

BIODIESEL: FARMERS PERSPECTIVES
from Bahia Brazil

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Executive Summary

In the past, family farmers in the North-East of Brazil have been socially excluded from the benefits of agricultural development, particularly biofuel production that has seen Brazil emerge as a world leader in production and consumption. Since 2005, the Brazilian government has attempted to promote social inclusion through the production of biodiesel, supporting small family farmers with technical support, access to markets and cooperatives.

This research project involved interviews with a sample of 20 different farmers across the state of Bahia from different geographical locations who are producing a range of different feedstock (castor, sunflower and palm) for biodiesel. By focusing on farmer's experiences of participating in the biodiesel program, this research sought to explore the lessons learnt from a local perspective and to provide a voice for farmers in the national and international debate on sustainability of biofuels.

A collaborative research team (Institute for Sustainable Futures, UTS and Permaculture Institute of Bahia with support from the ETC Foundation and the Institute for Society, Population and Nature) visited five different agricultural cooperatives in Bahia working with family farmers on biodiesel production, one biodiesel refinery and one castor bean oil press. The team video recorded 20 on-farm interviews with male and female farmers. The team also took the opportunity to participate in the Bahia Biofuels Network annual seminar to network with other industry professionals and understand the current focus within government agencies working on biodiesel production. The research raised some important questions about social inclusion and social sustainability in biodiesel production.

These included:

- Preserving the diversity of agricultural products and activities on small farms
- Risks associated with introduction of foreign species
- Importance of high quality technical assistance (extension service)
- Cooperatives and participation
- Ensuring the next generation of farmers
- Social values of the wider society toward farmers and farming
- Gender impacts of feedstock crops
- Quality of life in rural areas

The initial research findings highlight the gap between the social inclusion objectives of the program and the limited participation of family farmers. This report suggests that the current PNPB is making minimal, if any, contribution toward social inclusion for family farmers. The current vague use of the term means that claims that lack any adequate evidence base can currently be made about social inclusion under the PNPB. Future policy development must consider further research into social sustainability and social inclusion aspects of family farming. Farmer's positive attitude and deep understanding of the issues that affect their livelihoods should be considered as strengths to be utilised by the PNPB, especially if social inclusion is to remain a key objective. The report concludes by discussing potential future areas for research into social inclusion in the biodiesel production context.

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Abbreviations

COOAFTI	Irecê Territory Family Farmers Cooperative <i>(Cooperativa da Agricultura Familiar do Território de Irecê)</i>
COOPAF	Family Farmers Production and Commercialization Cooperative of the State of Bahia <i>(Cooperativa de Produção e Comercialização da Agricultura Familiar do estado da Bahia.)</i>
COOPERO	Olindina Region Rural Producers Cooperative <i>(Cooperativa dos Produtores Rurais da Região de Olindina).</i>
COOPERUNA	Una Rural Producers Cooperative <i>(Cooperativa dos Produtores Rurais de Una)</i>
COOTEBA	Work Cooperative of the State of Bahia <i>(A Cooperativa de Trabalho do Estado da Bahia)</i>
CPT	Pastoral Land Commission <i>(Comissão Pastoral da Terra)</i>
IPB	Permaculture Institute of Bahia <i>(Instituto de Permacultura da Bahia)</i>
ISPN	Institute for Society, Population and Nature <i>(Instituto da Sociedade, População e Natureza)</i>
PAR	Participatory Action Research
PNPB	National Biodiesel Production and Use Program <i>(Programa Nacional de Produção e Uso de Biodiesel)</i>
PRA	Participatory Rural Appraisal
SLF	Sustainable Livelihood Framework

1 Introduction

The purpose of this report is to present research findings regarding farmer's perspectives on biodiesel production, focusing on the 'social inclusion' aspects of the current biodiesel program. The research was conducted in the state of Bahia, in Northeast Brazil from April –July 2010. The report describes the research methodology and then explains the themes that emerged from interviews with farmers. The report concludes by discussing the findings and highlighting areas for further research and discussion.

The initial research findings were presented at the Centre for Sustainable Development, Federal University of Brasilia, in Brasilia (06 July 2010) and at the Permaculture Institute of Bahia public seminar in Salvador, Bahia (12 July 2010). Debate and questions from the respective audiences have been incorporated into this report.

This report is accompanied by a short video documentary, available online. Please check the ISF website (www.isf.uts.edu.au) for links to this video.

From 2020, the full interview transcripts should be available online at the University of Technology Sydney library eDatabank archive.

1.1 Background

In 2004, the Brazilian government launched a national program for biodiesel production, called National Biodiesel Production and Use Program (PNPB), followed by the Brazilian Agroenergy Plan 2006-2011. In relation to biodiesel, there is significant overlap between the two documents, in particular aimed at providing support to enhancing social inclusion of small farmers, improving regional development and positive environmental impact.

In part, the 'social inclusion' aspect of the PNPB was driven by the recognition that modernized agricultural practices and agricultural improvement had tended to be concentrated in the southern states and had led to the 'social exclusion' of small farmers, especially in the North and Northeast, who have limited market access and limited competitiveness with large agricultural corporations. The Brazilian government incorporated a 'Social Fuel Stamp'² in the PNPB that provided biodiesel refineries with tax incentives if they provided technical assistance and purchased minimum percentages of feedstock from family farmers³, particularly farmers from the North and Northeast of Brazil.

Whilst the Brazilian government acknowledges that the Brazilian biodiesel production model may not be suitable or replicable elsewhere, the country continues to 'lead by example' as the one of the major nations successfully and profitably producing biofuel and international initiatives, such as the Roundtable for Sustainable Biofuels, consider Brazil as a 'best practice' example.

In recent years, the debate over sustainability of biofuels gained increased international attention and widespread interest. As life-cycle assessments show

² *Selo Combustível Social*

³ The term 'family farmers' is defined by law in Brazil and there are limitations to farm area, external paid labourers and level of mechanization that affect the eligibility to be classified as a 'family farmer'. Whilst this research project focused on family farmers, it did not attempt to classify participants according to the government criteria. The term 'small farmer' and 'family farmer' are used interchangeably.

widely diverging results and the environmental risks, food insecurity, direct and indirect land use changes and associated deforestation have polarised opinions on biofuel production. There has been increased debate and research on the need for sustainability criteria for international trade in biofuels.

This piece of research focused specifically on small farmer's perspectives of producing feedstock for biodiesel production. The purpose was to provide opportunity for farmers to have a greater 'voice' in the debate and to increase the visibility and understanding of the social dimension(s) of sustainability in biodiesel production.

1.2 Social Sustainability and Social Inclusion

'Social sustainability' and 'social inclusion' are two terms that appear frequently throughout this report. In part, due to the fact that sustainable development and social inclusion are both priorities of the Brazilian government's agroenergy plan and in part due to the fact that this research is a qualitative social research project. The next section gives a brief overview of the two terms aimed at familiarising the lay reader with sufficient information for the discussion section and questions raised later on.

Social Sustainability.

The three sphere model of sustainability, with economic, social and environmental circles equally overlapping to create a 'sustainability zone' is now well-known and commonly used in discussions about sustainability. The focus of this research is on the social sphere and 'social' sustainability, drawing on the economic and environmental spheres as needed to understand social aspects of sustainability.

'Social sustainability' is difficult to define, in part due to the fact that social phenomena are subject to our perceptions and interpretations of social conditions but also as behaviour of individuals can change. Unlike economic or environmental sustainability, social sustainability is difficult to analyse quantitatively and will vary depending on time, place, culture and context. Various authors include or exclude a number of social conditions in attempting to define 'social sustainability'. These include but are not limited to:

- Cultural forms, symbolic bonds, community infrastructures (O'Connor 2006)
- Social capital (O'Connor 2006; Pretty 2008)
- Power (Lehtonen 2009)
- equitable distribution of resources and opportunities between present and future generations (Costanza & Patten 1995)

One popular approach to defining social sustainability emphasises the improvement of conditions (well-being) across generations (intra and inter generational), whilst other approaches focus more on social relations (such as trust and reciprocity) that facilitate coordinated or collective action (Lehtonen 2004 p.204).

Whilst these two approaches are useful in moving toward a greater understanding of social sustainability, it is neither feasible nor desirable for this research to adopt a single static of social sustainability. In part, due to the fact that the Brazilian Agroenergy Plan (Ministry of Agriculture Livestock and Food Supply 2006) leaves social sustainability as undefined, so any definition would be 'imposed externally' and in part, as the research team believes that 'social sustainability' should draw on multiple perspectives, remain fluid and ultimately be defined by the communities and individuals involved in this research. The research findings did not produce a 'set definition' but rather highlighted the complexity of social sustainability.

Social Inclusion

The term 'social inclusion' emerged in Europe in the latter part of the 20th Century in social policy debates (Wilson 2006 p.338). The approach of defining poverty as 'economic deprivation' and lack of resources, requiring a redistribution of wealth, sat uncomfortably for the French. They considered poverty to be multi-faceted and linked to the denial of citizen rights, particularly participation (Shortall 2008 p.451; Wilson 2006 p.338). This thought is grounded in Durkheimian notions of social solidarity and 'relational issues' within society (Shortall 2008 p.451; Wilson 2006 p.338). This new line of thought caused a significant shift in the understanding of poverty, as social *exclusion* defined poverty in relative rather than absolute terms, intricately linked poverty and inequality and perhaps most importantly placed emphasis on 'power' and 'participation'

Social exclusion ...refers not only to the distribution of income and assets (as does poverty analysis) but also to social deprivation and lack of voice and power in society... (Buvinic 2004 p.5)

Yet, whilst social exclusion was relatively easy to define, social *inclusion* remains a vague and elusive term. There is a stream of thought that considers social inclusion to be primarily defined in comparison to social exclusion. That is, those same factors that *exclude* communities and individuals from participating and living as the 'mainstream' economy and society, by default can *include* them if 'rectified'. This approach assumes that economic and material wealth and in particular, participation in wage labour will equal social inclusion.

...the labor market is one of the weakest links between excluded groups and mainstream society, so expanding the labor market insertion of excluded populations can be an effective tool to combat poverty... (Buvinic 2004 p.19)

There is another stream of thought that considers social inclusion to be focused on empowerment, decision-making and participation- so communities are socially included when they are participating in decision making, even if those decisions and choices are not part of the mainstream society '*The key to social inclusion (and also necessary for social capital and civic engagement) is participation.*' (Shortall 2008 p.455).

The Brazilian Approach to Social Inclusion

The Brazilian Agroenergy Plan 2006-2011 (Ministry of Agriculture Livestock and Food Supply 2006) has 'sustainable development' as a key objective of the plan, and considers contribution to 'social inclusion' as a priority. The plan does not explore or define 'social inclusion' but in discussion about the economic, social and environmental aspects of the plan, list the social aspects as being employment, income and migration flows (Ministry of Agriculture Livestock and Food Supply 2006 p.8)

The Brazilian social inclusion approach within the biodiesel development model follows a presumption that through biodiesel production, a change in conditions such as link to markets or training in technology will result in increased income and employment will therefore make for greater well-being and social inclusion for rural communities. The Brazilian model sticks closely to the understanding of social inclusion as lack of access to economic and material wealth of 'mainstream' society, rather than social inclusion as empowerment, decision-making and participation or any other quality-of-life conceptions.

2 Research Design

2.1 Research Methodology

The purpose of this piece of research was to explore small scale farmer's perspectives and experiences of biodiesel production, in part to increase farmer's 'voices' in the sustainability debate, but also contribute to greater appreciation of the complexity of social dimensions of sustainability in biodiesel production.

This research primarily used a qualitative research approach as it aimed to provide an in-depth understanding of farmer's perspective of biodiesel production in a local context. It was structured in way as to be sensitive to the social context of the study, through using action research methodology and collaborating with local partners at the planning, implementation and analysis phases of the research.

A series of research questions (see Annex 1) were outlined in the original research proposal, focusing on how farmers saw the link between sustainable livelihoods and biodiesel production. However, throughout the research, it became clear that (a) the biodiesel production in Bahia is still in early stages, and for many, the links are still unclear or uncertain and that (b) themes that emerged during the interviews would be a better way to capture the 'wholeness' or inseparability of issues that affect farmers involved in biodiesel production. Whilst the research questions are discussed in the final section of this report, the research team decided to focus on communicating the 'emerging themes' and discussing what other questions these raise for social sustainability in biodiesel production.

2.2 Action Research

Action research has become a common way to conducting research with rural communities, and is used in approaches as Participatory Rural Appraisal (PRA) and Participatory Action Research (PAR). Paulo Freire, a Brazilian, linked action research with education for poor rural people. In this research project, action research was chosen to ensure that open collaboration could occur with the local partners, that the research team would embrace the notion of 'multiple realities', that the research would be 'evolving and open-ended', discarding any illusory preposition of 'detached observer' and accepting our roles as active participants in the research process.

Potential local partners were contacted during a scoping visit to Brazil in 2009 and confirmed in 2010. The two principal local partners are the Permaculture Institute of Bahia (IPB) and the Institute for Society, Population and Nature (ISPN). Local partners were essential to the approach and the success of the research project, particularly in framing the research to be relevant to the national context and in contacting potential participants.

The research team used the process of group-reflections, self-reflections and interviewing one another before and after each interview with farmers in order to enhance our own learning. During the interviews with farmers, the team took turns of being the main interviewer and adapted our approach slightly differently in each subsequent interview. Interview process and questions did change throughout the research process based on our reflections.

In exploring 'social inclusion' and social aspects of sustainability, a methodological approach that accommodates 'dynamic' understandings and local perceptions of social inclusion, as opposed to 'external' and 'rigid' quantitative measures, was adopted.

A broad theoretical framework, the Sustainable Livelihood Framework (SLF) (Scoones 2009), was employed to provide initial structure to the investigation. This framework emphasises five broad areas of investigation; (i) contextual analysis (ii) livelihood resources (iii) livelihood strategies, (iv) institutions and organisations (v) outcomes and trade-offs. Two further important areas were also considered: gender and power. Gender and power were considered key dimensions that are weak or lacking in the SLF, yet integral to understanding social sustainability in biofuel production. The SLF, with gender and power components, informed the first draft of questions, with approximately 50 potential research questions posed from across the area's of investigation. The research team decided that these area's were too broad and time-consuming to cover in individual interviews and therefore reduced the focus. Broad areas and questions that the research team considered could be answered via 'desktop research' were disposed, as were questions that may have been confusing, politically sensitive or likely to cause uncomfortable feelings between the research team and participant. Several 'open ended' questions were included to increase the opportunity for farmers to decide the focus through their responses (see Annex 2 for interview questions).

During the analysis phase, the research team also considered agroecology and the multi-functionality of farms to inform our understanding of the emerging themes.

2.3 Data analysis

The interviews from this research were recorded on digital mini-disc recorders and on high definition video. Due to time considerations, only some interviews have been transcribed in full, whereas other interviews were analysed by using the recorded data (audio or video) for note taking. A combination of notes and full transcripts were used to categorise the thematic areas. When participants responses are based on notes, rather than full transcripts, the word 'paraphrased' is used to identify this throughout the report. A short survey (see Annex 3) was completed with each participant, collecting information such as approximate land size, principal crops grown, number of animals, number of household members and if any farm work was mechanized. Original survey forms were scanned and data entered into a simple table. Grounded theory (Gomm 2009 p.152), that is constant comparison, gradual abstraction and the writing of theoretical memos, was used to identify the emerging themes, together with the research teams reflections about the interview process. For example, reflections and observations about themes or issues that appeared important for the research participants. The themes that had the widest 'common denominator' were chosen for this research report. For example, the issue of land ownership was considered a priority by some participants, especially those living on agrarian reform settlements; however this theme did not appear as a high priority for established farmers living in stable conditions, and therefore has not been discussed in this report.

2.4 Research Methods

This research project involved in-depth qualitative interviews, that were video-recorded, with a sample of 20 participants across the state of Bahia from different geographical locations who are producing a range of different feedstock (castor, sunflower and palm) for biodiesel. This next section will provide an overview of the Ethical Considerations, Sample and Interview process.

Ethical Considerations

The research was approved by the Human Research Ethics Committee at the University of Technology, Sydney and adhered to the Australian guidelines of the *National Statement on Ethical Conduct in Research Involving Humans*.

Prior to commencing the interviews, the research team discussed ethical considerations, including potential risks to participants and researchers (based on the *do no harm* principle) and under what conditions and circumstances the researchers would cancel the research. For further information see Annex 4.

Sample

This research focused on farmers who are planning to, are currently or have in the past participated in biodiesel production, in Brazil under the 'social inclusion' program (PNPB). The research team attempted to interview a range of farmers taking into consideration key variables such as gender, age, land-ownership, level of activity in the biodiesel program, feedstock grown and location. This purposeful method was used in order to access a range of experiences and perspectives across key areas of social difference.

The research team also relied on selecting participants from referrals by other participants, local government, cooperatives, NGOs and church associations. This was particularly important for 'gaining entrée' with participants and establishing sufficient trust for the interview to proceed. The majority of participants are farmers, however, 2 participants are working as agricultural technicians and another participant is currently working as a community mobiliser. The research team decided that it was appropriate to include these participants, as they continued to form part of their rural community and could contribute to the research from a farmer's perspective.

Locations (In state of Bahia)	Females	Males	Feedstock
Ourolandia	6	15	Castor bean
Olindina			Sunflower seed
Morro do Chapéu			Palm kernel
Una			
Itajuípe			
Umberanas			
Santa Luzia			
Arataca			

Table 1 Snapshot of Participants

Cooperatives Visited (Brazilian Acronym)	Other Organisations visited
COOPAF	Pastoral Land Commission of Bahia
COOPERUNA	Umbuzeiros School of the Semi-Arid
COOTEBA	Local Secretary of Agriculture- Una
COAFTI	Petrobras Biodiesel Refinery in Candeias
COOPERO	Bahia Biofuel Network (coordinated by Secretary of Science, Technology and Innovation- State Government of Bahia)

Table 2 Other Organisations visited

Interviews

The interview style used included two parts; semi-structured and informal. The majority of interviews occurred on the participant's farm or at their home residence. Two interviews were conducted in public locations.

The interviews were generally conducted in two phases. Firstly, the semi-structured interviews generally took one hour to complete, and could be considered 'stationary' interviews, with the participants and researchers seated. During this first phase, the researchers followed the interview question and prompt guide. The second phase of the interview was informal and involved walking around the farm, and took between 30 minutes to 2 hours to complete. During the second phase, the interviewers engaged in casual conversation, and re-phrased interviews question in a more relaxed way in order to seek more in-depth responses.

Both phases of the interview process were video-recorded and audio-recorded.

3 Emerging Themes

The research raised some important questions about social inclusion and social sustainability in biodiesel production. The following themes emerged as the most important areas for consideration from across all participants, and the questions raised at the end of each theme include questions from the audiences at the two public forums held in Brazil during July 2010.

3.1 *Preserving the diversity of agricultural products and activities on small farms*

On farm diversity was considered essential by farmers for food security, resilience to market and climate fluctuations, as well as ensuring social reproduction and cultural life of communities.

In terms of food security, participants reported past occurrences of 'crisis' or 'difficult times', particularly associated with crop failure, extreme weather conditions or market gluts. Participants were asked if they had ever passed through a crisis or difficult time on the farm, and if so, what strategies did they use. Responses included exchanging food with neighbours, relying on stored food from previous harvests (for example, cassava flour was considered by many a staple when bean crops failed), having a variety of crops planted and in one case, the local farmers association took a loan to purchase food staples for families until the next harvest season.

People survive like this, those that don't harvest cassava, harvest beans and then they swap... (paraphrased Male#17- Palm)

One participant noted that after losing their all their bean and cassava crops one year, they now planted extra cassava for processing and storage and a wider variety of crops to ensure they didn't run the risk of being food insecure again. Many participants reported continuing agricultural practices learnt from their parents, for example underground storage of corn for animal feed. Oleaginous crops, especially castor, were considered an important source of income. Many participants reported having some 'off-farm' income, such as pensions, child support payments or family members working away in order to supplement their on farm income. Participants commonly purchased coffee, sugar, cassava flour, rice and meat off the farm. Participants who reported buying cassava flour felt that the price was so cheap, it was not economical them to produce their own.

Participants in general, emphasised the importance of the diverse crops on their properties for meeting their different needs. For example, one participant planted corn and peanuts for sharing with friends and family at the festival of Saint John (*São João* which falls on mid June), palm for selling to a contracted processors (for palm heart – *palmito*), melons, pumpkin, rubber trees, cocoa trees, coconut trees for personal consumption and for taking to the local market, as well other fruit and vegetables for personal consumption. This respondent emphasised, that if you had your own piece of land and planted a variety, then you would never 'go without'.

I've lived here for 24 years, and we plant a little bit of everything because our land is small, but we have experience in everything, we have beans, corn, cassava, cashew, palm, we have a little bit of everything. Last year we planted sunflower too ... (paraphrased Female # 8-sunflower).

In relation to the current biodiesel program, intercropping of oleaginous crops with food crops is promoted but the program lacks specific mechanisms to guarantee on farm diversity. For example, several farmers reported that due to current high prices

associated with oleaginous crops for biodiesel, mono-cropping was increasingly practiced and popular amongst family farmers.

Lots of people stopped planting cassava and beans, they are just planting castor, why wouldn't they when the price is so good...(paraphrased Male #4 Castor)

A local technician felt that the issue of monoculture in his region was already established prior to biodiesel program, but that the biodiesel program had pushed prices up, encouraging farmers to toward monocultures rather than diversity

... This region already has a huge monoculture problem and with the rain, high temperatures, low productivity we are seeing the degradation of the environment when only one crop is worked...with the production of biodiesel, there has been a reduction in the production of crops for sustainable food consumption, there should be a plan, some way to encourage farmers to be diversifying their crops whilst also working with oleaginous crops for biofuels.... (Male #22 Agricultural Technician)

One farmer reported that in his region, the local cooperative promoted intercropping sunflower with cassava, but that his neighbour was considered to have the most successful sunflower crop and he planted it as a monoculture.

The cooperative technicians are going up there all the time to learn what he did with his sunflower, they don't have any experience either with sunflower, so everyone is looking to his example to see what works...(paraphrased Male #6 -sunflower)

It was reported that in the south of Bahia where palm is being introduced for biodiesel, that this palm can only be inter-cropped during the first 2-4 years of its life as after that it will shade out other crops, meaning that during its productive life (4-25 years) it must be planted as a monoculture.

... with biodiesel I believe that it will end up being like the bean projects, that farmers will end up planting just castor, and can castor be eaten! Will the price of the castor be enough for the farmer to buy all their food in the supermarket where it's more expensive, and what about the quality of the food that the farmer is going to be able to afford? (Female #21-Community Mobiliser)

During the research, the researchers were informed about other government programs that encourage and support diversity on small farms, especially the School Feeding Law (Law no. 11.947/2009) that mandates that a minimum 30% of foodstuffs procured for school feeding programs to be purchased locally from family farmers. Cooperatives felt that this was a positive step, as family farmers are able to sell whatever consumable produce from their farm is in season, but for a limited time period each year (8 months according to the cooperative), meaning that farmers were not encouraged to become dependent on this program for all their income.

The companies that are encouraging the planting of monocultures, for me this is a weakness of the program because a farmer doesn't need just castor, sunflower or jatropha to make a livelihood, he needs to have his beans that he's always planted, he needs to have his corn, his andú (local vegetable), his melons..monoculture is a threat to family farmers... (Male #20, Agricultural Technician)

The frequency and importance that respondents placed on diversity as key to their livelihoods as well as social and cultural importance that they placed on different crops, signifies that ensuring diversity within the biodiesel program should be a priority for social sustainability. At the moment, the program has no clear mechanisms or control factors to limit monoculture and whilst the program encourages multi-cropping in theory, in practice, the attraction of increased income and better performing monocropped varieties threatens to undermine the approach.

Questions this raises for biodiesel programs

1. How could a biodiesel program contribute toward greater on farm diversity?
2. What mechanisms could the program incorporate to 'guarantee' on farm diversity?
3. How could the current 'loop-holes' (that encourage monoculture and focus on income generation) be closed?
4. What mechanisms could the program incorporate to discourage monocultures?

3.2 *Risks associated with introduction of foreign species*

Throughout the research, participants expressed some concern over the introduction of foreign species as part of the biodiesel program. This concern was centered on a lack of familiarity with the crop, and the associated risks that the farmers may be taking by planting that crop. In general, the participants expressed that they were open and keen to 'experiment' with new crops, but felt cautious about several factors, such as, land area to plant, accessing loans for seedlings (and ability to pay back loans) and longer term buying arrangements with cooperatives or corporations. All participants reported relying on cooperatives or corporations for information about new crops, and on occasion, feeling uncertain about the information provided. When farmers were unfamiliar with the crop, it was harder for them to weigh up the associated risks, and farmers reported different strategies for minimizing risk.

Many of the oleaginous crops introduced as part of the biodiesel program, such as sunflower and the palm (not the local variety) are foreign species. Castor bean plants have been established longer in the Northeast of Brazil, but the current program encourages farmers to use castor seed provided by the cooperative, rather than seed saving and re-planting from the farmer's own stock.

Some family farmers had taken loans for crops when they were not familiar with cultivation, harvesting or management of these crops. Failed crops meant families have been unable to repay their loans. Some species, such as Palm (Dendê) have common local varieties that have been traditionally cultivated and harvested for palm oil which is used in cooking. However, at least one biodiesel refinery is only willing to purchase feedstock from introduced varieties that farmers are obliged to purchase the seedlings from the same refinery.

Our local palm produces well- a grown man can hardly carry two palm kernels, they weigh about 25kg each, that alone should tell you that they produce well. Many people around here wonder why we have to buy the seedlings –is it because they don't value our local varieties or is it because they just want to make a profit out of the seedlings? ... (paraphrased Male #18 -palm)

Farmers in this region expressed concern that the local varieties of Palm were not 'eligible', as many already had local palms growing on their properties. They also stated that the company had not given any clear reasons as to why the local Palm wouldn't be eligible, and that people in their community felt suspicious of the companies motivations given that they were the sole supplier of the palm seedlings that farmers are being encouraged to buy. Participants were informed that they would receive seedlings sufficient for 1 hectare for free, and that up to 10 hectares of seedlings could be purchased via bank loans.

One participant's family had lost their whole crop of sunflowers to migratory birds, and was unable to repay the bank loan for the crop.

The technician came, but they didn't know what to do, we didn't know what to do. I wondered if those birds would come back this year, so I planted about a dozen seeds that I had saved, and sure enough, the birds came back. We won't plant sunflower anymore. I don't think our neighbours will either, because they all saw what happened...(paraphrased Female #8 -sunflower)

Another farmer managed his exposure to risk by planting a very small area with sunflower, less than the recommended area.

The research team observed that there are limited alternative markets for farmers to sell their any oleaginous crop outside of the current biodiesel market, with the exception of castor oil. In the south of Bahia, farmers reported only harvesting palm oil for their own consumption, as the market demand was currently met and prices low. Further, concerns were raised by several technicians about the suitability of castor oil for biodiesel. The main concerns included that castor is technically unsuitable for processing into biodiesel and only small amounts could be added to a biodiesel 'blend' due to its chemical properties, that castor is a relatively expensive oil, and as biodiesel is sold for common consumption at a low market price, refineries could not sustain or justify using castor oil in biodiesel.

It is complicated because these projects are tied up with approvals for bank loans, but we know that this region is degraded, that there are compacted soils, little rain and what is happening is that farmers are accustomed to borrowing money based on these projects, then they don't make any profit and can't pay, so they renegotiate the loan, or abandon it and whole communities end up in debt – its like a snowball that keeps getting worse...(Male #22- Agricultural Technician)

Introducing crop species for biodiesel production, with no alternative markets or local uses, poses a risk for local farmers as they will be dependent on the biodiesel refineries for purchasing their feedstock and for price setting. Most farmers did not perceive this as a risk or threat to their livelihoods, as they believed that the refineries are contracted by the government of Brazil, that the contracts include a minimum price guarantee, and the benefits of have a guaranteed purchaser outweigh any such risks. However, the research team were told various stories about other government projects, for example beans and coconut growing projects, that had made similar promises that did not eventuate. Further, the research team were informed of at least one area in the North of the state that had planted sunflower and the biodiesel refinery did not return to purchase the produce.

One group of farmers were aware of the risk of being dependent on a single company for purchasing in the future and had asked if they could have a copy of the biodiesel company's contract with the government. They wanted this contract in order to be informed and understand the obligations of the company to the farmers.

These farmers noted that having access to the internet would be one strategy to minimize their risk

It's at this moment, when they turn up to buy our produce that we need internet access. We need to be able to look at the stock exchange and see if we are getting a good price for our produce...(paraphrased Male#17 -palm)

In terms of social risks from introduced species, participants reported some changes and future potential changes in on farm labour. Participants, who had planted sunflower, noted that it had increased the work of women for planting and weeding. Participants who were planning to plant palm felt that this be 'men's work only', especially due to the physical demands of harvesting. One participant, an older farmer of 56 years, had decided not to plant palm as he calculated that by the time a palm plantation would be ready for harvesting, he would 60 years old and would have to hire external labour to undertake the harvesting for him, at a loss. Several of this participant's neighbours were approached about their intention to plant palm for biodiesel and willingness to be interviewed, but declined stating that they were 'too old for starting with palm' and that they were 'tired of government projects'.

Environmentally, it is well documented that the introduction of exotic species can have an influence on local vegetation and the equilibrium of ecosystems. In the south of Bahia, participants were asked where they planned to plant the palm for biodiesel, which needs flat ground, especially given the Brazilian government laws prohibiting deforestation. Participants generally stated that they would clear 'scrub' and native 'grass' areas not currently under food production for the palm. One participant noted that it was possible that he would have to re-forest one area of his property in order to clear another for planting palm.

In the north, participants were asked if they had similar experiences with participating in government projects and receiving seed of introduced species. One participant's response was

Yes, at one time here we were all planting beans, beans that the government had distributed the seed, but after a few years, this bean started getting diseases, it's not adapted well to our region...actually, now I am trying to get some of local variety bean seed from my neighbour because I stopped seed saving, but the local bean is hardier and doesn't get these new diseases...(paraphrased Male #6 -sunflower)

Whilst the biodiesel program is deliberately flexible in accepting multiple types of feedstock in order to benefit family farmers, the risks associated with introduced species, at the moment are heavily born by farmers.

It appears that farmers are using several risk minimisation strategies, and diverging from technicians recommendations by planting smaller or larger sized areas, intercropping with alternate food staples seeking copies of company contracts, seeking external advice and information and continuing to sell to established middle men (in the case of castor).

These 'risk minimisation responses' of farmers, suggest that the biodiesel program needs to consider not only a variety of accepted feedstock, but how introduced and local feedstock decisions will potentially impact on farmers.

Questions this raises for biodiesel programs:

1. How can local varieties be given preference?
2. How can farmer's knowledge about local varieties best be incorporated into the program?
3. How to minimize risk (financial, social and environmental) for farmers when introducing species?
4. What potential social and gender implications do different introduced species carry?
5. If a new species is introduced, what the potential social, economic and environmental costs? Are there alternate local varieties?
6. Are there alternate markets and end-product options for introduced species?
7. Do potential introduced species contribute toward and encourage on-farm diversity?

3.3 Importance of high quality technical assistance (extension service)

Access to technical officers and an agricultural extension service was considered a high priority by all farmers interviewed. However, farmers felt that the current level of service was 'superficial' and visits tended to centre on registration, seed distribution and feedstock purchase, with at least 2-4 months lapsing between visits.

I had several locations and in each location I was responsible for about 40 farmers, the company wasn't concerned about the quality of technical assistance but more concerned with how many people were registered, the more the better. The technical assistance ended up just being we'd go by to see if the farmer had planted the seeds or not...we were responsible for buying the feedstock too so in the end we had lots of families and no time. Often I'd make one visit when the farmer had just planted and by the time I went again in reality the crop was almost ready to harvest...(Male #20, Agricultural Technician)

As local technicians are often learning about introduced crops together with the local farmers the advice that could be offered was limited, and there are no mechanisms for local knowledge generated between farmer and technician to inform 'upwards' in the biodiesel program.

Actually, all the information that I gave to farmers, even though it was minimum, they liked, they thought it was good, it helped because farmers lack access to this information...it is really valued by them, it was a pity that we couldn't work more on capacity building...technical assistance is one of the most sought after priorities of farmers...(Male #20, Agricultural Technician)

Of the local technicians interviewed, both emphasized the importance of trust relationships between local farmers and technicians as a priority. Participants reported that the technicians were often learning together with the community, especially about oleaginous crops

You can't tell me that a technician, just because he is educated or graduated or whatever, knows more about this crop than me...I've been working here day in and day out since I was 8 years old...(paraphrased Male #18 -palm)

Both technicians and farmers reported that the current program allowed insufficient time for technicians to provide quality extension services. Few farmers reported using the technician as a source of information, and several considered the technicians as simply 'purchasers' on behalf of the cooperatives

Lots of these programs that come from the government, come from outside and people from far away come to work in our region and these people often don't understand the reality of our region, firstly they need time to adapt to the local conditions, and then they need to get to know everyone, and this needs a lot of time, their time and the community's time ...(Female #21- Community Mobiliser)

One story that emerged was a cooperative agricultural technician reported using his own money to purchase corn and bean seeds to distribute together with the sunflower seeds. This technician reported that the food crop seeds were meant to arrive from the government agricultural research corporation but were late, and he felt that the community would be reluctant to invest time and effort in planting sunflower, without seeds for food crops. This technician saw the purchasing of corn and bean seeds as an investment in his own job, as farmers in his area produced enough sunflower that the cooperative decided to continue their work for a 2nd year, and his technician's contract was renewed.

One farmer that had participated by selling his castor to a biodiesel company in the first year of the project, decided not to participate in the second year, and reverted to selling his castor bean to a local middle man or broker. The farmer's castor was diseased and he did not trust in the company technician. This participant's decision was influenced by the fact that the broker lived in the local community

He always gives an advance payment if ever we need it...he's a good friend, I really felt bad for him when we sold to the company, so now I just stick with selling to him, he has to support his family too...(paraphrased Male #5-castor)

In contrast, another participant talked about the advantages of selling to the cooperative, allowing him to access technical assistance and machinery, such as a castor 'de-husker'. However, this farmer did note that the technical assistance and access to the de-husker was a promise yet to be fulfilled- the cooperative assured him that it was only early in the harvest season and that the technicians would be visiting at a later date. This indicates that whilst the respondent's confidence and trust in the cooperative was high, and technical assistance is considered one of the major advantages of the cooperatives, the actual delivery of technical assistance was yet to be realized.

Of the cooperatives visited, it appeared that few were re-investing in their own technical assistance programs that are not dependent on government funding. The research team acknowledges that in fact, this may not be the case, but were surprised at how many cooperatives technical assistance program was limited to their contracts under the biodiesel program to provide technical assistance.

It appears that the current biodiesel program is considering placing a limit on technicians to being responsible for 150 families. Based on the high priority that farmers placed on access to technical assistance as a source of information, the limited other options for family farmers in rural areas, the need for the technician to support not only the oleaginous crop but other food crops and livestock as well, this number of families appears high.

Questions this raises for biodiesel programs

1. How could technical assistance best serve the needs of farmers to promote and maintain on farm diversity?
2. How can on farm learning from technicians and farmers feed upwards to better inform the biodiesel program?
3. How could technical assistance be separated from commercial interests?
4. How to ensure that the technician fulfills their role as agricultural technician and not as a broker for feedstock.
5. How could the biodiesel program support cooperatives and/or agricultural associations to develop independent agricultural extension services?

3.4 Cooperatives and participation

In Bahia, agricultural cooperatives are sub-contracted by the biodiesel plants to provide services such as technical assistance, seed distribution and logistics associated with feedstock purchasing. Several reports have noted the low level of cooperativism and understanding of cooperatives within the Northeast interior amongst farmers, often citing this as one of the main barriers to an effective biodiesel program for social inclusion of family farmers.

This research found that whilst the cooperatives were active, none of the farmers interviewed were conscious of being a cooperative member or that as a member they would have rights and responsibilities. Nevertheless, the research team discovered that farmers had high levels of understanding about their rights and responsibilities in the farmer's associations, which are smaller groups based at a local community level. This finding is important, as there is an assumption that through cooperativism, the social inclusion objectives of the biodiesel program are being met. Underlying this is the further assumption that cooperativism is not 'working' in this Northeast as farmers are 'inadequately educated' and 'lacking dynamism'. This research indicates that the question of cooperatives is complex, that registration with a cooperative does not necessarily equal social participation, and that farmers may be participating and dynamic in other groups and at other levels, that provide more obvious and immediate benefits based on their participation.

Farmers did not perceive cooperatives as protecting their rights, negotiating on their behalf, investing in their local community and cooperatives were often referred to as 'companies' or 'government' (both by farmers and cooperative staff). The contracting of cooperatives in the biodiesel program cannot be assumed to signify that farmer's participation in a social organisation or 'social inclusion' has increased.

These people that are in the cooperatives they are not seeing (pause)- the social side, we need to look for people that are not involved with the profit making side but that are involved with the social side, like NGOs, but it's very complicated, I don't think there is an easy answer ...(Female #21- Community Mobiliser)

In comparison, many farmers were highly aware and knowledgeable about their local farmers association, and perceived the farmers associations as the means by which they could have 'a voice' and a representative that would negotiate on their behalf. Participants reported associations being active in lobbying for electricity connections to villages, purchasing a community owned vehicle for transport produce to market and in attracting government programs or projects.

Today if it wasn't for the associations or the organized groups then we wouldn't be able to get many benefits for our community...we know there are

projects with government funds and that these funds are to be utilized by the community but unless the communities are organized then they can't get access... ..(Female #21- Community Mobiliser)

When asked about the benefits of being a member of an association, one participant's responded

It's like this, if I am just one voice, then I am not so loud, but if I am in the association, then we are many voices and we can be heard...(paraphrased Male #18 -palm)

Several participants had not yet formally joined the cooperative from which they had received seed, and at least one local cooperative confirmed that the current arrangement was a 'kind of de-facto membership' whereby farmers had been registered as part of the biodiesel program in order to receive seed and technical assistance, but were not yet formal paid up members.

Of the five cooperatives visited, all had contracts with Petrobras as part of the biodiesel program, generally for seed distribution, technical assistance and logistics of feedstock purchasing, though one cooperative was also contracted for seed production and another to operate a castor oil press.

In at least two cooperatives, the biodiesel program contracts appeared to be the main source of income for the cooperatives, and there were reports of financial instability and potential closure when a biodiesel refinery did not renew its contract with the cooperative. One cooperative was openly involved in local politics, having placed senior cooperative member to run in the local council elections, and in another region the Cooperative President was also the local Secretary of Agriculture.

One participant explained the difference between the cooperative and her local association

The President of the Association, he is the person that comes by your house, that talks to you, that knows everyone in the community, his job is to know and negotiate with everyone that lives here, but the President of the Cooperative, I don't know what is his job, but he does not come to your house, I guess he has to talk to the government or the big companies or something ...(paraphrased Female # 8 -sunflower)

Interviewing the cooperatives was outside the scope of focus of this research project, but the researchers were surprised to find both farmers and cooperative staff perceiving the cooperatives role closer to that of a government service provider or contractor, as opposed the farmer's associations which were perceived as civil society bodies.

This difference is important to highlight given that the biodiesel program has 'social inclusion' as a primary goal. Participants felt empowered and had high levels of consciousness about their rights and responsibilities in the farmer's associations but not in the cooperatives. This is important to highlight in order to move away from the assumption that cooperativism will benefit all farmers, regardless of the current situation indicating otherwise.

Questions this raises for biodiesel programs

1. What is the definition of social inclusion within the biodiesel program?
2. What is the definition of 'participation' of farmers defined within the biodiesel program?

3. What are the tools and mechanisms by which social inclusion should be measured?
4. How will the program demonstrate if the goal of increased social inclusion is being met?
5. What is the role of the cooperatives in relation to social inclusion and participation?
6. Given the different historical and cultural influences in the Northeast of Brazil, what is the potential role for local agricultural associations?
7. How best could farmers have a role, voice and influence within the biodiesel program?

3.5 *The next generation of farmers*

A striking result of the research was the frequency that farmers responded that they did not want their children to continue working on the family farm. Even with increased income from oleaginous feedstock crops, many farmers felt that the lack of educational opportunities, health, water, sanitation, electricity and the precariousness associated with being a family farmer offered a limited future to their children.

Parents are getting tired, and the value of their produce is at a minimum and they are feeling unstimulated and all of this is contributing to the fact that in 10 or 20 years there will a minimum number of farmers here, perhaps just pensioners living on their pensions and the fields will be abandoned because none of their children want to continue doing what their parents did...(Female #21- Community Mobiliser)

The youngest interviewee felt that farmers and farming were seen as 'backward' occupation, and not valued in society.

To be a farmer is to be a country bumpkin, none of my friends want to stay here, everyone wants to go to the city, to be an Engineer, to be a Doctor, to be respected...(paraphrased Male # 7 -sunflower)

When this young participant was asked if he thought his friends would want to be a farmer if they could earn as much money as an Engineer, he replied

No, it's not about money, it's about how society values farmers

This highlights that 'securing farmers in rural areas' as mentioned by the biodiesel program is extremely complex and that increased income is not a sufficient incentive to ensure future generations of farmers.

Farmers today don't want their children to follow in their footsteps and be family farmers, it's because it's like family farming has lagged in reality, it's something that is very insecure, farmers are planting without knowing if they will be harvesting and the income that people make is little compared to people in the city....(Male #20, Agricultural Technician)

Some farmers did want their children to continue in farming, and almost all participants stated that they personally felt a large sense of pride in being a farmer. Of those participants that wanted their children to continue in farming, infrastructure was highlighted as one of the major issues with living in country areas

Now my children live and work in the south, in the city, but every time I talk to them on the phone, they say 'Dad, just tell me when there is electricity and water and I'll be straight back there' ...(paraphrased Male #5 -castor)

Many participants perceived farming to be an 'honest' and 'good' way to earn a living, and for participants living on land reform settlements, the opportunity to own land and have a secure livelihood was given high priority

I have my small piece of the earth here and I'm never leaving...(paraphrased Male #19 -palm)

However, none of the respondents interviewed on three separate land reform settlements considered that their children would stay in farming. Parents thought that the income from farming was not sufficient to satisfy a young person's wants (as opposed to their needs).

Our neighbour, her son just left to work in Porto. He could have stayed here, he had work, he had school, he had food, but he didn't have any money. You know what young people are like, they want to go out, to dance, to have a little beer- and where is the cash for that?...(paraphrased Male#17 -palm).

Income from oleaginous crops represented a small percentage of entire income for all farmers except those planting castor. However, it should be noted that castor was a cash crop prior to the initiation of the biodiesel program. The research indicates amongst the respondents that the income from the biodiesel program has not yet been sufficient enough to have any impact on maintaining young people in rural areas. In one case, the biodiesel program appears to have had the opposite of the desired effect, with a 21-year-old migrating south after his biodiesel feedstock crop failed and having no other means to repay the associated loan.

The current biodiesel program does not address differences amongst farmers, such as age and gender, and how that may affect participation and ability to benefit from the program. Whilst income is important for young people in rural areas, other opportunities and infrastructure are equally as important. The biodiesel program could contribute toward maintaining the next generation in rural areas and in farming, but the current model is too limited in its scope to address the complex reasons behind rural to urban migration.

Questions this raises for biodiesel programs

1. How could the biodiesel program be targeted toward young people to provide greater benefits?
2. In what ways could a biodiesel program be structured to encourage young people to stay in rural areas?
3. How could the biodiesel program contribute toward greater opportunities for young people in rural areas.

3.6 Social values of the wider society toward farmers and farming

Following from the previous theme, which focused primarily on young people's experiences, this theme focuses on the challenges that farmer's felt they faced due to the lack of appreciation of society about the work of the farmer as a profession and way of life.

the government incentives for small farmers are so small, I think there needs to be greater economic development so that people don't even think about a rural exodus (Male #20, Agricultural Technician)

This was evident in the biodiesel program as farmers noted that some local varieties were not 'eligible' as a biodiesel feedstock, and that farmers local knowledge was undervalued by external agencies.

The first time I heard (about biodiesel) was when I went to a presentation in town, the invitation came from the local council and the secretary of agriculture and they presented about different varieties of castor, sunflower..even about corn and they talked about the program but I didn't really understand it, the information that they gave was really high level, just that castor oil could be used to make biodiesel for cars, they didn't talk about how, or what was the process, or where it would be processed, who would be using it or who would benefit the most- the farmer or the company- none of this just a lot of abstract information ...(Female #21- Community Mobiliser)

One respondent described participating in a meeting to establish a local working group and being told that farmers would not be eligible to be on the leadership board as they lacked the necessary 'qualities'. When asked what was meant by 'qualities' the respondent answered

'qualities'- that was the word they used, but they meant because I am illiterate. I waited until it was my turn to speak in that meeting and then I said 'I nominate myself to be a member of the board' because I've turned up to every meeting so far, I care what happens here, and for me, the ones here that lack qualities are you from the government that have never even been to one meeting before this'...(paraphrased Male#17 -palm)

Participants noted that there had been little local input from a farmer's level into the design of the current biodiesel program

I think that programs should have been created together with the participation of the community, not created in some meeting room of Petrobras or the government or some cooperative...Not just thrown to us as a package and we have to swallow it ...(Female #21- Community Mobiliser)

Participants frequently told of difficulties of dealing with government, banks and other service providers due to the fact that they are farmers. One participant felt that society's lack of value on agriculture started early

Nowadays children study in school, not to learn how to go and work on the farm with her parents but to go to a big city, to be a doctor, that's the profession that everyone dreams of because it's a good salary...these kids are from the farm, but they aren't educated to live on a farm ...(Female #21- Community Mobiliser)

This lack of valuing farmers and farmer knowledge is evident within the biodiesel program. There are no mechanisms for farmer's knowledge about crops, climate, production, on farm management to be fed upwards into the program and farmers are generally perceived as the passive 'receivers' (of seeds, of technical assistance etc), rather than pro-active partners within the program.

If it was me, I would put another program inside this program- focusing on education in the field...there are so many farmers that don't even know how to read and then this bloke turns up from the cooperative or from a company

with a contract to the give the farmer “*sir, let’s make a contract sir, for you to sell to us and you’ll be well remunerated blah blah blah*” and sometimes they read the contract but sometimes it’s just ‘*sign here, oh, and if you don’t know how to sign, well no worries just a thumbprint here*” and the farmer gives his thumbprint and then the bloke disappears again, and the farmer is just left, and the farmer is ashamed to ask someone who knows how to read to read it for him, and sometimes he doesn’t think that he should be bothered anyway ...*(Female #21- Community Mobiliser)*

Farmers reported waiting long periods for bank loans associated with biodiesel crops to be approved, or of loans being approved outside of planting season. To achieve social inclusion, the biodiesel program would need to consider much more deeply and extensively the role of family farmers as the base for the program as well as being active participants, leaders and knowledge generators within the program.

Questions this raises for biodiesel.

1. How can the biodiesel program contribute toward social inclusion outcomes for family farmers?
2. How can family farmers have an active role as decision makers and knowledge generators within the biodiesel program?
3. What sort of mechanisms could be included for farmer’s knowledge about crops, climate, production, on farm management to be fed upwards into the program?

3.7 Gender impacts of feedstock crops

As biodiesel is a fuel made from agricultural crops there will be a gender dimension in the production process as well as in the social goals such as social inclusion. However, the current program treats small farmers as a homogeneous group and fails to recognize that the experiences, impacts and outcomes of biodiesel production may differ by gender.

In our region practically every woman works with her husband in the field, but this work is not seen and it’s not valued, often the men are saying that women are just taking care of the house, but I know that most of them work in the fields and look after the house, the kids...it’s like no-one realizes all this work that she does ...*(Female #21- Community Mobiliser)*

This research showed that different oleaginous crops will impact differently on women’s on farm work, for example, harvesting of palm kernels was considered too dangerous and physically demanding for women.

The work needs too much physical force, you have to get up the palm once it reaches a height, each palm kernel is heavy, we’ll be working with machetes, perhaps some areas the pick-up can’t enter, so the palm kernels will have to be carried out, I think this is work just for men, that women will be staying home on this one *(paraphrased Make #18 -palm)*

Both male and female participants indicated that women who work on farms have greater responsibilities, because they are also responsible for the housework, noted as cooking, washing clothes by hand, cleaning and caring for children. Some male respondents indicated that they were willing to ‘help out’ in the house, but

acknowledged that this depended on 'each household's arrangement'. Many male participants noted that after a day of working in the fields, the men go home to 'rest and lay on the sofa' whilst the women would also work a day in the fields but then go home and complete housework. Men tended to indicate that women undertook what the men considered less arduous or physically demanding work on farms, such as planting, weeding, peeling cassava or collecting castor beans. However, women felt that their work was equal to that of men on the farm.

He'll go along one row, weeding, digging, planting, and I go along the next row, we do exactly the same, sometimes he's in front, sometimes I'm in front ... (paraphrased Female #3 -castor)

Throughout the research, there was evidence that some labour which was traditionally done by women, such as de-husking castor beans, was being mechanized by cooperatives introducing a mechanical husker.

In regards to decision-making, both male and female respondents felt that decisions were generally taken together as a couple. However, several female respondents indicated that only their husbands name was on the contract or agreement that they had made for providing biodiesel feedstock. Many respondents listed the male partner as being the 'head of household', with the only exceptions being single women (divorced or separated) or in one case, a 35-year old male who still lived with his mother.

The research does not indicate whether these changes will be positive or negative, only that clear gender dimensions exist in biodiesel production and that this deserves further investigation.

Questions this raises for biodiesel programs:

1. What are the potential gendered impacts from biodiesel programs for family farmers?
2. Through biodiesel programs, will women be more socially included or socially excluded?
3. How could the biodiesel program specifically target female family farmers for positive social inclusion outcomes?

3.8 Quality of life in rural areas

Linked with the themes of the next generation of farmers and social value of farming, quality of life in rural areas was an important theme that emerged from the interviews. Whilst increased income and financial incentives were important, overall quality of life, such local opportunities for higher education on a higher level, local industry, small scale processing of agricultural products, leisure, sports, cultural activities, internet access, radio, television, land ownership and health were considered more important in terms of encouraging people to stay in rural areas. .

I think that there is a lack of government incentives because there should be schools of good quality in villages, where people live there needs to be quality teaching and programs for leisure, social and cultural programs, and today this is rare, if you arrive in a community you are just going to see the same repetitive stuff (Male #20, Agricultural Technician)

When asked 'if you don't see the next generation wanting to stay on the farm, how could this be overcome?' participants responded in a variety of ways, but emphasised the need for local opportunities

I think that if they built a local factory, like that one they are building now for processing fruit, any type of small local industry, employment and income, you would find young people wanting to stay here ...(paraphrased Female #3 -castor)

Many participants indicated that they felt proud of the life that they had obtained by working in agriculture, and their ability to have built a brick house, purchase a car, send their children to school. Participants on agrarian reform settlements were proud that they had managed to survive and in some cases prosper, that having land had provided them with independence and certainty. Some participants had moved off their farm into villages or towns, and either walked or drove back to their farms each day for work. Participants felt that living in villages and towns offered greater security as well as socialising opportunities for themselves and their children.

My farm is just two kilometres up the road, but the girls were starting school and there is no electricity there, I don't mind those little oil lamps, but my girls need electricity for study...(paraphrased Male #2 -castor)

When talking about family members who had gone to work in the city, employment and income were mentioned as significant driving factors underlying people's decision to leave, yet when asked about what was needed to maintain or attract people back to rural areas, participants indicated infrastructure and access to services in local areas as being the most important. Interestingly, one participant observed that young people are reluctant to move back once they have left, yet many older people once eligible for the aged pension liked living in rural areas and working on farms, for a 'quieter lifestyle'.

... if you are 15 years old and just go to the fields each day weeding, weeding and then go home and sleep and the next day do the same... there needs to be more culture stuff, leisure, activities so that people really enjoying living in their villages, so that they don't want to leave, or just leave to study and then go back (Male #20, Agricultural Technician)

In terms of income, participants indicated that having a crop to provide cash income was an important aspect of their livelihood. The results between different crops varied immensely, in particular between castor, which is an well-known cash crop with an established market, in comparison to sunflower and palm, which are introduced species. There does exist many local palm varieties that produce oil for consumption, but the current biodiesel program is promoting the planting of an introduced species. Farmers generally felt positive about the current contractual arrangements, which provided a minimum price guarantee (for castor), and one refinery had guaranteed to purchase other crops as well as the oleaginous crop in future years. However, many had reported negative experiences with past contracts, which locked farmers into selling only to the company with no guaranteed minimum prices.

One of the benefits is that there is a price guarantee- a minimum price, for whatever they've planted, this is optimal because regardless of the market price they have a minimum price guaranteed...(Male #20, Agricultural Technician)

The biodiesel program needs to consider how parts of the 'process chain' maybe decentralized in order to make a greater contribution toward quality of life in rural areas, shifting the focus from straight income generation for farmers, to revitalizing rural areas. For example, the research team saw one example whereby an oil press was constructed in a small rural town under the management of the cooperative. As noted by other authors, at the moment family farmers are not benefiting or integrated in the biodiesel program but are being treated as external suppliers. Whilst this continues to be the case, with farmers having little input into the program, value-adding processing and benefits are limited to small increases in income, the program contributes minimal, if at all, to social inclusion and social sustainability.

Questions this raises for biodiesel programs

1. How could the biodiesel program make a greater contribution toward the quality of life in rural areas?
2. How could the biodiesel program support 'value-adding' at the family farmer level?

4 Conclusion and Research Gaps

4.1 Conclusion

The Brazilian Agroenergy Plan 2006-2011 and the National Biodiesel Production and Use Program (PNPB) clearly promote the social inclusion of family farmers in Brazil as a primary objective of the policy and program.

promoting the social inclusion of thousands of Braziliansthe Program also prioritizes participation by family agriculture, encouraging the formation of cooperatives and consortia by small farmers. (Ministry of Mines and Energy undated)

Yet the Brazilian social inclusion approach within the PNPB focuses on income, employment and agricultural extension services as the primary benefits for family farmers participating in the program. There is an inherent assumption that through biodiesel production, a change in conditions such as links to markets will result in increased income *therefore* make for greater well-being and social inclusion for rural communities. The empirical research found that the degree to which broader components of social inclusion, such as participation in decision-making, are integrated within the PNPB is minimal. 'Participation' in the PNPB has a narrow meaning and does not mean 'participation' in the sense that farmers are seen as partners in the approach. There were no reports of PNPB mechanisms for integrating farmer's knowledge or involving farmers in the policy formulation, even at the cooperative level.

The role of cooperatives within the PNPB in Bahia appears to be that of an intermediary service provider (technical assistance) and broker (feedstock purchase on behalf of biodiesel refineries). Unlike the agricultural associations, which are smaller local organisations established at village level, the cooperatives are not grounded in the local social network within the community. The cooperative's activities appeared heavily reliant on government or biodiesel refinery contracts. In fact, what the research revealed is an inherent economic dependence of family farmers on a chain of contractual arrangements mediated by government and large corporations. Whilst there may be economic benefit for farmers who are currently experiencing increased prices for their feedstock, there is no economic independence generated. Farmers have little negotiating power over prices, few opportunities for value-adding on farm, minimal alternative markets in competition for their feedstock. Further, there is a dependence on the on-going incentives of the Social Fuel Stamp in order for biodiesel refineries and cooperatives to continue the current activities with family farmers. If the Social Fuel Stamp were discontinued, it seems evident that this chain would collapse and family farmers would be disadvantaged with little changed in their situation. In fact, one biodiesel refinery in Bahia had its Social Fuel Stamp approval withdrawn by the government after it failed to meet the minimum criteria, and there was anecdotal evidence of disillusionment and anger amongst contracted farmers who had planted feedstock and were left with no buyer for their harvest.

More broadly, this research shows that farmer's concerns encompass a range of issues such as biodiversity, risk management of introduced species, gender divisions of labour for feedstock crops as well as participation and legitimate voice in the decision making processes. The three issues of focus of the PNPB, being income, employment and technical assistance, were also important for farmers but are yet to develop clear outcomes. Some farmers reported an increase in income, others reported a decrease and many reported little change. Given that the program to date

has been active in Bahia for less than five years, and the majority of participants in this research had participated in the program for less than two years, the contribution of the PNPB across these three areas is unclear.

Many participants expressed concern about whether their children or grandchildren (the next generation) would continue in farming and no participants thought that the PNPB provided any incentive to encourage people to stay in rural areas. All participants had several immediate family members (siblings or children) who had migrated to urban areas. Several participants expressed concern that they would not pass on their knowledge and wisdom about farm management as the next generation either didn't want or couldn't sustain themselves through farm work. The claim made (Biodieselbr.com ; Vicentini 2007) that biodiesel production has successfully contributed to 'securing the farmer on the land' cannot be supported by this research.

Many farmers who participated in this research felt positive about the PNPB. Farmers appreciated the technical assistance but felt that current levels were inadequate and held hopes that more support and extension services would be offered in the future. Small benefits, such as receiving free sacks, were viewed in a positive light. Even farmers who had limited success with their first oleaginous crop were willing to attempt future plantings. This challenges us to address the issues raised in this report whilst there is still the good will of farmers to experiment and participate.

4.2 Implications for the future: Research gaps and priorities

It is likely that biodiesel production and the debate over its sustainability will continue to remain controversial for the foreseeable future. However, observing the significant financial investment and new biodiesel infrastructure (refineries, oil presses) in Bahia, it can be expected that this program will continue beyond the current policy period of 2006-2011.

The findings summarised in this report suggest that the current PNPB is making minimal, if any, contribution toward social inclusion for family farmers. The Brazilian government should consider that if social inclusion is to remain a primary objective of the PNPB, then the term as it applies to this policy should be defined, with specific measurable targets for family farmers. This would clarify if empowerment and participation of family farmers, as a social inclusion aspect, are part of the PNPB or if the focus is only on income, employment and technical assistance. This research does not indicate a preference for a broad or a limited definition of social inclusion - only that the current vague use of the term means that claims that lack any adequate evidence base can currently be made about social inclusion under the PNPB. As suggested in other literature, it is possible that social inclusion objectives for family farmers may be better addressed through alternate government programs rather than the PNPB.

Future policy development must consider further research into social sustainability aspects of family farming. This research reported in this report demonstrates that the tendency to approach agricultural and rural development as primarily a technical or economic issue is deeply flawed. Farmer's positive attitude and deep understanding of the issues that affect their livelihoods should be considered as strengths to be utilised by the PNPB, especially if social inclusion is to remain a key objective. There are other successful programs within the Brazil that could be drawn on for best practice examples of social inclusion approaches.

There are a number of key research gaps that need to be addressed to better understand how biodiesel production may contribute toward social sustainability and social inclusion.

More specifically, priority research needs include:

1. Improved baseline data collection on the different components of social sustainability and/or social inclusion to feed into future research and inform decision making
2. Determining what social inclusion components can effectively be addressed through biodiesel production and how those will be measured
3. Social Fuel Stamp policy options in order to decrease the high dependency of farmers on the chain of contractual arrangements
4. Obligatory (not voluntary) mechanisms to promote intercropping and on-farm diversity and limit monocultures
5. Re-thinking the institutional arrangements in relation to social inclusion (for example, de-linking the commercial interests of cooperatives acting as brokers as well as service providers).
6. Potential alternate roles for agricultural associations and non-government organisations in promoting social inclusion
7. Integrating farmer's knowledge and creating mechanisms that allow newly generated knowledge to feed upwards and influence the program/policy
8. Synergies and conflicts with other issues such as biodiversity on farms, promoting policulture, minimising risk for farmers and regional development
9. Synergies and coordination with other federal and state government programs that have similar social inclusion and sustainable development objectives
10. Build capacity within government, industry, associated service providers (such as banks) and the research community to understand social sustainability

5 Appendices

Annex 1 Original Research Questions

The main research questions are:

- How do small family farmers perceive the current biodiesel production model in relation to their own livelihoods?
- What do small family farmers see as the opportunities associated with biodiesel production?
- What do small family farmers see as the threats associated with biodiesel production?
- From the perspectives of small family famers, what would it take for biodiesel production to contribute to a sustainable livelihood?
- What are the primary enabling factors from a farmers perspective? What are the different gender perspectives (gender disaggregation of results)
- How might this knowledge be incorporated to ensure more successful social inclusion?
- How might these enabling factors inform policy development (in Brazil and internationally)?

Annex 2 Interview Questions

1. Can you tell me about yourself? What is your age? You were born here locally?
2. Can you tell me about your family?
3. Can you tell me about your farm? How long have you on the farm? What you plant over the years here?
4. How do you inform yourself about the world outside of here? Why?
5. You feel deprived of certain types of information? What?
6. Do you participate in any association, cooperative or other group? Who else in the family is involved?
7. What do you think of the advantages and disadvantages of participating in these groups?
8. Can you tell me about access to electricity in your community? Can you tell me about access to water in your community? Can you tell me about housing in your community, you always lived in this house?
9. What changes have you seen this infrastructure (housing, sanitation, water) in the last years? (five/ten/twenty year time frames).
10. What types of financial services / credit exist (both formal and informal)? What services they provide, under what conditions (interest rates, collateral requirements, etc.)? Which groups or types of people who have access to? What prevents others from having access?
11. Do you have family members or relatives living far away, do they send money or financial support?
12. Women are able to make their own choices or are limited by pressure from family / local custom? (*Note: this question was only used once and then discontinued*).
13. How much food is produced on the property and how much food is purchased? What did you buy at the market this week? What did you eat yesterday and what part was local and what part was purchased?

14. How are the responsibilities of men and women differently on the farm?
15. How are decisions made on the property? There are things that men decide and other things that women decide? There are things that are decided together?

Biodiesel Questions

1. When, where or from whom did you first hear about biodiesel? What did they say? Why did you decide to participate?
2. What happened then? Can you tell me about the process? Where / Who did you get the seed and / or feedstock? Did you sign a contract?
3. Have you ever sold feedstock to a refinery / plant / cooperative? Can you tell me about the process involved? Who came to purchase your feedstock? How was it transported? How were you paid?
4. You can say what you think about the price you received and how you used the money?
How did the price compare to the price of other crops you have?
5. Can you tell me about this year and how is your production of feedstock (castor, sunflower, palm) on your farm? Are you raising the crop for biodiesel? Do you think you'll plant for biodiesel again next year? Can you tell me why?
6. What do your neighbours think about the biodiesel program? Do they participate in the biodiesel program? Why? What do you hear people talking about this?
7. Do you think there are differences between working women and men in the production of biodiesel? What are the advantages and disadvantages for men and women in the production of biodiesel?
8. What do you think are good things (forces) of the program in your opinion?
9. What do you like about the program?
10. What do you think are things that are not so good (weaknesses) of the program in your experience? What do you not like about the program? What would you like to change in the biodiesel program?
11. How do you imagine the situation in 10 (ten) years? Will you still be producing biodiesel?
Do you imagine that your farm will produce biodiesel feedstock or do you think that your farm will do something else? Do you think you will still be here on the farm?

Additional Questions: These questions were developed as part of the reflection process and not used in the first few interviews.

1. Can you remember if one time you passed through a 'rural crisis' and what you did to survive this time?
2. Can you remember any government programs in the past that focused on increasing farmers income? Can you tell me about it?
3. Do you remember how the climate or rural areas were during your childhood? Can you tell me it?
4. What do you think is needed to keep the next generation in rural areas?

5. How do you imagine the future for your children? Do you imagine that they will continue working in farming, or producing biodiesel or doing something else? Why? If you think that they will do something else, what are your hopes for them?
6. If a farmer arrived from another area and said "hey, I've been thinking about producing for biodiesel, but I hear some people saying it's good and some people saying it's not so good"- what advice would you give this farmer?

Regional Specific Questions

1. How do you see the question of castor monoculture in this region?

Annex 3 Survey Questions

Note: These questions were presented with a series of 'tick' boxes for researchers to be able to quickly fill in details.

Box options are represented here by a forward slash “ / ” symbol.

1. Participant chose to remain anonymous? Yes/No
2. Name of Participant
3. Age
4. Female/male
5. Single/married/widowed/de-facto/divorced/separated
6. Number of children / Children at home / children out of home/ children deceased
7. Number of household members (including participant)
8. Name of Household head / age /male /female
9. Approximately size of property / years on this property
10. Property is rented /individual owned / family owned / other
11. Principals crops on property
12. Type and number of animals
13. Does the family have other sources of income (off-farm) - No / Yes- if yes, describe
14. Approximate percentage of total area cultivated with oleaginous crop for biodiesel
15. What percentage does feedstock for biodiesel contribute to property income?
16. Is mechanized equipment used? No / Yes- If yes, describe what for
17. Is external labour hired/used? No / Yes- if yes, how many?

Annex 4 Ethics

Prior to conducting the interviews, all participants were informed verbally of the purpose of the research, that their participation was entirely optional, that they had the right to terminate the interview at any point and that they had the option to remain anonymous. Participants were informed that they are free to withdraw consent at any time prior to publication, and that being recorded (video and/or audio) was optional.

Further, participants were given two hard copies of the consent form to sign, one for the participant to retain and the other for the research team archives. The consent form included contact details (local and international) should the participants have any complaints about the research process. In only one case did the research team diverge from this methodology, where explanation and consent was video recorded rather than signed. The contact details were mailed back to these participants.

The purpose of the video recording was explained to the participants, particularly explaining that their image /recording would always be represented with dignity and respect. This is based on the principle of not portraying people as 'victims of poverty' and avoiding *images and messages that potentially stereotype, sensationalise or discriminate against people, situations or places* (Child Rights Information Network 2010) This is due to the fact that much of the research will take place in isolated areas and the researchers will be unable to return in the future to ask participants permission and for re-validation on the use of their image/voice.

Participants were given time to ask questions prior to the interview. The common questions included '*will my participation jeopardize me in any way*', '*who is funding this research and why*' and '*how can I receive copies of the video and report?*'.

Importantly, all participants requested that copies of the final report and video be sent to the participants, which the research team agreed to do within 12 months

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