Biofuels could offer unprecedented opportunities to support agricultural industries and provide rural employment in developing countries (Tewani 2007). Among them, *Jatropha curcas* has recently created a great deal of attention in Kenya and elsewhere. Still, there are increasing questions over the economic feasibility of *Jatropha* plantations for smallholder farmers, due to the lack of agronomic knowledge as well as under-development of reliable output markets. This study assessed some of the gaps in our knowledge and helped to guide future research activities.

**Background: Literature Review**

*Jatropha* is claimed for wide environmental adaptability (Heller 1996), while it requires sufficient annual rainfall for commercial production (Owens et al. 2007; Jongezaap et al. 2007; Achtem et al. 2008). Estimates of dry seed yields across the world indicate a wide variation across different rainfall regimes - from 0.2 to 2.0 kilograms per tree (Achtem et al. 2008). Recent analyses from Tanzania show uncertainties over yield estimates but unanimously reject *Jatropha* plantation’s economic feasibility for smallholder farmers (Loos 2008; Wiskerke 2008; Wahl et al. forthcoming).

**Background: Activities in Kenya**

*Jatropha* has been sporadically observed across Kenya (Tomomatsu & Swallow 2007). However, interest in *Jatropha* as an oilseed crop only started in 2006, along with the farm level. Productions are too small to support agricultural industries and provide rural employment in developing countries (Tewari 2007). Still, among the 289 farmers, 283 produced valid data. Actual survey data were used to show yields for year 0-4, while high and low case scenario projections were made to calculate yields for the year 5+ (Figure 3).

**Background: Value Chain Development**

Despite potentials, a complete value chain has not yet developed in Kenya. Most activities are concentrated at the farm level. Productions are too small to support agricultural industries and provide rural employment in developing countries (Tewari 2007). Among the 289 farmers, 283 produced valid data. Actual survey data were used to show yields for year 0-4, while high and low case scenario projections were made to calculate yields for the year 5+ (Figure 5).

**Result: Economic Analysis**

Economic analyses were conducted for model one-acre plantations over a 10-year span for each plantation type (Table 2) with low/high yield case scenarios. Input costs were estimated based on the average costs reported by farmers. Revenue was calculated with reported yields, with the price for seeds at KSh15/kg.

**Conclusion**

There are extreme uncertainties over the economic viability of *Jatropha* plantations for smallholder farmers due to the low yields and high costs involved, while no systematic market has yet developed in Kenya. At this moment, significant investment should not be encouraged, except when grown as a living fence, the least intensive, least risky option, including provenance and agronomy trials are urgently needed.

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**References**


Sponsored by GTZ, a yield survey was conducted in February and March of 2009. A total of 289 *Jatropha* farmers were interviewed across Kenya (Figure 3).

**Introduction**

Among the 289 farmers, 283 produced valid data. About 80% of these plantations were younger than 3 years old. Intercropping was found to be the dominant planting regime. Plot sizes were small, with those less than 0.25 acres comprising over 50% (Figure 4).

**Table 1:** Range and optimal agronomic parameters for *Jatropha*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Optimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual rainfall (mm)</td>
<td>300 - 1,500</td>
<td>1,000 - 1,500</td>
</tr>
<tr>
<td>Altitude (m)</td>
<td>1 - 1,800</td>
<td>1,000</td>
</tr>
<tr>
<td>Soil</td>
<td>loamy, sandy, acid pH &lt; 9</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2:** Assumptions on economic analysis by plantation type

<table>
<thead>
<tr>
<th>Plantation Type</th>
<th>Low Yield Case</th>
<th>High Yield Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low margin</td>
<td>0.4 kg/tree</td>
<td>1.5 kg/tree</td>
</tr>
<tr>
<td>High margin</td>
<td>2 kg/tree</td>
<td>4 kg/tree</td>
</tr>
</tbody>
</table>

**Figure 1:** (Left) wild *Jatropha* in Shamba Hills, Coast province, (middle) a 3-year old plot in Kitwe, Eastern Province, (right) a 55-ha experimental plantation in Kitamba, Eastern Province.

**Figure 2:** *Jatropha* value chain in Kenya (by Carol Humberger based on Messemaker 2003).

**Figure 3:** Locations of 289 *Jatropha* farms surveyed in Kenya

**Figure 4:** Yield per tree (kg/tree) in year 0-4, while high and low case scenario projections were made to calculate yields for the year 5+ (Figure 5).

**Figure 5:** Net margin up to year 10 by plantation type/yield case

**Acknowledgments**

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