

## Biofuels for rural development: Lessons learnt and concepts in development cooperation

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**Abstract:** *The question of how biofuels contribute to rural development is still debated: How can we avoid resource conflicts and depletion while making use of additional income opportunities from renewable energy markets? One key answer is that smallholders and the local population should be able to participate equally in biofuel value chains. Experiences from development cooperation highlight the importance of adequate organization and education of farmers. The approach of partnership farming offers new ideas on how to improve the relationship between farmers, laborers and buyers while building up knowledge on sustainable agriculture and market access.*

**Keywords:** *biofuels, rural development, outgrower schemes, group certification, partnership farming*

### Introduction

Since 2000, the production of biofuels, particularly ethanol and biodiesel for use in the transport sector has tripled and is projected to double again within the next decade (FAO, 2009). Increases in demand are largely stimulated by energy and climate policies in developed countries. At the same time, developing countries have also begun to set up biofuel targets to improve rural development, foreign energy supply and exchange.

The analysis of biomass production potentials in developing countries has moved their agricultural sector into the center of attention of investors, politics and development cooperation. Considering the steadily increasing overall demand for food and non-food commodities from renewable resources, the competition for land, water and biomass is expected to increase. Recent and predicted rises in agricultural commodity and food prices can be partly attributed to the growing use of biomass for biofuels. As the majority of the poor in developing countries are engaged in agriculture, but in the past often suffered from low agricultural prices, the growing biofuels market offers new possibilities of income generation in rural areas. The negative consequences of increased resource conflicts, largely debated in various sustainability fora, include the threats of food insecurity, displacement of local population, biodiversity loss, water scarcity and rising greenhouse gas emissions. They have to be taken serious when aiming at rural development benefits through biofuel production.

Against this background, the aim of this paper is to show entry points for pro-poor biofuel production. Many of the above mentioned threats to sustainability do not solely apply to biofuels but agriculture in general, and call for regulatory frameworks at national and international government levels. However, the scope of this paper will be on options to include smallholders in biofuel value chains and the role of development cooperation in this context. As currently the largest markets for biofuels exist in developed countries, the focus here will be on development opportunities from export-oriented biomass production. From this agricultural sector perspective, local energy supply from biomass is a positive side-effect, not the main objective.

### Who are the main actors and what are their interests?

In order to identify options for rural income through biofuels, it is important to understand the interests of the different stakeholders involved. These include governments of developing countries,

private investors and farmers. Even though each of these groups is far from being homogenous, it is possible to identify certain recurring interest patterns.

From the perspective of governments in developing countries, the promotion of biofuels offers generally the opportunity to attract foreign direct investment for the modernization of the agricultural sector, thereby increasing the productivity of existing crop systems and other underexploited land. Moreover, biofuels can contribute to domestic energy supply and/or generate foreign exchange through exports. At the same time, governments are responsible for safeguarding the living conditions of their population. Thus, with increasing foreign investments they are more and more urged to review their legal frameworks across energy, land, agriculture and trade to establish a clear policy environment for both investment and local population benefits. In Mozambique, for instance, the land earmarked for agricultural investments amounts to almost seven million hectares. Currently the government is setting up a national land policy which warrants land use rights to investors for up to 50 years, while involving local populations into the negotiation process and ensuring adequate benefit-sharing (Valá, 2010).

Investors are primarily interested in secured feedstock supply meeting certain minimum quality standards. Driven by the global debate on risks of biofuel production and the related claims by policy and the public, they are increasingly required to also comply with specific ecological and social sustainability criteria. In 2009, the EU issued mandatory sustainability criteria for those biofuels supported within its climate change policy. Furthermore, a number of voluntary standards and guidelines are under development, e.g. by (commodity specific) multi-stakeholder roundtables or the Global Bioenergy Partnership (GBEP) – a G8 initiative to promote sustainable biofuel policies. In order to correspond to these requirements, investors need skilled labor and/or farmers to provide the feedstock. Control over production inputs and processes, e.g. through land acquisition or supply contracts allows them to keep their investment risks as low as possible. In this context, they depend on functioning law enforcement as well as good knowledge of local business and policy environments – a particular challenge when operating in developing countries.

From a farmer's perspective, the main interests when participating in biofuel value chains are secured market access, additional income and minimal dependency on external input of supplies and information. Within developing countries, there is generally a broad continuum of interests among farmers ranging from benefit oriented to risk-averse agriculture. The latter applies especially on resource-poor smallholders who mainly produce for their own consumption, with a low share of income from market sales and/or off-farm labor.

### **Which production schemes offer most potential for rural development?**

Biofuels can be produced in different production schemes involving the choice of operation system, cropping system and feedstock.

The operation system determines the supply and control over production inputs. In plantation systems, investors provide land and production inputs. Labor workers – often non-locals – are hired for production and processing of the feedstock. The overall employment effects are rather limited as production is mostly mechanized. In general, developing countries differ significantly with regard to land availability and distribution of large-scale and small-scale estates. Due to existing land use patterns, the potential for the establishment or expansion of large-scale plantations is often limited bearing the risks of displacement of local population.

From the perspective of rural development, operation systems which include the production of biomass by local smallholders are viewed as most promising. In these cases, the control over land and land use remains with the farmer and the income generated from access to biofuel markets is more widely spread. Farmers can be linked to agricultural markets individually or as members of an association cooperative, whereby smallholders organize themselves and manage the group by themselves (possibly with support by local government agencies development cooperation and/or

NGOs). The latter helps to reduce transaction costs and to gain better bargaining power against buyers.

Another common form of linking smallholders to commodity markets is through contract farming, where the farmer agrees to provide certain quantities of a specific agricultural product to a processing and/or marketing company. These should meet the quality standards of the purchaser and be supplied at the time determined by the purchaser. In turn, the buyer commits to purchase the product often at predetermined prices. Usually, the purchaser also supports production through, for example, the supply of farm inputs, land preparation and the provision of technical advice (Eaton et al., 2001). These kinds of contractual arrangement between companies and farmers are also commonly referred to as outgrower scheme. In avoidance of the high transaction costs resulting from individual contracts, companies usually prefer to work with farmers groups. These groups are the vehicle for distribution of inputs, dissemination of technical advice, and procurement of the crop.

In order to avoid the risks of relying on smallholder production alone, many investors favor a mixed approach, i.e. the combination of a nucleus plantation with outgrowers. The nucleus is managed by the investor. It guarantees control over the minimum yields needed to safeguard the investment and can be used as test and seed production site as well as a demonstration plot for training of the farmers.

With regard to the cropping system, large-scale monoculture is commonly practiced by plantations as it allows for economies of scale. However, they can pose a threat to the environment and local population, especially if linked to previous clearing of high natural value areas and/or displacement of previous land use forms. In view of short-term benefits investors may opt to move on to new production areas once natural resources have been exhausted. Crop rotation and intercropping, which are common practices among smallholders, are more beneficial to environmental sustainability. Within contract farming, intercropping might be difficult to match with the contractual requirements in terms of time, quality and quantity of yields. However, it can be used to ensure income in the initial cultivation stages of perennial crops. The fact that, in contract farming, farmers keep the control over their land does not automatically mean that they work it sustainably. The prospect of quick revenues may give incentives to substitute food crops with cash crops and/or overuse natural resources, especially in situations of uncertain land rights. The challenge will be to diversify existing crop systems and to harmonize food and non-food crop production in a sustainable way. Certification provides a useful instrument for socially and ecologically sound land management within a production system. Macro-effects such as indirect land use change and food price increases, which negatively affect the environment and food security, further call for policy frameworks to enable long-term participatory land use planning and social safety nets.

Essential for the sustainability of biomass production for biofuels and its potential for rural development is the choice of the crop. Besides agronomic and climatic conditions, two key determinants in this context are profit margins and opportunity costs. In the past, *jatropha curcas* has often be argued to be a profitable crop for marginal, degraded land, with low input requirements and – due to its inedibility – no competition with food production. Recent studies show that apart from its apparent resource competition with food crops, profit margins for *jatropha curcas* are largely negative with high opportunity costs compared to alternative land use options (GTZ, forthcoming; GTZ 2010). In addition, from a farmer's perspective, it seems more preferable to produce crops which can be sold on different (food and non-food) markets in case the demand for biomass for energy decreases. Another argument for the production of crops like sugarcane, soy, cassava and oil palm is that they are already scientifically developed and smallholders are often familiar with their production.

In sum, if biofuel production is realized by the involvement of smallholders who keep their land and diversify their existing crop systems in a sustainable way, while making use of investments in these systems through contract farming, it can lead to a boost in productivity of the agricultural sector in general and also contribute to food security.

## **Which role can development cooperation play?**

There are different ways for development cooperation to contribute to pro-poor biofuel development. They range from policy advice and capacity building for setting up the regulatory framework at national and international level to public private partnerships projects for supporting smallholder integration into biofuel value chains and promoting sustainable agriculture for food and non-food production. Within this chapter, the focus will be on entry points for the latter by giving lessons-learned and approaches from outgrower schemes and smallholder certification in other agricultural sectors which can be transferred to the biofuels sector.

### **Experiences from outgrower schemes**

The evaluation of outgrower schemes (mainly in the horticultural sector) has revealed a range of challenges faced by farmers and buyers (Strohm et al., 2006; Abwino et al., 2007). A frequent challenge concerns the compliance of contracts on both sides. In times of high prices it may be more profitable for a farmer to break his contract and side-sell to a higher-bidding party. In the same way, in countries or regions with weak law enforcement, buyers can refuse or delay the payment of agreed prices.

Often farmers fail to provide the required quality, quantity and timely delivery, causing the refusal of their product by the buyer. The underlying reasons are often related to attitude, knowledge and legal constraints. Farmers may divert inputs supplied on credit to other purposes, thereby reducing yields. In some regions in Kenya, farmers seem to lack the right attitude to grow crops commercially. If they do not show enough commitment, the crop performs poorly and thus they incur losses. Farmers sometimes do not understand the necessity to stick to the planting program of the company and for instance do not plant in time. This affects the company's ability of fulfilling the obligations with its customers.

As mentioned above, contracted farmers may also face land constraints due to lack of security tenure, thus jeopardizing sustainable long-term operations. Social and cultural constraints may affect farmers' ability and willingness to produce to managers' specifications. This is especially a problem when sustainability standards in the context of certification are involved. The absence of pre-planting prices, coupled with low understanding of why and how international market prices fluctuate and how companies derive the price they pay for the produce leads to uncertainty and a feeling of exploitation. Limited access to information, particularly in a format that can be understood by the farmers, adds to this problem.

Breach of contract from the buyers' side is often due to inefficient management and marketing problems. Investments in agricultural production require adequate research, staffing finance and management skills. Poor management, corrupt staff and lack of consultation with farmers may lead to farmers' discontent and result in a long and expensive learning process for the company. The preferential treatment of the production on the nucleus estate can lead to delays in buying and transportation of outgrower products.

Production problems and excessive advances can lead to farmers' indebtedness and create dependencies. This gives space to exploitation, especially in case of a buyer's monopoly situation. Companies often force farmers to buy inputs from them to ensure the quality they need. However, the companies sometimes increase the price they charge the farmers for the inputs to cover for defaults and then farmers need to pay more than with their local input provider.

The engagement of development cooperation in public private partnerships to support outgrower schemes can contribute to improve the relationship between farmer and buyer by supporting the compliance of certain success criteria (GTZ, unpublished).

A careful selection of outgrowers should make sure that the farmers can fit the minimum requirements of the new crop within the existing activities. The issues to be looked at here are land availability and tenure, land quality, crop compatibility, labor resources and accessibility of the

cultivation plot. Farmers who show agricultural skills, business-awareness and willingness to learn are more likely to succeed as outgrowers. The same applies for those showing motivation and commitment to the scheme in order to improve their livelihoods instead of just picking up credit. As mentioned above, business plans need to consider farmers' opportunity costs and profit margins of the selected crops in comparison with alternative crops.

Selection of a group leader is mostly an interactive process between the company and the group. Group leaders must be approved by the company (they must be literate and be able to keep a minimum of administration), but at the same time be accepted and trusted by the farmers. Size, level and organization of the group is often determined by the nature of the commodity. For perennial crops where longer-term partnerships are at the core of the relationship, with a relatively high level of investment by the supporting company, smaller groups of 5-10 farmers are more effective.

Contracts and production agreements between companies and farmers (or farmer groups) as well as the monitoring of their compliance should be transparent, comprehensive and illegible to farmers. They should contain a balanced contract design with risks, incentives and enforcements modalities being fairly applied to all parties. Conditions that apply to the provision of inputs and other services, the range of inputs and extension services made available, their cost, any interest charged and repayment modalities must be clearly stipulated. Possible farmer contributions towards the value of inputs and other services are to be considered at all times, thus ensuring a higher degree of commitment from the farmers.

Timely delivery of inputs and other services needs to be properly planned and must respond to farmers' needs, creating incentives for farmers to honour contracts. The better and wider the range of services offered, the closer the relationship between farmers and the outgrower company, and the more the farmer will lose by breaking the relationship. The same applies to the design of properly functioning marketing arrangements including networks of depots, transparent grading and post harvest treatment by trained staff and farmers in grading.

Development of transparent pricing systems also contributes to trust-building. However, in view of uncertainties with regard to developments on the international markets or macro-economic policies of governments, it is often difficult and it certainly entails a degree of risk for the outgrower companies to set a pre-planting price. The minimum should therefore be some form of pricing mechanism which is acceptable to the outgrower company and to the farmers, ideally also to the governments of the countries in which the outgrower companies are operating to avoid political interference.

The common issue of side-selling should not be tackled at the farmer side only. A first step towards addressing this problem may be to include the issue of side-buying into a Code of Conduct between the companies or organizations concerned. A regular follow up requires accurate reporting by field or extension officer.

### **Experiences from group certification**

As mentioned above, the compliance of sustainability standards for biomass production is an increasing precondition for access to biofuel markets and an important factor to minimizing negative social and ecological impacts. Thus, the participation in certification schemes is an additional challenge to be met by smallholders seeking to benefit from biofuel value chains. As certification of individual smallholders would cause excessive transaction costs, thereby excluding smallholders from markets for certified products, group certification provides a useful solution which can be supported by development cooperation. The group to be certified can either be farmer-led (cooperative or association) or work under a company-led outgrower scheme. The advantage of the latter is that the company can set up and maintain an internal control system (quality management system) for the group and provide financial and technical support to the farmers. In this case, the decision making power lies more in the company than with the farmers themselves.

Indications on the opportunities and challenges of group certification can be drawn from a pilot project to facilitate group certification of horticultural smallholder producers in Kenya, Ghana, Thailand and Macedonia under the GLOBALGAP scheme.<sup>1</sup> Similar to the mandatory EU sustainability criteria for biofuel production, GLOBALGAP standards are requirements by a large number of key buyers in Europe and for this reason are adopted by the main exporters. The main difference lies in the scope of products (fresh produce) and requirements (focus on food safety and traceability).

In the course of the pilot project, 17 out of 23 participating farmer groups achieved certification. While some smallholders dropped out of the program there is evidence from a recent post-pilot evaluation in Ghana that the majority of farmers increased their incomes through increased productivity, reduced production costs as well as rejects. Furthermore, membership in several pilot groups increased (Will, forthcoming).

The pilot cases indicate that small-scale farmers are capable of achieving certification. However, the viability and sustainability of group certification depends on several key conditions, similar to those mentioned above for outgrower schemes. Technical capacities, group structures, management capacities and leadership skills are indispensable preconditions for maintaining group certification. Simplified handouts have to be developed to adapt the quality management system to the capacities of smallholder farmers. Depending on previous technical knowledge, management skills and group performance, sufficient time needs to be provided to enable farmer groups to adopt relevant technologies as well as attitudes necessary for achieving compliance. As benefits are often difficult to predict while costs incur immediately, it is necessary to inform farmers on probable benefits and costs of group certification to assist them in taking informed business and investment decisions. In this context, resource-poor and risk-averse smallholders require special attention.

In sum, the main issue is not whether small-scale farmers are able to achieve certification and integrate into up-market supply chains. The question is rather how the weak service sector and business environment can be compensated for so as to enable smallholders to achieve certification without compromising supply chain competitiveness. Experience suggests that (i) standard regulations have to be adapted to the actual risks of smallholder production; (ii) technical and managerial capacities need to be built; and (iii) initial investments as well as recurrent costs of compliance need to be made affordable for smallholders. The latter could also be covered by business partners benefitting from smallholders' low-cost, labor-intensive production or by other stakeholders committed to integrating smallholders into agricultural markets.

Private sector, public sector and development partners play critical roles in promoting a better market-integration of smallholders without compromising supply chain competitiveness. While private sector commitment will be essential for the success of both outgrower schemes and group certification, public-private partnerships can serve as an appropriate tool for promoting smallholder inclusion into global supply chains by adding public (governments, donors) value to private initiatives.

## **A comprehensive approach: partnership farming**

Many of the challenges experienced in the context of contract farming and group certification schemes result from a lack of technological and business skills on the farmers' side. This leads to an unequal relationship between buyers and farmers that is often characterized by mistrust. Apart from the above mentioned key factors that help to overcome these constraints within conventional outgrower schemes, the approach of partnership farming<sup>2</sup> follows a more comprehensive strategy to improve the relationships between different actors in the agricultural sector, including farmers, laborers, buyers and the environment (GTZ, unpublished).

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<sup>1</sup> The GLOBALGAP Smallholder Pilot Project ran between 2006 and 2008 was jointly implemented by the sector project Agricultural Trade of the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH and the Gesellschaft für Ressourcenschutz (GfRS) in cooperation with GLOBALGAP (by then still EUREPGAP) and various programs implemented by GTZ, DFID and USAID in the four pilot countries.

<sup>2</sup> The concept of partnership farming is currently being developed by GTZ and a private sector partner in preparation of a public-private partnership project in India.

Starting point is the observation that neither public nor private extension services involved in the context of contract farming impart general knowledge on modern agricultural techniques and commercial enterprise which smallholder farmers would need to substantially improve their position in agricultural value chains. Moreover, agricultural laborers are often excluded from these services.

The key difference between contract farming and partnership farming is that while contract farming provides commodity specific training, partnership farming provides a broad education base which can be applied to a variety of commodities and production systems. By not limiting the education to the contractual relationship between farmers and buyers, this approach offers post-secondary education for farmers as agricultural professionals or "agripreneurs" who act as self-sufficient decision-makers. The term 'partnership' in partnership farming encompasses three levels of relationships within the agricultural system:

- The first level of relationships involves the farmer and the environment as an integral component of his farming system. Farmers' understanding of the interaction between land use and the environment is considered key to sustainable resource management, including efficient use of production inputs and recovery of soil and water resources.
- The second level concerns the relationship between farmers and laborers. In the Indian context, the attitude of farmers towards laborers was found to be characterized by low esteem. The assumption is that, if farmers better understand the importance of laborers for improving their production system, they are more likely to facilitate trainings (including reading, writing and basic household economics) for laborers which in turn enable laborers to achieve higher wages.
- The third level targets the relationship between the farmer and the buyer of his products. It is expected that if farmers improve their knowledge about markets and prices, they will better value the benefits of contract farming. The trust between both parties will be increased by the buyer contributing a portion of the course fees for farmers considering it an investment in the farmers' capabilities and thus the quality of produce.

The financing concept of partnership farming includes contributions by farmers (through course fees), public and private sectors with initial support by donors. The core component of the partnership farming concept to facilitate farmers' and laborers' education is the farming school center with laboratory and language center, complemented by demonstration farms and satellite classrooms.

The curriculum is based on four consecutive program modules each offering a specific certificate upon successful completion (Fig. 1). The overall timeframe is envisaged to cover approximately 12 months. The first module 'Intro to Modern Farming' will be a short module targeted towards experienced and beginner farmers introducing the concept of partnership farming. The second module 'Advanced Professional Farming' will deepen knowledge of modern farming practices leading to the certificate in agripreneurship. The third module will respond to the farmers' demand for skills related to specific commodities. The final module 'Agribusiness' will focus on advanced economics and linkages to export markets concluding with a diploma in modern agriculture.

An important aspect to be treated in all modules will be the topic of sustainability standards and certification, facilitating joint discussion between farmers and buyers about which certification scheme matches best the respective farming system. Through a broad understanding of present challenges and technological answers in modern sustainable agriculture, farmers are expected to be better prepared to comply with the sustainability standards, e.g. required in the context of biofuels production.

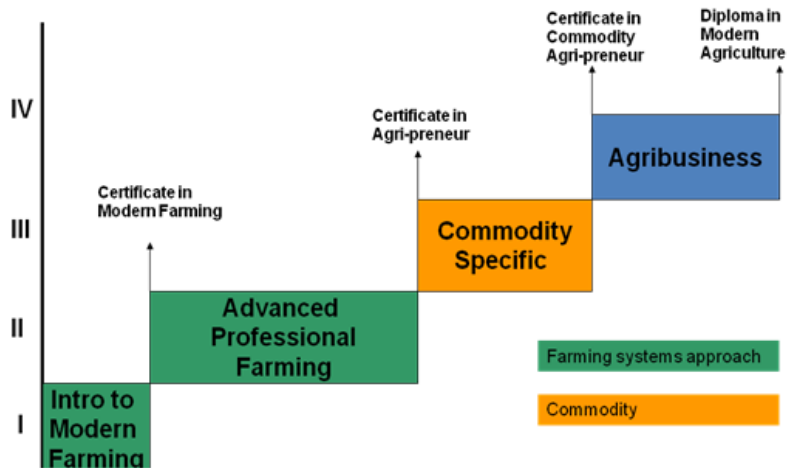


Figure 1. Module plan of farming school for partnership farming (GTZ, unpublished).

## Conclusion

The increasing demand for biofuels has revived the interest of investors in the agricultural sectors of developing countries. How these investments will contribute to rural development depends on the successful involvement of smallholder farmers. Benefits for rural development are greatest if investments contribute to the modernization and diversification of existing farming systems instead of effecting land acquisitions for large-scale monoculture plantations.

Experiences in outgrower schemes and group certification have shown that the strong commitment from both farmers and buyers coupled with adequate technological, organizational and commercial skills on the farmer side are key prerequisites for facilitating smallholders' access to agricultural export markets. In this context, development cooperation can play a supportive role, e.g. by providing advice on the adaptation of business models to local smallholder conditions and inducing effective mechanisms to improve farmers' skills.

The approach of partnership farming offers farmers broad knowledge on markets and sustainable resource management. Thereby they acquire the skills particularly required in the context of biofuels production to face the challenges of increased resource competition. Moreover, partnership farming contributes to moving the sustainability discourse from the rather theoretical international to the practical local level while enabling farmers to assume a stronger role in the innovation of the agricultural sector and thus contribute to rural development and food security.

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