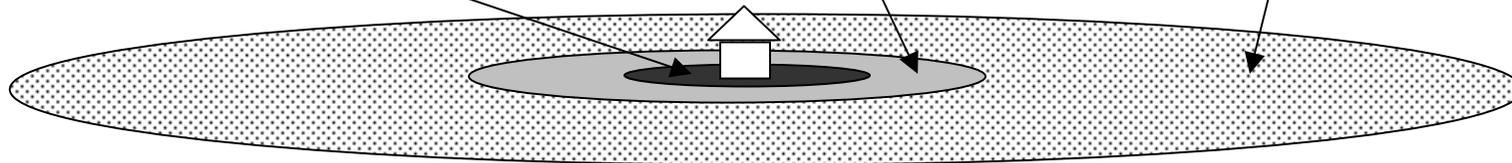
Recycling (16%)
500-999m



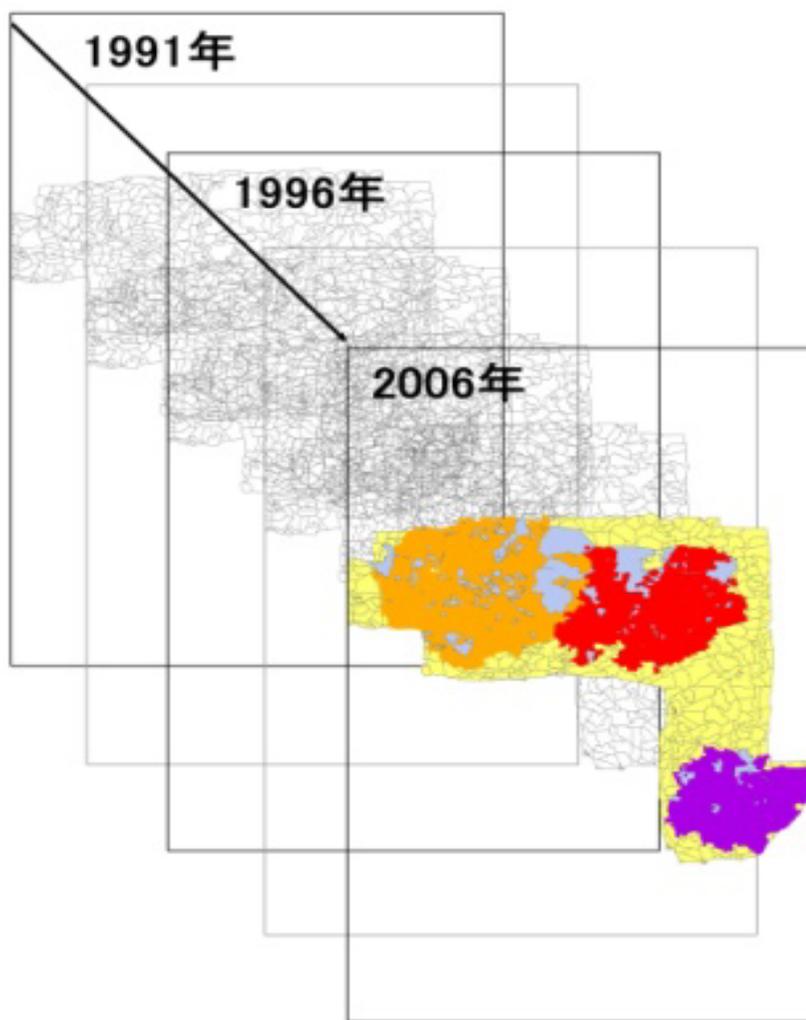
Corralling (18%)
1000-1999m



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

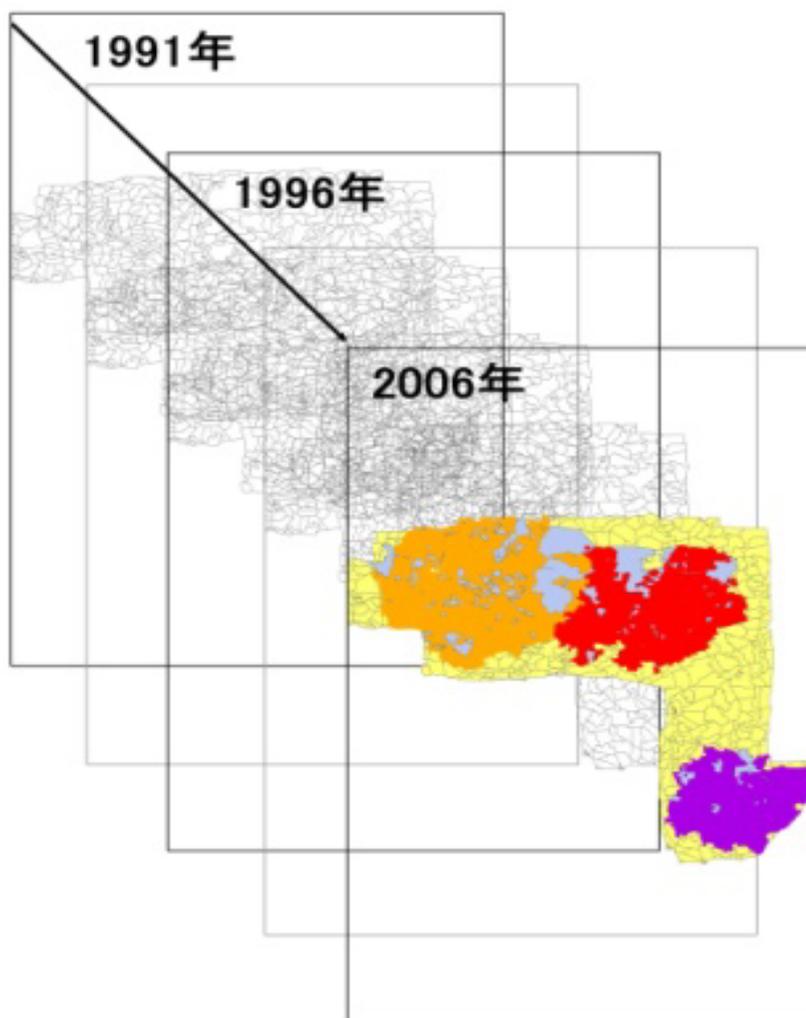


Identification of area for *Jatropha* production



	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

	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

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

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

*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



The Guardian, Thursday June 24, 2008



Thank you!