



Foundation FACT

JATROPHA FOR RURAL DEVELOPMENT APPLICATIONS & REVENUE SOURCES

Biofuels for Local Development

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FACT Foundation
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1. FACT Foundation



- Fuels from **A**griculture in **C**ommunal **T**echnology
- Established: May 2005
- Aim: Support income generation rural population through production, transformation and use of biofuels (not only Jatropha)
- Strategy:
 1. Knowledge and Expertise centre
 2. Projects
 3. R&D

Initiator FACT



Kees Daey Ouwens
1936-2007

FACT Knowledge and Expertise Centre



- Located in Eindhoven (TU/e)
- FACT staff (3 fte)
- FACT teammembers: Arrakis, RREnergy, STRO
- Approach: collect knowledge biofuels, analyse and verify (FACTS) and disseminate (North South and South South)
- R&D partners: WUR, TU/e, Diligent
- Guidance students
- Network: >3000 members
- Financing: SHGW (requested Dutch Government)



FACT Projects



- Existing projects:
 - Mali
 - Mozambique
 - Honduras
- Financing: SHGW, World Bank, Stichting DOEN, Solidaridad, HIVOS, EU.
- Planned program with projects in:
 - Laos
 - Bolivia
 - Kenya
 - Guinea Bissau
 - Honduras
 - Panama

FACT projects



FACT R&D

- Agricultural production:** Bio-energy production systems
- Conversion:** transformation to energy carriers (gas / liquid /solid)
- End-use:** electricity, heat/cold, power



2. FACT PROJECTS



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MFC/FACT project in Mali



- Jatropha nursery established producing for 440 ha
- 470 ha Jatropha planted (target total 1000 ha)
- 3 x 100 kW dieselgenerator sets installed
- Electricity company established
- Local electricity grid established and households (230) and enterprises (10) and social services (9) connected, serving some 3000 people
- Training in agriculture of Jatropha (intercropping), and operational aspects system
- R&D in Jatropha and intercropping, mycorrhizae

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ADPP/FACT project Mozambique



Binga Lamp Soap, Diesel



Using **Jatropha** for stationary engines, lighting and small soap making

ADPP/FACT project Mozambique



Some preliminary results:

- 100,000 seeds were planted at the beginning of the project (Jan-Mar), with an approximate germination rate of 30 per cent;
- 24 of the planned 25 Farmers Clubs have been established;
- 7 steel hand rope pumps have been installed, 16 newly dug wells lined out and 3 old wells rehabilitated;
- 21 nurseries were established with 1,000-2,000 plants each;
- Training has been given to FC leaders;
- Household survey of approximately 200 families has been held;
- Practical study on pests in Jatropha, experiments with three accessions
- Baseline survey including 250 hholds
- Seeding and planting practices study
- Trainings given on different levels, 12 in total

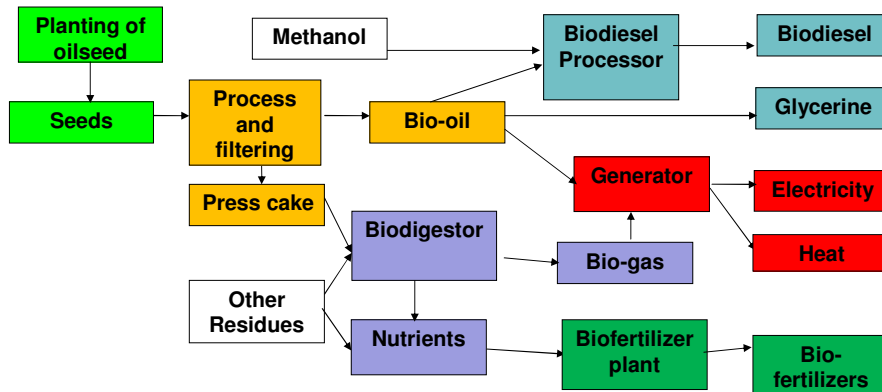
STRO/FACT Honduras



- “Gota Verde” (“Green Drop”) is indication of the approach: small-scale biofuel production for the local market.
- The aim is to demonstrate the technical and economic feasibility of this approach.
- Specifically:
 - Agricultural: improve know-how on biofuel crops.
 - Technical: improve know-how and local experience on biofuel processing and engine adaptation technologies.
 - Enabling environment: create a favourable socio-economic and financial environment for successful introduction of small-scale biofuel production and use.



3. Jatropha system optimisation







Conclusions Jatropha system



- Feasibility of seed production is mixed: Labor costs can be prohibitive: Pressing to PPO and sales of that is normally feasible with low seed costs 12 to 16 USDct/kg,
- Electricity generation with Jatropha oil does not seem to be competitive with that of Jatropha biogas based generation,
- It seems most interesting to use the Jatropha oil for Biodiesel, if fossil fuel prices are high (>100 USD/barrel);
- Organic Fertilizer using Jatropha cake as input can be feasible for local markets.

4. Lessons learned



- Mali
- Mozambique
- Honduras
- General

Lessons learned Mali Garalo project



- **High quality seeds** are **important** when starting Jatropha plantations: clonal and seed gardens are key tools for the local production of high quality seeds.
- **Direct seeding is giving good results** under conditions of a 3 to 4 month rainy season. Nursery efforts and costs can thus be avoided.
- Good yielding Jatropha requires **good nutrient levels** and **climate conditions**;
- **Food and Fuels** can be **combined** with good nutrient levels and produce more than food alone under current practices;
- Generator technology: **marine** generator sets do better than automotive based generator sets. This is a key to the success of the Garalo project;

Mali Garalo Continued



- Electricity distribution: **new methods of payment** as a result of discussions in the project: in a first test the regular monthly payment might be replaced by the payment in kind (e.g. with livestock) for a longer period;
- The **prescribed minimum local electricity tariff** is key factor in economics of the project: Jatropha based generation more expensive than current electricity tariff, but cheaper than diesel based generation;
- The Garalo project is highly replicable: in neighbouring villages replication was studied using participatory village discussions: a program was prepared **for 10 villages**.

Lessons learned Mozambique



- Introducing bio-fuels requires careful imbedding in the local situation. **Farmers Clubs**, proved to be **most important actors** in the project.
- The **combination of food crops and Jatropha** is a “conditio sine qua non” for smallholder farmers. Placing Jatropha fences around vegetable fields, animals are kept out, while the food crops ensure maintenance of Jatropha.
- **Project duration** of three years is generally too short. **Best 5 years** in order to obtain sufficient yield of the Jatropha plant.
- **Long time controlled endurance** tests (Netherlands) for PPO fed diesel engines are required before introduction in the field.

Mozambique continued



- The **quality of oil** is to be **controlled during in whole production chain**, from plant production to distribution. For example: harvesting green unripe seeds results in too high phosphor contents, bad for diesel engines.
- Comprehensive **identification of pests and diseases** in *Jatropha curcas* was needed. *Jatropha* contrary to the myth can be affected by numerous pests. Involving the local R&D institutions (the Eduardo Mondlane University), has proved to be effective;
- *Jatropha curcas* **does not need** shaded nurseries when water is OK.

Lessons learned Gota Verde project

- Apart from *Jatropha*, **many other oil crops** were tested in Honduras and **found attractive** as producer of oil for energy purposes and for other uses.
- **Biodiesel production was tested** and best practice information on the process on semi industrial scale available as open source.
- The feasibility of *Jatropha* cake for biogas for electricity generation was studied and **found highly attractive**: a factor 3 less costly as with PPO.
- **Replication biogas from cake**: use of press cake is pursued in 3 other projects, Tanzania, Kenya and Indonesia, power plants of 150, 150 and 200 kWe capacity.
- An innovative system **using energy pastures** in the tropical humid zones for energy was developed and will be tested in the Gota Verde project.



Lessons learned General

- Projects to be based on **realistic (lower) estimates of yield potential** of the selected crops;
- Good **genetic starting** material (seeds) of the biofuel crops is crucial and comes at a price;
- **Intercropping of food and fuel crops** is useful for fuel crops that take several years to mature, such as Jatropha. Intercropping ensures income for the farmers from the start of the project and helps to suppress weeds;

General Continued



- Maximum value should be obtained from the agricultural production chain. **A bio-refinery approach** should be practised where feasible, aiming to bring maximum value of all components of the plant;
- The project area is best to avail over **basic development needs** (schools, medical care, markets, demand for energy), with agriculture beyond subsistence level, and farmers eager to experiment with new cash crops;
- **Presses**: thanks to R&D at TU Eindhoven and at Wageningen University and in the SHGW projects **much new knowledge** is generated about the technology for pressing seeds.





- Thanks for your attention,

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