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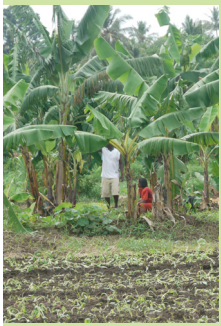

BETTER-iS: Biofuel Evaluation for Tanzanian Technological Efficiency using Renewables – integrated Strategies

Assessing Crop Production Potentials for Biofuel Production

The operational assessment tool ScalA-BF

Better-iS

www.better-is.com

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

funded by BEAF, www.giz.de

Foreword

The project BETTER-iS (www.better-is.com) aims at identifying the potential for linking low-productivity farming to small and medium enterprises (SME) to enhance livelihoods through biofuel value chains. Local biomass production and processing targeted to small-scale farmers in Tanzania through linkages to SMEs is expected to be improved by further developed methods. Within the scope of increased energy demand, strategies on locally produced feedstock or biofuels may be used decentralised for producing electricity, cooking and heating. Farmers, regional organizations and local authorities will be collaboratively develop feasible strategies to benefit from biomass production potential and mitigate food insecurity. The Assessment Tool ScalA-BF is a mean to discuss these feasible strategies and to analyse site-specific requirements of different biofuel value chains.

BETTER-iS has been funded in the frame of the program “Adaptation to Climate Change” by the Advisory Service on Agricultural Research for Development (BEAF/GIZ www.giz.de). The first version of ScalA was originally developed from 2006 to 2009 in the frame of two research projects Globe I and Globe II, which were financed by the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The Better-iS project has developed further the ScalA-Tool to be used in selected pilot regions around Morogoro specifically for biofuel value chains.

The Leibniz-Centre for Agricultural Landscape Research ZALF e.V. is an interdisciplinary institute that investigates ecologically, economically and socially sustainable land use systems. BETTER-iS is a project coordinated by ZALF www.zalf.de in collaboration with the partners Food Policy Research Institute (IFPRI) www.ifpri.org, World Agroforestry Centre (ICRAF) www.worldagroforestrycentre.org, Wuppertal Institute for Climate, Environment and Energy www.wupperinst.org, Institute for Environmental Economics and World Trade (IUW) www.iuw.uni-hannover.de, Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) www.asareca.org and with essential support of the Sokoine University of Agriculture (SUA) www.suanet.ac.tz/.

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Introduction to ScalA-BF

ScalA-BF is a tool for the evaluation of the likelihood of the successful adoption of a biofuel crop production system in specific local settings (a village or a community). The tool is designed for an evaluation prior to the start of the promotion of biofuel crop production. ScalA-BF therefore is an ex-ante assessment tool.

The basic idea of ScalA-BF is a comparison of specific requirements of a biofuel crop production system and the specific conditions that are relevant for the production of this biofuel crop in a specific locality.

ScalA-BF facilitates, from a given selection of biofuel crop production systems, the identification of biofuel crop production systems which are most suitable to the local conditions.

Photo:
Dr. Götz Uckert, Dr. Stefan Sieber

ScalA-BF defines “suitability” as the match between specific biofuel product production requirements and local conditions. The “requirements” are i.e. inputs and other conditions that are required for the adoption of a specific biofuel crop production system. The “local condition” is the specific factor endowment of local farm household, organisational capacities at the community level, the degree of connection of the location to markets and other social factors.

ScalA-BF therefore evaluates the match between a chosen biofuel crop production method and local conditions. The underlying assumption is that a match between crop production requirements and local conditions leads to a high potential for successful adoption of the biofuel crop production system.

ScalA-BF uses a set of five pre-selected biofuel crop production systems for assessment. In addition, it allows for an analysis of different alternative biofuel crop production systems which the user group can modify independently (for details see the section “tool description” further down in the text).

Therefore, ScalA-BF is

- A means for the ex-ante assessment of the likelihood of the adoption of five different pre-selected biofuel crop production systems, as well as

other individually defined biofuel crop production systems in a specific locality.

- A means for the ex-ante comparison of different biofuel crop production alternatives and its likelihood for adoption.

- A means for the ex-ante identification of critical bottlenecks for potential adoption of biofuel crop production systems within one production system.

In effect, ScalA-BF helps to answer the following questions

- Which biofuel crop production system is most suitable under specific local conditions in a specific community?

- Which challenges and bottlenecks for biofuel crop production are to be expected if the biofuel crop will be adopted in the specific community?

System Boundaries of ScalA-BF

Biofuel production value chains link multiple actors and processes. They are diverse, product specific and complex. Particularly in the biofuel sector very different value chains exist, which deviate particularly in marketing and processing. In order to develop a generic tool for different biofuel alternatives, ScalA-BF studies only one key aspect of biofuel value chains. The tool mainly focuses on the assessment of adoption of biofuel crop production systems at farm level. Specific details in processing and marketing chains are not assessed.

Therefore, a study of the potential integration of biofuel crop production in marketing and processing channels is a precondition for its assessment by means of ScalA-BF. It is necessary that all involved parties discuss a shared vision for the envisaged value chain for biofuel crop production. It is therefore important to keep in mind that, while ScalA-BF mainly looks at production issues, the use of ScalA-BF alone does not replace the need for a careful understanding of how and by whom the biofuel crop product is to be marketed and processed and which are the associated costs.

The use of ScalA-BF is only feasible if some conditions for marketing and processing are met or ways how to meet these challenges are clearly defined. These following aspects should be clarified:

- The market can absorb the biofuel crop products and
- Marketing options for biofuel crop products are available (individual, via middlemen, under outgrower schemes or through cooperatives) or
- Marketing of biofuel crop products is not desired
- Processing options for biofuel crop products are available at village level or
- The biofuel crop products can be sold without processing ScalA-BF has a pre-selected set of biofuel crops: jatropha, oil palm, sunflower and croton megalocarpus and a pre-defined set of crop production systems:
- Intensive oil palm production in nucleus estates with smallholder outgrower schemes or smallholder palm oil cooperatives
- Sunflower mono-cropping by small scale farmers
- Croton megalocarpus and jatrohpha extensive production by means of fencing or farm boundary crop production
- Intensive jatropha production for mono-cropping on low quality lands.

With the exception of croton megalocarpus, the pre-selected biofuel crop alternatives are selected as they were already studied in the frame of the Better-iS research project. Therefore, empirical background knowledge could be used for the development of the tool.

ScalA-BF Stakeholder Workshop

It is recommended to use ScalA-BF during stakeholder workshop sessions. The workshop should ensure the participation of all stakeholders in the targeted value chain: local residents and crop growers, extension agents, development experts and planners as well as potential biofuel crop processors, traders or middlemen. The workshop location should

be near to the targeted area for biofuel crop production introduction or expansion in order to allow local stakeholders to participate.
During the workshop, the following key questions need to be discussed among the stakeholders:

- Is biofuel crop production directed at marketing or home consumption?
- Which biofuel products are absorbed by the market? What is the final product for biofuel crop produce sales with the highest marginal rate of return?
- Is processing required? Which technology is needed for biofuel crop processing? Is this technology available?
- How should marketing be organized? Is individual marketing preferred or market access through middlemen or traders or local cooperatives possible?

Further, the workshop participants need to assess the following conditions for the location where biofuel crop production should be expanded or adopted, if no previous data is available. This information is essential in order to generate meaningful results from ScalA-BF.

- A marketing chain assessment: actors, their capacities, the services they offer, and the relevant costs
- A processing chain assessment: actors, their capacities, the services they offer and relevant costs
- An assessment of the marginal return of biofuel crop production and the marginal return of alternative use of the land for other crop production

Based on the generated information, the workshop participants should use ScalA-BF in different working groups. The results of the analysis strongly depend on accurate information about the local situation. Therefore, the working groups should consist of all stakeholders that are involved in the process. However, the participation of local experts (including male and female farmers) is key to the successful use of ScalA-BF.

Tool description

Step 1 - Agro-ecological Conditions Assessment

The first step of ScalA-BF helps to assess the agro-ecological suitability of different biofuel crops for the specific locality. It shows the temperature and precipitation requirements as well as soil quality requirements of the pre-selected set of biofuel crops.

The user group needs to possess information about local temperature ranges, precipitation and soil quality in the target area in order to assess which crop might be suited best for the specific location. Clearly, agro-ecological conditions set the frame for succesfull biofuel crop production. Intensive production systems might be only useful if they agro-ecological conditions fully meet the requirements of the crops.
It might be useful to incorporate additional information for the agro-ecological conditions assessment, such as local experience with biofuel crops if any.

Step 2 - Biofuel Crop Production System Selection

In step 2 of ScalA-BF a selection of biofuel crop alternatives is made. Currently, the tool has a pre-section of five alternative biofuel crop production system alternatives: intensive palm oil production, sunflower mono-cropping, extensive jatropha production as live fences, intensive jatropha production and extensive croton megalocarpus production. In the bottom graph of step 2, a pre-assessment of the requirements for each of the crops is displayed.

In case the displayed assessment for biofuel crop requirements for the pre-selected crops does not match with real conditions of the production system the user group might modify the biofuel crop production requirements in step 3 (please select the button “adjustment”).

Scala-BF also allows for the assessment of alternative crops than the pre-selection. Additional alternative biofuel crop production systems which the user group might want to assess can be analysed. The “other” button in step 2 allows the user group to define other biofuel crop production systems than the pre-selection. However, in this case different biofuel crop production requirements exist. The user group then has to define these requirements in the following step 3.

Step 3 - Biofuel Crop Production Requirement Assessment

In step 3, financial, human, institutional, infrastructural, and agricultural input requirements of the selected crop are assessed. Each biofuel crop production system has specific needs in terms of capital, labour, laws or local organization, means of transport, or agricultural inputs. This needs to be accounted for in the assessment. Therefore, in order to assess the specific requirements of each biofuel crop production system eight indicator questions are used.

Photo:
Dr. Götz Uckert, Dr. Stefan Sieber

For the pre-selection of biofuel crops in ScalA-BF, the assessment is already made and the values are already given. The requirement assessment appears for the pre-selected set of biofuel crop production systems in the step 3 table. The user group can directly switch to step 4. The values are determined by expert discussion among the Better-iS team. In case the given requirement assessment seems not to match with the actual requirements of the biofuel crop, workshop participants can make adjustments in step 3 and modify the requirements assessment by inserting adequate values in step 3

The use of the “other” button in the step 2 table, for the assessment of other biofuel crops than the pre-selected varieties jatropha, oil palm, sunflower and croton requires the user group to individually insert data in the step 3 table. The user group needs to assess biofuel crop requirements according to the given scale as the use of the “other” button deletes the pre-selection. User groups can insert adequate values for an alternative biofuel crop production system and continue with the assessment the step 4 table.

Step 4 - Local Crop Production Capacity Assessment

In step 4 the local production capacity towards needs of specific biofuel crop production system is assessed.
The following detailed information is needed:

- Detailed local expert knowledge on the agro-ecological situation in the target area

- Farmers' economic situation, farm incomes and access options to credit
- Farmers' crop production expertise as well as their access opportunities to training and extension services
- Farmers' endowment with labour, the distribution of labour and the available labour resources
- Farmer's access to and specific costs for farm inputs including, seedlings, fertilizer, plant protection, organic manure as well as specific crop production equipment
- Farmers' endowment with land and potential available land resources, including land rent
- Farmers' current production patterns and preferences
- Local market conditions for biofuel crop products including marketing options, as well as access costs to these markets, expected farm gate prices for the biofuel crop products
- Local rules and informal cultural perceptions about the production of the biofuel crop

Interpretation of results

Biofuel crop production capacity assessment with ScalA-BF helps to fill two knowledge gaps: bottlenecks for biofuel crop adoption if the biofuel crop were to be adopted under the current conditions; and second, it thereby helps to assess the suitability of a biofuel crop production system under the local conditions and allows for a comparison of the amount of bottlenecks of different biofuel crop production systems.

Scala-BF uses a simple colour scheme in step four to identify the bottleneck factors. Critical factors that might hamper successful biofuel crop production system adoption are highlighted in red in step 4 after all data has been filled in and the "finish" button has been pressed.

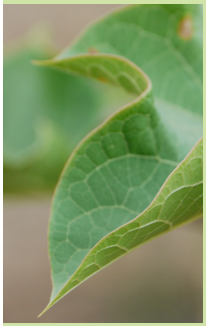
The red-highlighted factors are those factors for which the assessment deviates strongly from the required optimal conditions for adoption.

Biofuel crop production systems where no such critical factors are highlighted are therefore comparatively better adapted to the local conditions than those where red occurs. Thus, it should be particularly studied how and if these critical red conditions might be modified and possible options for adjustment of the factors should be reviewed by the expert group in charge of the assessment.

However, all other factors in the step 4 analysis are also, even though to different degrees, important for successful adoption of a biofuel crop. The analytical weighting in step 3 accounts for this different factor importance.

The Scala-BF assessment and the results analysis should also lead to a review of those factors that, even though they might not be highlighted in red, do not meet the “maximum score” in the column “actual satisfaction”.

In case the actual weighting of the existing conditions (“rating” times “weighting” value does not satisfy the requirement value (“maximum score”) values larger than 0 occur in the “”deviation from maximum score”. Values larger than 0 in the “deviation from maximum score” indicate potential bottlenecks for the introduction of biofuel crop production. The reasons, why there is a deviation of the actual value from the potential “maximum” value should be taken into account for the analysis and discussed among the stakeholders. While the red factors are most critical and show the highest deviation, all other factors in step four that show positive values in the “deviation” column should be taken into consideration.



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