Information System Better-iS

IUW - Output

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Summary:

IUW and ZALF conducted an economic land evaluation to assess the potential of large-scale Jatropha oil production in Tanzania. The potential was analyzed against different certification schemes. Our findings indicate that production may be able to meet international sustainability standards. Yet, costs are still too high for both domestic consumption and (certified) exports.

Title:

Revising the Potential of Certified Jatropha Oil Production in Tanzania: An Economic Land Evaluation Assessment

Problem and Objective:

When the Better-iS project started, both academics and practitioners expressed high expectations on the potential for Jatropha oil as a new source of energy in Tanzania. However, little was known about the agronomic potential of the crop. Moreover, in the course of the project lifetime, more and more doubts were raised about the sustainability of its production and the economic feasibility.

Our goal was therefore to use primary and secondary data to revise the potential of Tanzanian Jatropha oil production, both with regard to national consumption and exports. In response to the discussion on sustainability, we further aimed to analyze to what extent Tanzanian farmers are able to meet international certification standards.

Method:

To analyze the economic and agronomic potential of Jatropha oil we used an economic land evaluation approach: first, we estimated the physical land suitability at an experimental site in Kilosa. In addition, we determined the average water availability for the Jatropha plants in order to predict the seed yield under rainfed and irrigated conditions. On the basis of this, we were then able to derive necessary inputs to obtain certain levels of yields. Second, we looked at the optimal input-

output level with regard to economic costs and benefits. Finally, we introduced certification criteria to see where input restrictions may appear.

Data for the farming system were collected from the mentioned farm in Kilosa. As focus changed from high-input cultivation to a low-input system when the plantation was four years old, we used the data from the first years and complemented them with secondary literature to estimate yields also for high-input scenarios.

Results:

According to our yield assessment, seed yields in the range of 2000 to 5400 kg per ha are possible on land with a good agronomic potential and with good climatic conditions. The upper boundary would only be reached for high levels of fertilization. Labor and fertilization are the two most important – and expensive – factors of production. As benefits are still too low to cover the costs of operation, future feasibility of Jatropha oil production will hinge on more efficient cultivation and processing methods.

Sustainability certification would induce a cost increase of about 13%, where the main part would result from social criteria rather than environmental restrictions. Given the already high production costs of conventional oil, it is questionable if certified exports could have a chance on the global market other than as a niche product (e.g. in the aviation industry).

Lessons learnt:

For practitioners:

We recommend private stakeholders to be cautious in promoting new large-scale Jatropha investments. Even though yields may be increased by chemical fertilizers and irrigation, the high labor requirements reduce its financial potential.

For research:

In particular more empirical evidence is needed to analyze the impact of input on yields, the efficient use of by-products and how the crop compares with other feedstocks and renewable fuels. Also innovations to mechanize the system (e.g. the harvesting) could be a step to improve the economic potential of large-scale production.

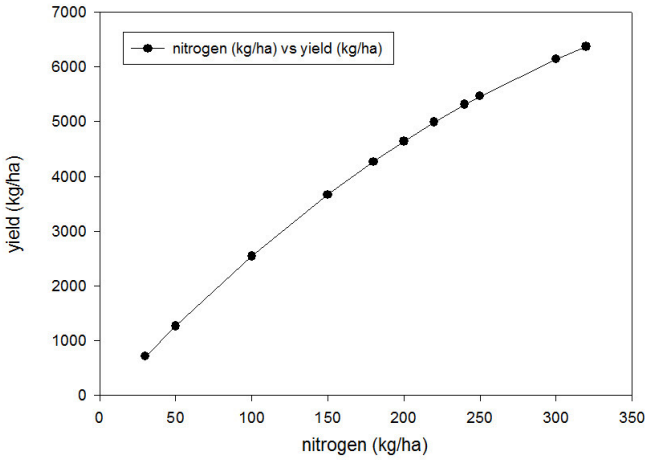
For policy-makers:

Focus of public policies should be on broadening the knowledge base rather than encouraging new large-scale developments.

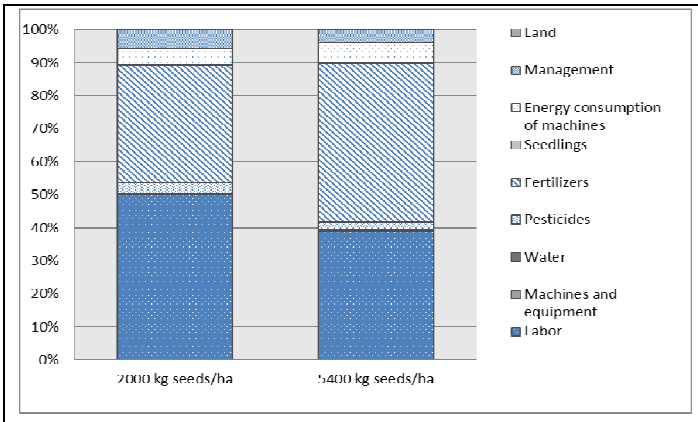
IFPRI · Leibniz Universität Hannover · World Agroforestry Centre · zalf Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V. · Wuppertal Institute for Climate, Environment and Energy · ASARECA
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
On behalf of Federal Ministry for Economic Cooperation and Development

Documentation (pics/figure):

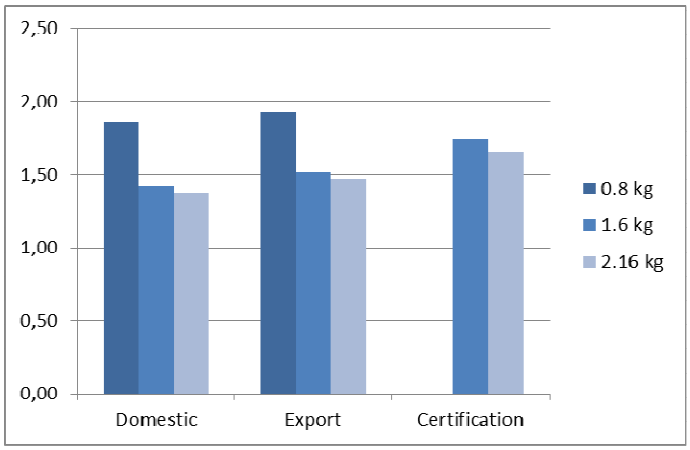
Deduced nitrogen response function of Jatropha



Distribution of costs (in USD) when using the universal nut sheller and a mechanical oil press. The cost shares are given for the low and high input scenario and 1000 ha.



Production cost of one liter Jatropha oil (in USD) for 150 hectares. The green line indicates the local diesel price of USD 1.30, and the red line the rapeseed oil price equivalent of USD 0.90



More figures are available upon request.

Policy recommendations:

Our analysis reveals that Jatropha production has potential to be sustainable, however there are still many factors that need to be considered. For example, fertilization requirements are substantial when aiming at high yields. In combination with the tropical soils and the acidifying effect of the mineral nitrogen fertilizers commonly used in Tanzania, cultivation will only be feasible on (highly) suitable soils. Further, for most parts of Tanzania, irrigation will improve the results. This implies that opportunity costs may be high, as it would replace other crops that could be grown under the same favorable conditions. In contrast, if land is chosen where the soil is less suitable, sustainability of production may not be guaranteed.

Policy makers should consider this before granting new land to large-scale Jatropha projects. More research is needed to optimize the process. For now, Jatropha for large-scale production is still a high-risk venture.

Better-iS full document this output is refering to background documents:
Fasse 2009 Value chain analysis:
http://www.econbiz.de/archiv1/2009/96835_value_chain_analysis.pdf

http://www.better-is.com/files/Segerstedt_etal_2010_Paper_-_Potential_of_Sustainable_Jatropha_Oil_Production_in_Tanzania.pdf

Participating institutions: International Food and Policy Research Institute (IFPRI), Institute for Environmental Economics and World Trade IUW, World Agroforestry Centre ICRAF, Wuppertal Institute for Climate, Environment and Energy, Leibniz-Centre for Agricultural Landscape Research (ZALF e.V.), Association for Strengthening Agricultural Research in Eastern and Central Africa. Associated partners: SOKOINE University of Agriculture, Ministry of Agriculture, Food security and Cooperatives Tanzania, Ministry of Energy and Minerals, Tanzania.

On behalf of Federal Ministry for Economic Cooperation and Development