



Biofuels in Mozambique: Policies, Investments and Technologies

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Background and Motivation

- Mozambique a poor country with large agricultural potential.
 - 36 million hectares of arable land
 - Numerous rivers and reasonable rainfall in many parts
 - Less than 5 million hectares actually planted in 2003 and an even lower rate of use of water resources
- Agriculture currently characterized by low productivity subsistence production.
- Substantial interest in production expansion particularly for bio-fuels.
- Land is owned by the state.
- 2.6 million hectares in credible requests for plantations of bio-fuel crops especially jatropha and sugarcane.



Outline

- Summarize recently published biofuels policy.
- Update on investment decisions.
- Present available (sparse) information on technology choices.



Biofuels Policy

- A National Biofuels Policy and Strategy was approved by the Council of Ministers in March 2009.
- Fundamental motivations:
 - Promote sustainable development
 - Reduce GHG emissions
 - Confront instability of international fuel prices



Principles of the Strategy

- **Inclusiveness**

- Mainly related to the development of the strategy. A consultative process was put in place.

- **Transparency**

- Mainly concerned with pricing. Links to international market prices a key element.

- **Environmental and social protections**

- Laudable but not well specified.



Principles (2)

- **Incrementalism**

- Take small steps and assess.

- **Fiscal sustainability**

- Maintain fuels sector as an important source of revenue for the State.

- **Innovation .**

- Foster agricultural and industrial innovation by attracting investment in commercially proven technologies and building human capacity.



Objectives

- Reduce the burden on the economy posed by ***fossil fuel imports***;
- ***Promote rural development*** through biofuels investments and support for small-scale producers;
- Increase ***access to energy in rural areas***;
- Stimulate ***rural incomes***;
- ***Diversify the country's exports*** and improve its balance of trade;
- ***Promote greater economic integration*** of the country;
- Promote the development of ***technical capabilities***;
- Generate ***environmental benefit***.



Actual Implementation

- Gradual imposition of fuel mix standards.
- World market pricing.
- Export orientation.
- Designated zones for production of biofuels
- Creation of a National Commission for Biofuels
- Desirability of regional grading and standards



Summary

- A sensible document.
- Necessarily somewhat vague, but provides orientation on the principal issues.

Ongoing Investments

| Project | Province | Region | Area (ha) | Crop |
|-----------------|-----------|--------|-----------|------------|
| Procana | Gaza | South | 30000 | Sugar cane |
| ESV BioAfrica | Inhambane | South | 4000 | Jatropha |
| Energem | Gaza | South | 60000 | Jatropha |
| Elaion Africa | Sofala | Center | 4000 | Jatropha |
| Sun biofuels | Manica | Center | 5000 | Jatropha |
| AVIAM | Nampula | North | 10000 | Jatropha |
| Projecto etanol | Manica | Center | 48000 | Sugar cane |
| ECOMOZ | Maputo | South | 3000 | Copra |
| Madal | Zambezia | Center | 40 | Jatropha |
| Mocangalp | Maputo | South | 150000 | Jatropha |
| GalpBuzi | Sofala | Center | 25000 | Jatropha |
| Projecto Sofala | Sofala | Center | 20000 | Jatropha |
| Projecto Sofala | Sofala | Center | 5000 | Jatropha |
| MPEnergy | Manica | Center | 18000 | Sugar cane |
| Total | | | 382040 | |



Jatropha Production Technology

- Propagation Methods
 - Generative Propagation (seeds)
 - Direct seeding
 - Transplantation of precultivated plants
 - Seed beds (bare roots)
 - Poly bags
 - Vegetative Propagation (cuttings)
 - Direct planting
 - Transplanting of precultivated plants
 - Seed beds (bare roots)
 - Poly bags

Plant Spacing

Plant Spacing:

The commonly used spacing is:

- 2 m x 2 m – which gives 2,500 plants/ha but larger spacing is being considered
- 3 m x 3 m - which gives 1,111 plants/ha
- The larger the spacing the higher the yield/plant



Pruning

- The current jatropha technology includes pruning, this results in:
 - Maximizes branching (more fruits)
 - Keeps trees less than 2 m high, facilitating harvest



Production Technology



Fertilization

- Fertilizer trials are being conducted to determine the best fertilizer response
- 20 g (urea) + 120 g SSP + 16 g MoP/plant annually is being recommended



Growing Pains

- Few projects in Mozambique are at present working with, or supporting, **small farmers** as growers of Jatropha.
- Insufficient knowledge both by commercial and smallholder sector have led to failures in jatropha plantations.
- Severe pest attacks have further destroyed a major part of small scale and commercial plantations.



Research Priorities

- Research on *Jatropha* in Mozambique, is focused on implementation aspects, plant growth and yields under field conditions, and pest prevention.
- Several trial plots are operating to measure yields and to experiment with plantation forms and conditions.



Research Findings to Date

- Seeds are best planted directly (without pre-treatment);
- In nurseries shading is not needed;
- Pruning the shrubs 2-3 times offers 80% more yield;
- The time of planting has large effect on sensitivity to pests (planting in February- March gave the highest pest incidence);

Jatropha Seed Yield (MT/ha)

| | Without irrigation | | | With Irrigation | | |
|------|--------------------|--------|------|-----------------|--------|-------|
| Year | Low | Normal | High | Low | Normal | High |
| 1 | 0.10 | 0.25 | 0.40 | 0.75 | 1.25 | 2.50 |
| 2 | 0.50 | 1.00 | 1.50 | 1.00 | 1.50 | 3.00 |
| 3 | 0.75 | 1.25 | 1.75 | 4.25 | 5.00 | 5.00 |
| 4 | 0.90 | 1.75 | 2.25 | 5.25 | 6.25 | 8.00 |
| 5 | 1.10 | 2.00 | 5.75 | 5.25 | 8.00 | 12.50 |



Conclusions

- The recent approval of biofuels policy and strategy is a necessary step in the right direction for the promotion of biofuel production in Mozambique.
- Considerable commercial interest.
- Best production technology of jatropha still under investigation. Economic viability still unproven.