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Smallholder Farmers and Biofuel

Farmers' Perspectives in Growing Castor Beans in Ethiopia

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Abstract

Globally biofuels have increasingly been considered as an alternative energy source that could help to reduce green house gas emissions for combating climate change. It is also believed that biofuels have a variety of other potential benefits such as promoting rural development and employment generation. Currently some concerned bodies have started to question the benefits of biofuels development especially in relation to food insecurity and improving livelihoods of smallholders in developing countries. However, there are limited studies from the field that show as to whether the smallholders participating in biofuel development initiatives are benefiting from biofuel development schemes. This study takes a case of castor bean production for biofuel through contract farming with smallholder farmers in wolaita zone, southern Ethiopia. The contractual farming was initiated by a company called the Global Energy Ethiopia Private Limited Company (GEE) since 2007. The study aims to contribute to the understanding of the implications of the current biofuel developments by exploring farmers' experience in growing castor beans for biofuel production. Issues of livelihood and food security have been used as guiding concepts and semi structured interviews, participant observation and field notes have been employed for data collection. The study reveals that farmers have relatively low economic incentives to grow castor beans in comparison to food crops. The study further shows that growing castor beans in a contractual agreement contributes insignificantly to the improvement of farmers livelihood and food security situations. However, due to availability of fertilizer at relatively low prices, many farmers continue to grow castor beans on fields that are aimed for food production. The study discusses that growing castor beans on fertile land is not in line with Biofuel Development Strategy of Ethiopia, which emphasizes that energy crops should be grown on "marginal" lands.

Keywords: *Biofuels, livelihood, smallholder farmers, food security, castor bean, Ethiopia*

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Kassaye Tekola Moges

List of Abbreviations

CBE- Commercial Bank of Ethiopia

CFC-Common Fund for Commodities

EIA-Ethiopian Investment Authority

ETB-Ethiopian Birr

FAO-Food and Agriculture Organization for the United Nations

FSS- Forum for Social studies

GEE-Global Energy Ethiopia Private Limited Company

Ha- Hectares

ICRISAT-International Crops Research Institute for the Semi-Arid Tropics

ILLC-The Institute for Logic, Language and Computation

IFPRI-International Food Policy Research Institute

Kg-Kilograms

MoME- Ministry of Mines and Energy of Ethiopia

NAI - The Nordic Africa Institute

SNNPR-Southern Nations Nationalities and Peoples Regional State

SLU - The Swedish University of Agricultural Sciences

SEIA- Social and Environmental Impact Assessment

UK-United Kingdom

UN-United Nations

UNDESA-United Nations Department of Economic and Social Affairs

UNEP-United Nations Environment Programme

UN-OCHA-United Nations Office for the Coordination of Humanitarian Affairs

US-United States

USD-United States Dollar

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CHAPTER ONE

1. INTRODUCTION

1.1 Background

Biofuels have increasingly been considered as an alternative energy source that could help to reduce green house gas emissions for combating climate change. Apart from combating climate change, it is often claimed that biofuels have a variety of other potential benefits, such as promoting rural development and employment generation (Ewing and Msangi, 2008; Nurye, 2009, pp. 74-76). Biofuels have also been presented as an important source of energy for meeting future energy demands in the light of a forthcoming oil peak (Oxfam, 2008, Reijnders and Huijbregts, 2009).

In recent years, however, the potential benefits of biofuels have been questioned especially in relation to food insecurity in developing countries. It is argued that shifts in land allocation from traditional food production systems to biofuel production are one of the causes for increased food prices and for creating global food shortages (c.f. Adnew, 2009; FAO, 2008; Oxfam, 2008; Reijnders and Huijbregts, 2009). Oxfam (2008) further argues that biofuels could exacerbate food insecurity, deepen poverty and hunger in developing countries as a result of increased competition of land between food crops and energy crops. Oxfam (ibid) calculates that biofuel investments have "dragged" more than 30 million people into poverty, as land, once used to grow valuable food resources is now cultivated for biofuels. It has also been stressed that production of biofuels in the light of future energy demands may lead to major deforestation, displacement of people, and eventually to food scarcity (Engström, 2009). Proponents of biofuel development argue, on the other hand, that agricultural crops for biofuels can offer new income opportunities for farmers in developing countries as non-edible crops can be grown and harvested for biofuels applications. It is also stressed that several biofuels crops can be planted and grown on arable and marginal lands that are not under cultivation (United Nations Department of Economic and Social Affairs, 2007; Food and Agriculture Organization for the United Nations (FAO), 2008). It is also argued that countries in the tropics have comparative advantages in biofuel production that can play a role in employment generation and in improving the food security situation (Peskett et al, 2007).

However, the concern remains that when biofuel crops are produced on a large scale, they may divert agricultural production away from food crops and drive prices up (United Nations Department of Economic and Social Affairs (UNDESA), 2007, p.7). Furthermore, in order to be

considered as a viable alternative, biofuels need to provide a net energy gain, have environmental benefits, be economically competitive, and be producible in large quantities without reducing food supplies (Tilman et al, 2006). Many recent studies recommend careful examination of current biofuel developments (FSS, 2008; Nurye, 2009; FAO, 2008). In allocating land for biofuel investment, livelihood implications on the poor and/or indigenous people should be taken into account (Barbara, 2007). Biofuel development at the local level should not harm the livelihood strategies of small-scale producers and communities in rural areas (Dubois, 2008).

Many governments in developing countries consider biofuels as an opportunity for enhancing different sectors of the economy. Dufey, Vermeulen, and Vorley (2007) have identified four policy goals as motives for promoting biofuels in developing countries; i) energy security, ii) rural development, iii) export market development and iv) climate change mitigation. Ethiopia is not an exception between the developing countries and the government of Ethiopia has included biofuel development as one of its development strategies since 2007 (Adnew, 2009, p.21). Although, the aforementioned policy goals constitute important motives behind biofuel development in Ethiopia, the main reason for the Ethiopian government to promote biofuel development in the country is the fact that the transportation sector consumes about 70% of the export earnings (MoME, 2007 and Adnew, 2009, p. 22). Ethiopia considers biofuel as an opportunity to enhance the export sector and reduce the import of petroleum oil by substituting it with domestically produced biofuels (Lakew and Shiferaw, 2008).

The first biofuel development initiative in Ethiopia was initiated in 2006 by the United Kingdom (UK) based private company called Sun Biofuels Ethiopia Ltd. Since then, the government of Ethiopia is promoting biofuel investments by inviting national and foreign based companies to invest in biofuel development projects in the country (Lakew and Shiferaw, 2008). Generally in Ethiopia, biofuels have been regarded by development professionals and policy makers as having great potential in replacing imported oil and oil products to meet the growing energy demand in the country.

As part of the county's development strategy, the Ethiopian government has developed a Biofuel Development and Utilization Strategy in 2007 (MoME, 2007). The strategy aims at reducing costs for imported oil by producing biofuels domestically to meet the demand for national consumption. The strategy includes plans to device an incentive scheme for imports of vehicles fully operated with biodiesel and accordingly to issue and implement the plan. The target is to extract biodiesel from

jathropa, palm oil, and castor seeds; and bioethanol from sugarcane (MoME, 2007). In general, the strategy is also meant to facilitate biofuels development and utilization in the country with proper consideration of remedies to avoid any unintended social, economic and environmental consequences (Lakew and Shiferaw, 2008, p.7)

With regard to land allocation for biofuel investment, the governmental strategy discourages the utilization of fertile land for the production of biofuel crops. Instead, the strategy insists on biofuel investments to be carried out on so called marginal lands that are not suitable for the production of food crops (Ethiopian Ministry of Mines and Energy, 2007). According to the strategy, there is an estimated area of 23.3 million hectares of suitable land for biofuel crops production in the country (Ibid, p.8). The Biofuel Development Strategy aims to coordinate farmers participation to produce biofuel crops in deforested areas and at adjacent margins of their farming lots in order to facilitate market access for products engaging them in rural and agricultural development and extension programmes and cooperatives (ibid, pp.12-14). In response to government strategy to grow biofuel crops with farmers, there are biofuel development projects which run by different national and international companies in Ethiopia that engage farmers in the process of growing crops for biofuels. However, in Ethiopia there has been little information so far on how biofuel investment has been carried out on the ground (Nurye, 2009).

Biofuel investment has increased rapidly in Ethiopia during the last few years. In February 2010, there were 83 biofuel companies registered for the cultivation of energy crops for biofuel production in Ethiopia and several of them are operating in different parts of the country (Ministry of Mines and Energy, 2010). In 2007, the total land allocated for biofuel producing companies in Ethiopia was about 300,000 hectares (Lakew and Shiferaw, 2008) and in 2009, it was estimated to be more than 600,000 hectares (Ethiopian Investment Authority (EIA) and the Ministry of Mines and Energy (MoME)), 2009). This shows that there has been a remarkable increase of land allocated for the production of biofuel crops during the past two years. Based on the calculation made from the list of biofuel development projects received from EIA and MoME, it has been estimated that, when also including those companies in pre-implementation stage, the expected total land area used for biofuel production to be 2 million hectares. The total capital invested in the biofuel industry is estimated to be around 700 million USD[1] (Ibid).

[1] 1 USD is equivalent to 13.4259 Ethiopian Birr (Commercial Bank of Ethiopia, April 16,2010)

There is growing evidence that smallholders can gain considerable benefits from biofuel developments if the production, marketing and distribution networks are designed appropriately (Woods, 2006 and ICRISAT, 2007; cited in Ewing & Msangi, 2008). In order to avoid land use conflicts, displacement of local people and forest destructions due to biofuel developments, Nurye (2009) recommends that small scale biofuel projects should take place after conducting Social and Environmental Impact Assessment (SEIA) of projects as prerequisite for land allocation and project implementation in potential production areas. In Ethiopia, still there are some concerns regarding the possible impacts on food security and livelihood of local people. The concerns have been raised by non-governmental organizations such as Melca Mahiber (2008) and researchers working on food security related issues.

1.2 Rationale, objective and research questions

Since biofuel investments are a fairly recent phenomena (started about half a decade ago) in Ethiopia, little has been written on the consequences of biofuel development in the country. Most of what have been written on the issues of biofuels are mostly policy documents, agency affiliated reports and consultancy reports, and few field studies exist.

Besides large scale land investments for the production of biofuel crops, currently there are companies in Ethiopia, that produce biofuels through contractual agreements with smallholder farmers in so called biofuel development schemes. However, as to my knowledge, the rationale behind joining a biofuel development scheme by farmers has not been studied so far. Furthermore, the farmers' perspectives and responses in growing biofuel crops are not well known.

The objective of this study is to contribute to the understanding of the implications of the current smallholders' biofuel developments by exploring farmers' experience in the process of growing biofuel crops.

More specifically this study seeks to answer the following research questions:

1- What kinds of changes in local farming practices can be observed? How do farmers respond to growing biofuel crops?

2- What are farmers' views on biofuel crops with respect to food security and local livelihoods?

3- How is land accessed for biofuel crops in food crop producing areas?

4- What are the rationales behind farmers' decisions to grow biofuel crops?

This study intends to discuss the experiences of growing biofuel crops in the study area during the last three years. Furthermore, the study intends to discuss the changes in agricultural practices occurring as a result of biofuel development in the study area. In general, the study aims to contribute to the understanding of the implications of the current biofuel developments by exploring farmers' perspectives that are in the process of growing biofuel crops.

1.3 Description of the Study Area

The Wolaita Zone[2], the study area, is located about 390 km south from Addis Ababa, the capital city of Ethiopia. Administratively it belongs to the Southern Nations Nationalities and Peoples Regional State (SNNPR). *Wolaita* is known for being one of the most densely populated zones in Ethiopia with a population density of more than 600 persons/km2 (Wolaita Zone Finance and Economic Development Department, 2009). The national population density for Ethiopia is about 64 persons/ km^2. It is also an area known for experiencing food insecurity over the past years (UN Office for the Coordination of Humanitarian Affairs (UN-OCHA, 2003). It is estimated that nearly 50% of the population is food insecure (Harcourt, 2008). The main source of income in the rural areas is small scale farming. For Wolaita Zone, the average land holding size per household ranges from 0.125- 0.5 hectares (Wolaita Zone Finance and Economic Development Department, 2009).

The farmers who are engaged in biofuel crop production in the Wolaita Zone, produce castor beans and to some extent jathropa seeds to supply to GEE for export. Since the start of growing castor beans for biofuel in wolaita zone some controversies surrounding biofuel development have come out (Ethiopian Review, 2009; Harcourt, 2008). The controversy in this area has come from the fact that farmers grow castor beans on fertile land, on which they could produce food crops (Harcourt, 2008). In the process of growing castor beans in Wolaita Zone, it has been reported that many farmers have complained on growing castor beans for biofuel on their land, which came at the expense of their stable crops such as maize and sweet potato (ibid).

[2] Zone is the third highest in size in the division of government administrative regions, which is located within a region. From largest to smallest, the hierarchy of administration of Ethiopia is: Federal state, Regions, Zone, Woreda and Kebele

1.4 The Biofuel Producing Company in the Study Area

This study has selected the project area of the biofuel crop producing company called Global Energy Ethiopia Private Limited Company (GEE)[3]. GEE operates at both small and large scale levels. It commenced its operations in Ethiopia in 2007 with a total capital of 22 million US$ (Ethiopian Review, 2009). The company have involved about 20,000 smallholders (out growers) in 10 woredas[4] in the Southern Nations and Nationalities Region (SNNR), out of which five woredas are located in the Wolaita Zone (GEE, 2010). When growing biofuel crops with smallholder farmers, there is a contractual farming agreement signed between farmers and GEE. GEE focuses on producing castor beans. The castor bean is a fast growing inedible crop from which castor seeds are produced and processed to produce biodiesel oil. During the last three years many farmers have been promoted to grow castor beans and sell the seeds to GEE (Ethiopian Review, 2009).

GEE has also leased about 20,000 hectares to produce biofuel crops on a large scale. However, GEE hasn't started their large scale operations yet. Growing biofuel crops with a contractual agreement is referred to as 'community farming' by GEE. In Ethiopia, even though there are different biofuel development schemes, there are only two 'community farming' projects (GEE, 2010). According to GEE, growing castor beans for biofuel through "community farming" is a "unique" biofuel development project in the Ethiopia. It is "unique" because other biofuel schemes in the country, except one in eastern Ethiopia, Harergie area of Oromia region are large scale projects. "Community farming" unlike large scale schemes operates with distributed and shared responsibilities between GEE and smallholder farmers. Both company and farmers involved have influence on the success of the "community farming" in growing castor beans.

[3] GEE is a subsidiary of a US company (Global Energy Pacific Ltd). In Ethiopia it has been owned by Israel citizens.

[4] *Woreda is the fourth highest in size in the division of government administrative regions, which is located within a zone. From largest to smallest, the hierarchy of geographical location of administration of Ethiopia is: Federal State, Regions, Zone, Woreda and Kebele*

CHAPTER TWO

2. GUIDING CONCEPTS FOR THE STUDY

In this thesis, there are some central concepts and terminologies that guide the study. They are discussed in this section.

2.1 Biofuels

First of all, as this thesis is about biofuels, it is important to define it in the context of this study. In general, biofuels are fuels produced from biomass for purposes such as transport, heating, electricity generation and cooking (Dufey, Vermeulen, and Vorley, 2007, p.19). The production and use of liquid biofuels for transport are also called agrofuels (Eide, 2008). However, there are different forms of biofuels although all are produced from biomass. Bioethanol and biodiesel are among the biofuel forms[5] that have been widely promoted and produced recently in many developing countries (Havnevik, 2009). Among the different forms of biofuels available, this paper focuses on biofuels, which are mainly used for the purpose of transportation, particularly biodiesel.

2.2 Livelihood and Food Security

In this study, there are some concepts that are emanated from the purpose of the study and research questions indicated in chapter one. These concepts, among others include livelihood and food security. To some extent, this study has been influenced by the rural livelihood framework developed by Ellis (2000). From the rural livelihood framework the study takes land as livelihood platform; institutions as a mediating factor of livelihood; activities and practices in the context of growing biofuel crops. Basically these concepts are defined and contextualized for this study as follows.

Livelihood

Livelihood is a very broad concept. According to Ellis (2000), the concept of livelihood can be seen as comprised as the assets, the activities, and the access to these, which are mediated by institutions

[5] *There currently exists at least five different forms of biofuel, (i) bioethanol, made from sugarcane, wheat, cassava, sorghum and maize that are rich on starch, (ii) biodiesel, made from oil rich seeds including soya, oil palm, jatropha and algae, (iii) biogas produced from the biological breakdown of organic matter including waste from plants and wood, (iv) biomethanol made from ceullulosis and (v) biohydrogen made from biomass or by converting methane through steam reforming.* Source:http://www.nai.uu.se/livelihood/papers/biofuel_and_africa/

and social relations. These together determine the livelihood gained by the individual or household (Ellis, 2000). Land is taken as a basic asset for farmers' livelihood. In mediating access to land from the farmers that are involved in biofuel crop production, institutional arrangements play a significant role. Institutions can be defined as the rules and norms that constrain and facilitate people's behavior (c.f North, 1990). In the context of this study, the contractual cooperation agreement between GEE (the biofuel company) and farmers growing biofuel crops constitute the major institutional arrangement that guide farmers production of biofuel crops.

Food Security

FAO defines food security as a "situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO,1996; Eide, 2008). With respect to biofuel development one can consider two major dimensions of food security: access and availability. Biofuel production stands to impact on both of the major dimensions of food security: availability in terms of food supply and access in terms of entitlements and distribution among society (Dufey, Vermeulen, and Vorley, 2007). In Ethiopia about 80% of the population depends on smallholder agriculture and about 6 million people are considered as food insecure (Canali and Slaviero, 2010).

Food security has been also explained by Amartya Sen with the concept of entitlement in his popular works (1986, 1991). "In food security sense, in a market economy, entitlement refers to the terms of trade under which different income sources can be exchanged for food" (Ellis, 2000, p.17). According to Sen (1986, p.8) "the entitlement of a person stands for a set of different alternative commodity bundles that the person can acquire through the use of the various legal channels". The concept of entitlement is used in this paper to understand as to whether producing biofuel crops would help farmers participating in biofuel development scheme to increase their access to food by improving their entitlement to attain food security, as a result of increased income from the production of biofuel crops.

CHAPTER THREE

3. RESEARCH METHODOLOGY OF THE STUDY

3.1 Choice of Methods

The study has chosen a qualitative approach to achieve the objective of the study, which is to understand the implications of the current biofuel developments by exploring farmers' experiences in the process of growing biofuel crops.

In order to study experiences, a qualitative research approach was seen as convenient as it gives flexibility in interviewing and to put follow up questions. Under qualitative research approach, using an interview guide provides the interviewer with flexibility to pursue certain questions in greater depth (Rudqvist, 1991). The research methods that have been used for data collection of this study are interviews, participant observation and field notes. The applications of these methods are discussed in the following sections.

3.1.1 Interviews, Observation and Field Notes

Semi-structured interviews were used to collect primary data. The semi-structured interview was used as a guide as it provides topics, subject areas and sequences of questions within which, the interviewer has the freedom to explore, probe and ask questions according to responses from the interviewees (Kvale and Brinkmann, 2009).

Besides the interviews carried out, field observation and field notes were used. 15 farm visits were conducted, which provided the study with an ethnographic orientation. Silverman (1985, cited in Alvesson and Sköldberg, 2000, p. 45) describe ethnography as a research field that involves observation of events and actions in 'natural' contexts. The field observations on the farms enriched the study with understandings of how farmers carry out the production of castor beans, their experiences on the castor bean farms and the new practices they have developed in relation to growing castor beans. The total period that was spent for interviews and field observations was 20 days (February 1st to 19th, 2009). During the observation on the field, field notes and digital pictures from the castor farms were taken.

Beyond interviews with farmers and farm visits, four visits to relevant institutions which include: Wolaita Zone Agriculture Office, Wolaita Zone Finance and Economic Development Office, Soddo University and Wolaita Agricultural College were made to obtain complementary perspectives on biofuel development issues in the Zone. Discussions were made with zonal government officials, who were knowledgeable about the biofuel development projects in the Wolaita Zone. These visits and discussions provided the study with complementary perspectives on the development of the biofuel crops production in the Wolaita Zone and they enriched the study with information on biofuel crops production in wolaita zone.

3.1.2 Methods of selection of the study area and the informants

This study purposively selected three woredas as a geographical focus for the study. Within the selected woredas, 15 farmers were interviewed. The number of interviewees were decided taking into account issues such as accessibility of farmers for the study, transportation availability to the famers' home and castor bean farms and the time required for the interviews and observations on the fields. The procedure of selection of the woredas and farmers was as follows.

The different woredas, were identified together with a Chief Operation Officer of the GEE at Wolaita-Soddo and two other project coordinators working for the GEE. There were five woredas out of 12 woredas in Wolaita Zone, which are targeted by the GEE for growing biofuel crops, specifically castor beans. The five woredas where the GEE were operating in are: *Damot Woyde, Offa, Kindo Koysha, Dunga Fango and Humbo.* Out of these five woredas; three woredas, namely: *Damot Woyde, Offa and Kindo Koysha* were selected (see figure 2) taking into account the recommendation from the GEE officers. These three woredas were selected because they were, at the time of the study, the woredas in which the GEE have active projects of growing castor beans through contractual farming agreements. The other reason was that these woredas could be accessed via public transport.

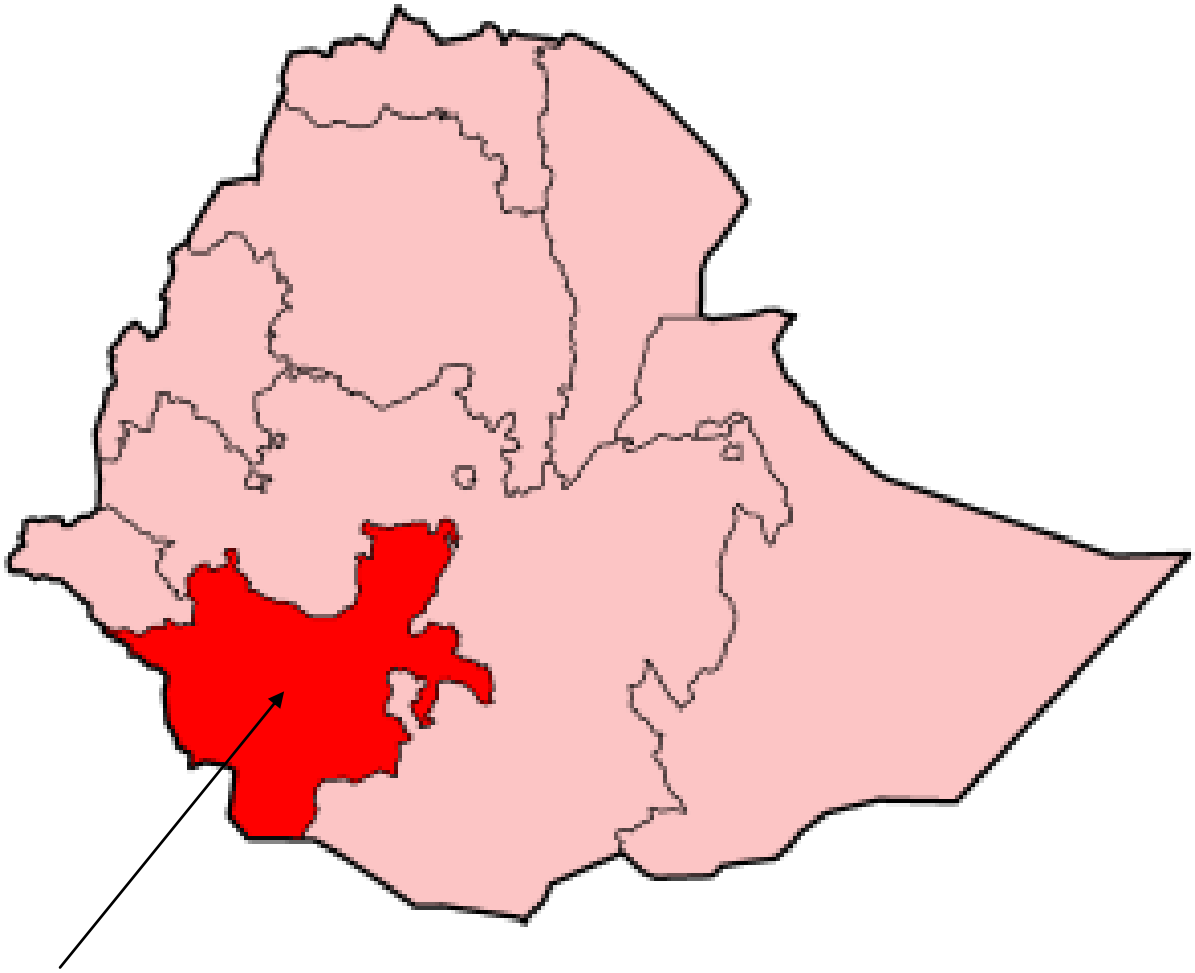

Figure1: Map of Ethiopia showing the Southern Nations, Nationalities and Peoples Region (SNNPR)

Source of Picture: http://commons.wikimedia.org/wiki/File:Ethiopia-Southern_Nations,_Nationalities_and_Peoples.png

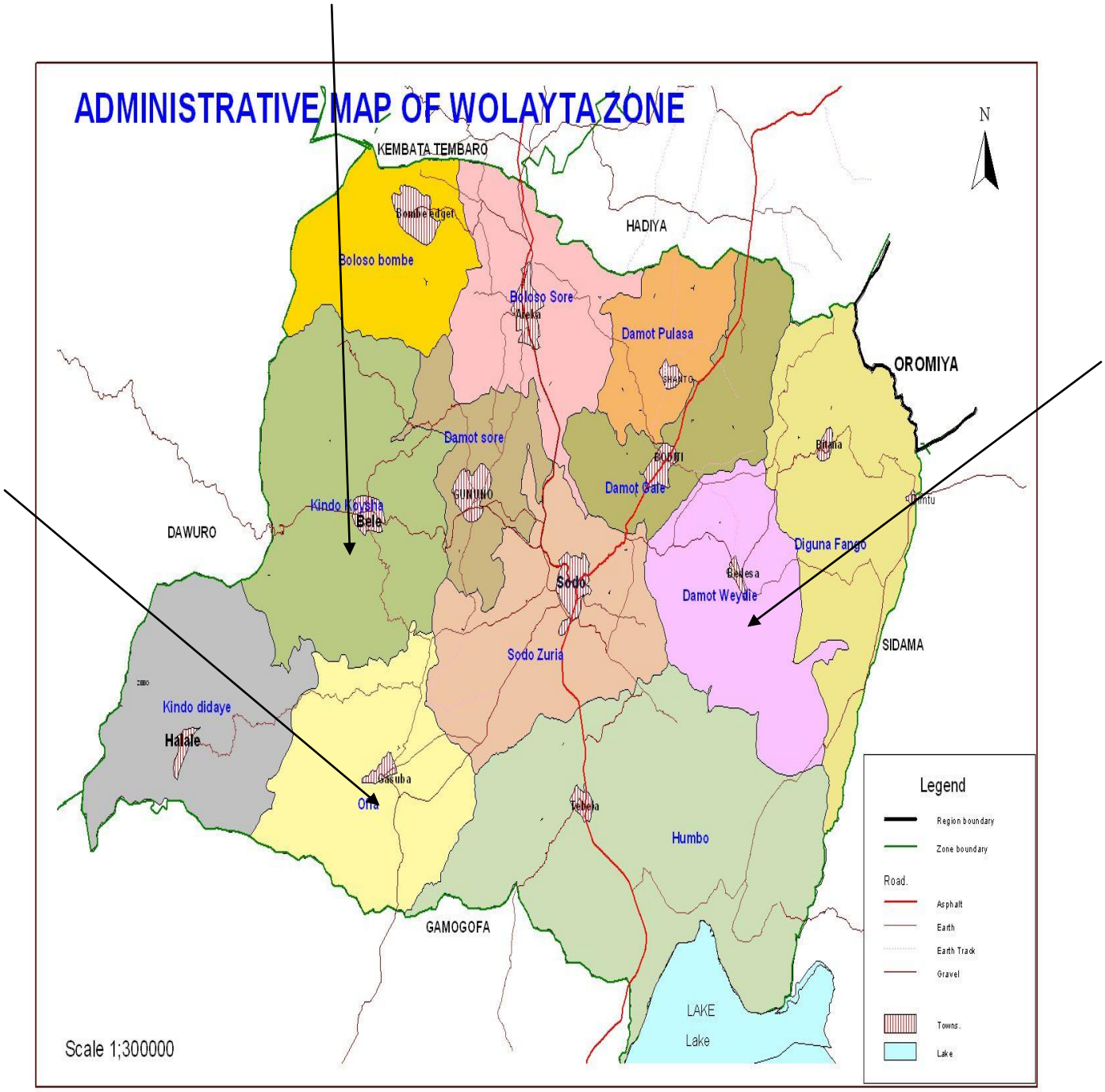

Figure 2: Geographical map of the study area

Source*: Wolaita Zone Finance and Economic Development Department (Received electronically on February 8, 2010).*

After going to the selected woredas, contact with the GEE field officers at Kebele[6] level was made. These field officers coordinate the project and they had direct contact with the farmers. They helped out in selecting the farmers to be interviewed from the three woredas. Here, it is important to note that, there might be a selection bias towards recruiting more successful farmers as the farmers to be interviewed were selected by the GEE project coordinators. In order to circumvent this, I made a request to select farmers that I believed constituted a representative sample of farmers in the area. I asked the field officers to suggest farmers with a record of both success and failure in growing castor beans through contract farming. Meanwhile, the GEE field officers insisted that based on their previous experience most farmers in the area have more or less similar experience in the project. But still the selection process might have affected the results of the study in some way as the selection might have had some bias. The meeting with the GEE field officers was made at centers[7]of the GEE in the woredas selected. Accordingly, visit was made to three centers in *Damot Woyde*, *Kindo Koyisha* and *Offa* woredas, from which five farmers from each center were interviewed.

The interviews were carried out at the farmer's house and were followed by observation visits in the castor bean fields. On an average an interview took about an hour and the observation visit to each castor bean field took roughly 30 minutes. Out of the fifteen selected farmers, two farmers didn't show up. Instead, two other farmers, who were growing castor beans, were interviewed.

The scattered settlement and poor rural infrastructure were among the limiting factors to access more farmers for interviews. The GEE offered me transportation and without the transportation services offered by the GEE, accessing farmers would have been very difficult and time consuming. An advantage of using the GEE transportation was that it was helpful to talk with the GEE workers through informal discussions on issues related to the project and obtain information about GEE's activities.

In addition to the interviews with the farmers, I interviewed three Kebele officials, three government appointed agricultural development workers and six GEE's field workers to

[6] Kebele is the smallest government administration unit which comes one stage below woreda.

[7] Center refers to a place where farmers receive castor seeds, fertilizers and get training how to grow biofuel crops. The center also serves to collect seeds from the farmers at the time of harvesting the biofuel crops.

supplement the data obtained from the farmers. These interviews gave the study additional perspectives on biofuel development in the studied area.

3.2 Transcription of interviews

The interviews were recorded on tape, transcribed, and are subjected to qualitative analysis. During the transcription, selective transcriptions were made through focusing on parts of the interviews, which were closely linked to the purpose of the study and the research questions. Out of the total 15 interviews with the farmers, 12 interviews were transcribed. The transcription of three interviews was omitted due to record device problems and found to be incomplete in answering the research questions in relation to the purpose of the study. Although, three interviews with farmers were not transcribed, they were useful in providing information for the study

3.3 Ethical considerations

This research has attempted to meet the required ethical standards in the research process, which include, respecting confidentiality, ethics and considering potential consequences on the research informants(May, 2001). All the informants of this research were informed about the purpose of the study. The interviews were conducted after getting the informed consent from the interviewees from the very beginning by asking their voluntarily to participate in the research. Agreement has also been reached with the informants to keep their confidentiality on issues that they were not willing to be disclosed. Sometimes, it may be difficult to anticipate the potential consequences of an interview report (Kvale and Brinkmann, 2009). In this regard, the participants were informed that their respective names will be made anonymous in the study. That means information that potentially violates the confidentiality of the interviewees will not be disclosed in this thesis. With the awareness of ethics, in order to differentiate between the farmers, fictitious names are used. Accordingly, in the upcoming sections when reference is made to the texts from the interview the corresponding fictitious name appears together with the respective texts.

3.4 Methods of data analysis

With regard to the analysis of data from the interview, different ways have been used. In the data analysis of this thesis, techniques indicated by Kvale and Brinkmann (2009) such as meaning condensation, meaning categorization, narrative structuring, meaning interpretation and generating meaning have been employed. For instance, meaning condensation is in use to reduce very long statements of the interview to shorter ones without affecting the meaning, what is said by the

interviewees. The technique of meaning categorization has been used by bringing together similar responses from the interviews by categorizing them under the four research questions raised in chapter one.

In results section, the main findings from the interview are presented by analyzing the data. In the discussion chapter, discussion was made with reference to the research questions, analytical concepts and earlier research works identified in chapter one and two. Finally, conclusions are drawn from the findings of the study and discussion sections at the end of the thesis.

3.5 Limitations of the study

The research was limited by a number of factors mainly the availability of resources and time. Especially lack of my own transportation was the major problem to reach out to the farmers. Due to such constraints, five farmers per woreda were selected for interview. A problem of accessing local transport was one of the major problems and I was obliged to integrate the field trip to farmers' village with the travel programs of the GEE to the field. The selection of farmers for interviews was thus influenced by the GEE staff at the field offices.

The biofuel producing company, the GEE, was initially skeptical about the study. An earlier workshop held in 2008 in the Wolaita-Soddo had criticized the GEE biofuel project, which according to the GEE officials had hampered the relationship with stakeholders in their operational areas. According to the GEE officials, the workshop has brought doubts on the activities of the GEE on part of the government authorities and the community around since then. Likewise, the company initially looked at my study with suspicion since they feared that it might have negative implications on the operation of GEE's projects. However, in order to overcome such skepticism, I explained the purpose of the study indicating that the study is being carried out to fulfill a master program. The company's previous experience has probably influenced the information that the company gave for this study. The GEE probably gave information that tends to tell out only successes rather than failures in relation to the execution of the castor bean project.

Another problem encountered was that four farmers did not speak Amharic[8] language. In such cases, I was obliged to rely on the interpreters. GEE field workers were used as interpreters when interviewing those farmers who didn't speak Amharic. The other major limitation for the study was

[8] Amharic is the national official language of Ethiopia that most Ethiopians speak.

that translation was made from Amharic to English, while the speech was transcribed to text for data analysis.

CHAPTER FOUR

4. RESULTS AND ANALYSIS

In this section the results of the study will be presented making reference to the data from the castor bean production project by the GEE. It would be helpful for the readers to provide brief information on how the castor bean production project with contractual farming works. Below is the brief summary of how the castor bean production through contractual farming works in wolaita zone.

1. GEE approaches farmers in order to grow castor beans for the production of biodiesel. Farmers who would like to participate in the project willingly prepare and show the plots of land on which they could grow castor beans. If a farmer agrees to participate in castor bean production project he/she signs contractual agreement to accept the partnership and carry out different activities from sowing of the castor seed up to harvesting and supplying the product of castor bean to the GEE.

2. The GEE supplies the farmers with inputs (such as castor seeds, fertilizers, pesticides, etc.) that are needed to grow castor bean.

3. Training is provided by the GEE to the farmers on how to grow the castor beans according to the requirements of the company. The training includes how to sow the castor seed, weeding of castor bean farm, pesticide control, and harvesting the castor beans.

4. The GEE regularly follows the plots of castor beans during the production period and guides the farmers how to do the manage works on the farms.

5. The GEE monitors the plots for pests and diseases and provide the farmers with the sprayers and chemicals to apply on the castor beans.

6. After harvesting, GEE buys all the yield of castor beans from the farmers on a predetermined price. The contractual agreement between farmers and the GEE states that the price of castor bean seeds per a kg is one Ethiopian Birr (ETB).

All the interviewed farmers were members of the contractual farming project to grow castor beans in wolaita zone. The following table summarizes the basic data obtained from the interviewed farmers.

Table1. Summary of basic information of farmers interviewed

Farmer	Woreda	Kebele /center	Family size	Land size (ha)	Land allocated for castor bean (ha)	Percentage of land allocated to grow castor bean	No. of harvests of castor bean since joining the project	Total yield from castor bean farm (kg)	Income earned from castor beans (in USD)
Alemu	Damot Woyide	Sura Koyo	7	0.5	0.125	25	2	108	8.04
Bekele	Damot Woyide	Sura Koyo	6	0.5	0.1	20	2	550	40.97
Chala	Damot Woyide	Sura Koyo	7	0.25	0.06	24	1	250	18.62
Debele	Damot Woyide	Sura Koyo	7	0.60	0.125	20.83	1	66	4.92
Ebba	Damot woyide	Sura Koyo	6	0.5	0.125	25	2	330	24.58
Fikru	Offa	Wachiga Esho	10	1	0.33	33	2	280	20.86
Girma	Offa	Wachiga Esho	1	0.5	0.08	16	1	20	1.49
Hailu	Offa	Sere Esho	7	0.5	0.25	50	2	600	44.69
Ibrahim	Offa	Sere Esho	7	0.5	0.25	50	2	270	20.11
Jaleta	Kindo Koyisha	Mundena	7	4	0.75	18.75	2	400	29.79
Kedir	Kindo Koyisha	Mundena	10	3	1	33.33	2	810	60.33
Lemma	Kindo Koyisha	Mundena	8	4.5	0.5	11.11	2	270	20.11
Total			**81**	**16.35**	**3.25**	**19.88**	**21**	**3954**	**294.51**
Average			**6.75**	**1.36**	**0.27**		**1.75**	**329.5**	**24.54**
Average yield per hectare (Kg/ha)			**1216**						
Average price/kg(in USD)			**0.08**						

The basic data of twelve interviews provided by the interviewees is summarized in the above table.

Among the interviewed farmers, the maximum land size a farmer owns is 4.5 hectares and the least is found to be 0.25 hectares of land. The average size of land a farmer owns is 1.36 hectares**.** From the data in Table 1, it is noted that in *Kindo Koyisha* woreda, farmers have relatively larger land size. While in *Damot Woyide* and *Offa* woredas, the land size is somewhat smaller, which is less than a hectare for all farmers interviewed in the two other woredas.

In all the three woredas GEE's project of growing castor beans for biofuel production started in 2007. The project has been under implementation in partnership with those smallholder farmers, who are interested in participating in the project through contractual farming arrangement. In 2008, farmers harvested castor beans for the first time. Since then the project has continued in in wolaita zone.

During the previous two harvesting seasons (2008 and 2009), out of the 12 farmers from which data was summarized(Table 1) nine farmers harvested castor beans twice and the other three farmers did it once. During the study period (February 2010) farmers were still in the process of harvesting castor beans and supplying to GEE with a price of one Ethiopian Birr per kg (0.08 USD/kg). At the time of the study, farmers were also preparing plots for the harvest in year 2010 and some farmers were yet harvesting castor beans from the year 2009. In order to maintain quality of produced castor beans GEE buys castor beans together with the seed coat (the coat of the seed not removed).

In the following sections, the results from the interviews are presented in relation to the objective of the study and the research questions identified in chapter one.

4.1.1 Production of Biofuel Crops and Changing in Farming Practices

Growing castor beans as cash crop has not been part of the farming activities and practices in the study area before it was introduced by GEE in 2007. Castor bean grows as wild plant without having much significant benefit for the people in the area before. Some people used the castor beans as a lubricant on traditional clay made stoves especially when making '*injera*[9]' and to soften leather products for further processing.

It has been estimated that around 10,000 farmers have grown castor beans every year since 2008 (GEE, 2010). Based on the information from the GEE Office in the Wolaita-Soddo, in 2008 alone a total of 9,893 farmers involved in the castor beans growing project in three woredas selected by this study. The disaggregated number of farmers participated in the contractual farming project were:

[9] *Injera* is Ethiopian national food, usually made from a stable crop in Ethiopia called Teff.

2,753 farmers in *Kindo Koyisha* woreda; 3,210 farmers in *Offa* woreda, and 3,930 farmers in *Damot Woyide* woreda. The farmers' involvement in the project was voluntary according to all farmers interviewed. All the interviewed farmers have grown castor beans at least once since the start of the project.

Based on the discussion made with the project managers at the GEE and farmers interviewed, there are justifications made as to how castor beans production would help smallholder farmers in changing their farming practices so as to support their livelihood. The major justifications made among others include:

1) Castor bean is a new cash crop that serves as a new source of income for farmers;

2) The project helps to introduce modern agricultural practices based on the technical advices from agricultural experts employed by the GEE;

3) Through crop rotation the productivity to food crops would increase and it eventually improves food security of the farmers in the area;

4) Inter-cropping would help farmers to benefit from both castor beans and other intercropped crop, which are usually edible crops;

5) Castor bean is drought resistant and so it could be good means of diversifying livelihood.

6) Castor bean is not eaten by animals and so there will be less damage on castor beans during the production process;

7) Training farmers would improve their knowledge of farming practices;

8) There is a possibility of improving farmers' livelihood as a result of growing castor beans on degraded and/or less fertile land.

The farmers interviewed claim that they participated in the contractual farming project with high expectation of benefits when GEE did the promotion on castor bean growing and its benefits in 2007. All farmers participated in growing castor beans in 2008 have claimed that they didn't benefit as they expected from changing part of their land to grow castor beans. For example, Alemu, a farmer interviewed in *Damot Woyide* woreda, *Sura Koyo* center explains how he didn't benefit from the project in his first year participation in the project.

> *"…last year [2008] I have been severely affected for growing castor beans on my land. It was new for us to grow castor beans. Many farmers grew the castor beans on fertile land assuming that it is beneficial to improve income…The Company [GEE] also told us not to grow any type of crop on the land that we agreed to allocate to grow castor beans."* (Alemu)

The farmer has indicated that the experience in his first year [2008] participation in growing castor beans was not beneficial. Firstly, he involved in the project without having prior experience in growing castor beans as cash crop. Secondly, he allotted part of his fertile land assuming that the income from the castor beans would be better than he would be getting from other crops on the same land. Thirdly, the company didn't allow the farmer to do intercropping at least at the beginning of the project.

Farmers have similar stories in growing castor beans. The reason why farmers didn't benefit from growing castor beans as expected include that of the low production compared to the expectation of 5,000 kg/ hectare, under optimal conditions. As shown from the data provided by 12 farmers, the total amount of castor beans produced was estimated to 3950 kg from about a little more than three hectares of land allocated for castor beans by the interviewed farmers altogether (Table 1). Taking the average, 1218.5 kg per a hectare of land is by far less than the expected level of harvest. The factor that contributed for low yield in the woredas includes that of drought in the year 2008. It was noted that the GEE didn't allow intercropping in the first year [2008] of the castor bean production. As a result farmers grew only castor beans on the plot of land used to grow castor beans in 2008. All farmers have pointed out that rainfall failure was the major reason that affected the overall production in wolaita zone during their three years experience of growing castor beans.

Fig.1 Drought was one of the major factors for low harvest of castor beans. This picture shows hindered growth of castor beans due to drought in 2008. (Source: GEE Operation Office in Wolaita-Soddo)

4.2 Biofuel and Farmers' Livelihood

In Ethiopia, agriculture is the backbone of the economy. More than 80% of the population depends on agriculture for their livelihoods. The agricultural system is predominantly subsistence farming. As other parts of rural Ethiopia, the majority of the farmers in wolaita zone are dependent on subsistence farming for their livelihood and most farmers in the study area produce crops for household consumption. Many farmers claim that they produce little for the market. In wolaita zone, the major source of farmers' assets is the land they own. Land is scarce resource in the area as there is high population density.

The interviewed farmers have usufruct right in order to support their livelihood from the land. The farmers own the land to use for productive purposes. Based on Ethiopian land ownership policy, they don't have the right to sell it off. However, they have the right to use the land for whatever they think appropriate and rational except selling it off. The farmers in the study area have different livelihood strategies in order to support themselves from the land they own. The farmers stated that they started to grow castor beans as one means of livelihood diversification. They allocate parts of

their land to grow castor beans (Table 1), and allocate larger part of the land to produce mostly food crops. As per the discussion made with GEE project managers, farmers are allowed to grow castor beans on up to one-third of their land. The contract with farmers also states that farmers should not use more than one-third of their land to grow castor beans. The GEE believes that this arrangement would be helpful in minimizing the risk of diverting most land to castor bean farms, which might eventually affect the food production and livelihood of the farmers in the area.

Most of the interviewed farmers stated that there is no major change in their livelihood as a result of growing castor beans to support their livelihood. It has been observed that in woredas such as *Damot Woyide*, where farmers have relatively small size of land, there is high risk of losing their livelihood as a result of growing castor beans. This is largely due to the fact that land is very scarce resource in this woreda. Farmers claim that even they couldn't produce enough food that feeds the family year round. In relative terms, in woredas such as *Kindo Koyisha* farmers could benefit from growing castor beans as they have relatively larger land size and less used land compared to other woredas. In order to compare the size of land between farmers at different woredas, please refer Table 1. Farmers stated that in the case of small land ownership, they prefer to grow food crops rather than castor beans. In the case of owning relatively larger lands, farmers could grow castor beans on marginal land as fences. When castor beans are used as fences to farms they have also benefits in protecting farms from animal intrusion and damages on food crops. This was mentioned by farmers interviewed in *Offa* and *Kindo Koyisha* woredas.

The majority of the farmers in the study area use family labor to carry out activities on the castor bean farms. In the three woredas that have been studied, women and children participate on the activities of castor beans production. Women and children engage in activities such as tilling the soil and the subsequent activities to be carried on the castor bean farms.

Farmers persistently complain over the predetermined price of castor beans set by the GEE. Although farmers complain about the price, they still claims that castor bean could support their livelihood. For example, Chala, a farmer who owns a quarter of a hectare of land in *Damot Woyide Kebele* stated the following.

> *"If the GEE stops the project, I think we will be affected. Because we have learnt that castor beans add fertility to our soil, which is good to increase productivity from our land. The money we get from castor beans whatever amount is beneficial."* (Chala)

One of the issues raised by farmers was about the chemicals used on castor beans in the production process. Three of the farmers interviewed had concern with regard to chemicals sprayed as pesticides to protect castor beans from diseases. They believe that it has affected the livelihood of some bee keepers by killing the bees sucking the flowers castor beans. For example, Hailu, a farmer in *Offa* woreda discussed the effect of the chemical as follows.

> *"One of the problems, though I am not a bee keeper is that, bee-keepers have been complaining about the chemical, which is used to control pests on castor beans. When I spray pesticides on castor beans, people usually come to me and complains. Some people say the chemical kills the bees. Some bees have been seen falling under the castor bean plant, while they suck the castor flowers after the spray…I think the flower of castor bean is good for the production of honey. But what the bee keepers complained about is the chemicals."* (Hailu)

Fig.3. spraying pesticide on castor beans (Source: GEE Wolaita-Soddo Office, 2010).

In general, farmers believe that pesticide control on castor beans is important in order to improve the yields.

4.3 Farmers thoughts on castor bean production in relation to food Security

One of the major issues that has been raised along castor bean production is its direct or indirect effect on food security. According to the farmers interviewed, the issue of food security is the main issue in wolaita zone. Nine out of twelve farmers consider themselves as not having enough land to produce sufficient food for the whole family during the year. Having small land size and the recurrent drought due to rainfall failure especially in 2008/2009 season was found to be the main contributing factor that pushes the farmers to food insecurity. As the result, food insecurity and rural poverty have been pervasive among the farmers in the study area.

It has been stated by farmers in the study area that the role of castor beans in supporting food security is minimal. The interviewed farmers claim that since they started growing castor beans their food insecurity situation has not been improved. The income they earn from selling the castor beans has given them low income in return, which is too low to buy food products, in times of food shortages. Most farmers conclude that the contribution of the castor beans production project towards improving food security situations is insignificant during their involvement in the project over the last three years.

The other point that farmers raise with regard to the role of castor beans in supporting food security is associated with the poison of the castor seed. Castor bean is non-edible crop for people and animals. The farmers claim that castor beans have no dietary support for their families as the seed is poisonous. For example, in connection with the poisonous nature of castor bean, Hailu, a father of five children, stated the following:

> *"Many people in the surrounding say that, castor beans can't be roasted to be eaten as kollo[10], when you get starved you can't eat it. So, people criticize those farmers growing castor beans. On top of that, the price for castor beans is only 1 Birr per kg. People criticize us [farmers engaged in castor bean production] taking castor bean as harmful that brings famine and food insecurity to the area. Many people here are against those farmers who are growing castor beans."* (Hailu)

[10] *Kollo* is type of dry food item very common in Ethiopia mostly in rural areas, which is made of food crops such as wheat, barley, beans, etc. by roasting seeds.

This farmer is critical to growing castor beans with respect to improving food security. He has pointed out at least three points. First, castor bean is not a crop for household consumption so it doesn't support the immediate food needs; second, the community in the surrounding are disapproving the engagement of farmers in castor bean production; third, the price for castor beans is low to attract farmers. Some farmers complain on the predetermined price of castor beans as shown above, whereas others argue that the poisonous nature of castor beans has its own advantage. For example, Ibrahim, a farmer who grew castor beans twice argues that it is possible to grow castor beans on far away farm lands as it can't be affected by wild animals.

A majority of the interviewed farmers question the role of castor beans in contributing towards food security in relation to perceived low price of castor beans. Because of the low price of castor beans the income the farmers earn said to be insignificant. Furthermore, the buying power of Ethiopian Birr has declined during recent years due to inflation as some farmers explained. For example, Debele, a farmer at *Damot Woyide* woreda who is a father of six, stated that the price of everything has increased during the past few years, but the price of castor beans has remained the same.

In line with the complain about the price of castor beans and its overall benefit in improving food security of the farmers, Hailu, for example, questioned the benefit of growing castor beans in his area as follows:

> *"Honestly speaking, I earn only 1 birr from one kg of castor bean, but the value of other crops is more. For example, one kg of haricot bean is sold for 5 or 6 birr per kg on the market. I think I should tell you the truth. Castor bean doesn't benefit farmers as such; it doesn't fulfill the economic needs of farmers and doesn't improve food security either. For instance, I grew castor beans during the past years [2008 and 2009]. The benefit I get is not proportionate to the effort I made to produce castor beans. When I reflect back what I did, I regret to grow castor beans for the past two years [2008 and 2009]."* (Hailu)

Hailu put his argument forward based on his experience of growing castor beans. Even though he was not forced to grow castor beans on his farm, he was expecting better economic returns.

The results from other interviews in general also show that growing castor beans have not contributed much in improving the food security situation of farmers engaged in the production of

castor beans. It contributed to some extent, but the income increase earned was insignificant as noted apparently by most farmers interviewed.

4.4 Accessing land for castor bean production and contractual agreement between GEE and farmers

Accessing land through contractual agreement with farmers is the basis for the functioning of the contractual faming project run by the GEE in wolaita zone. The contractual agreement between the farmers and the GEE comprises among others: the objective of the agreement (i.e growing castor beans); farmers' roles and responsibilities, which states rights and obligations on the part of the farmers; company's roles and responsibilities, which include the rights and obligations of GEE; how the quality of castor beans to be that the farmers should supply to GEE; ways of solving disagreements and conflicts related to growing and supplying castor beans.

The contractual agreement regulates how farmers grow castor beans and it serves as a binding document for both the company and the farmers contracted to grow castor beans. In the study area in particular and in Ethiopia in general a company cannot buy land directly from smallholder farmers as there is a national regulation that prohibits buying the land from smallholder farmers. The Ethiopian law provides farmers only users' rights to the land.

In order to access lands from smallholder farmers, the company should approach farmers after obtaining the consent from the offices of the Woreda Administration and Kebele offices in the respective areas. The interview with the farmers and discussion with the GEE project leaders show that the approach the GEE uses is promoting about the overall benefit of castor beans. For instance, it was stated by farmers that they would get a yield of castor beans up to 40 quintals or 4000 kg per hectares. The GEE itself have stated that in optimal conditions, up to 5 tons (5,000 kg) of castor beans could be produced from a hectare of land (GEE, 2010). However, the results from the interview show that the farmers didn't get realistic information about the level of production they actually could obtain from the plots of land they have allocated to grow castor beans. Factors such as drought, shortage of rainfall, and other agro-ecological and climatic constraints should have been taken into consideration when the GEE staff did their promotion.

Farmers made comparisons between castor beans and other food crops in an attempt to discussing the benefits received from allocating land for castor bean production. For example, Fikru, a father of eight children, in *Offa* woreda, *Wachiga Esho* kebele stated the following.

> *"I would have received better benefit from food crops. At least, I would have collected about 50 kg of teff from the same land, which is equivalent to about 300 birr. If I grew cassava on the same plot of farm that I grew castor bean, I would have obtained better yield. That means I didn't get better benefit from castor bean growing."* (Fikru)

Other farmers interviewed pointed out similar issues and compared prices of castor beans with prices of food crops. It was observed that there was a competition between castor beans for biofuels and food crops on the limited land farmers have at their disposal.

4.5 Rationale to grow castor beans

The rationales for farmers to grow castor beans for biofuel production can be categorized into economic incentives, fertilizers, intercropping, and the use of less fertile land. These motives to grow castor beans by farmers are discussed as below.

4.5.1 Economic Incentives

Economic incentive was said to be the major factor by the GEE officials to attract farmers to grow castor beans. As shown in Table 1 the average gross income earned from cultivating castor beans was estimated to 325 Birr (about 26 USD) from an average land size of around a quarter of a hectare among the twelve farmers interviewed. Such estimates show that the economic return to grow castor beans is low compared to the prices of other food crops. Most farmers interviewed complain over a predetermined price set by the GEE.

When farmers complain over the price they usually compare the price of castor beans with the market price of food crops they produce. In some of the following quotes farmers also raised the fact that the GEE is the only buyer for castor beans in the area.

> *"This year [2010] one kg of haricot bean is about six Birr; however, castor bean is sold for only one birr. Because of the low price all farmers have been affected. We only sell castor beans to the GEE. Due to the fact that there is no other company here to buy castor, the GEE is buying castor beans with low price."* (Alemu)

> *"To produce for next year, in my part, the price for the castor beans is too low. We are discussing among ourselves [farmers], to stop growing castor bean next year.*

Many people in the area are criticizing us for growing castor beans for low price." (Bekele)

"As an example one quintal [100kg] of haricot bean is about 600 birr on the market. So the price of food crops is much more than the price of castor beans. Because of this people are saying that it is better to produce food crops instead of castor beans" (Chala)

"The price is too low compared to other crops. The other issue is that naturally castor beans have lighter weight and so it is not encouraging to grow… Farmers have no price incentive to grow castor and many people are discussing to stop producing castor beans."(Fikru)

"I grew castor bean on fertile land that could have been used for other food crops. That means on the land that I used to grow teff, maize and others. Now, some farmers intercrop castor beans with other crops. But I grew once and didn't intercrop that time. I didn't have the awareness to do intercropping by that time." (Girma)

"For me growing castor beans doesn't benefit farmers. I have the awareness that castor bean might have benefit to Ethiopia by reducing expenses for fuel import. We have been told that and are aware of it. I will not produce castor bean next year [2010].I have seen the pros and cons and I have made up my mind. For example, I grew castor on around 0.25 ha. However, if I had grown, for example, potatoes on the same plot of land, I could have harvested yield that feeds the family for the whole year and if I sell the potato, I could have earned better money than I actually receive from selling castor beans. Even half of the farm I used for castor beans could do this. So it doesn't benefit farmers…I recommend that the company [GEE] should produce castor beans on its own land instead at a place where large land is available….Because there are no other buyers (competitors) of the castor bean, we haven't been offered good price and we don't benefit from the scheme. There is no better market. I can't say that I don't want to sell my castor bean, because there is no buyer other than the company." (Hailu)

The above quotes show dissatisfaction among the farmers to grow castor beans. Most farmers question the economic incentives of growing castor beans by comparing it with the economic

incentive they have for producing food crops. During this study it has been found that all farmers unanimously agree that the price of castor beans, which is predetermined by the GEE, is very low compared to the other crops they produce on their farm.

The other important point the farmers pointed out with respect to lack of economic incentives for growing castor beans is the monopoly situation. Farmers could not able to sell castor beans to any other buyer on the market. The farmers claim that they don't have power to determine the selling price of castor beans. In addition, according to the contract agreement they entered with the GEE farmers are not allowed to sell their products to other companies, if any. The contractual agreement, which is prepared by GEE, and signed by the farmers participating in the project of castor bean growing states that the farmers under contractual agreement should sell castor beans only to the GEE. The contractual agreement obliges the farmers to supply the castor seeds only to the GEE in the following six years since the time of the contractual agreement. Two points can be identified with respect to GEE's monopoly situation. Firstly, there are no other companies that could buy castor beans on the local market. The other is the contractual agreement between the GEE and the farmers obliges farmers to supply their castor bean product only for the GEE for six years since they entered the contractual agreement. Farmers are not connected to any market outlet than supplying only to the GEE.

4.5.2 Chemical Fertilizer

One of the findings in this study is that the chemical fertilizer that the GEE gives to farmers together with the castor seed to apply on the farm of castor beans is an indirect motive for farmers to join the scheme. The fertilizer is sold to participating farmers as a loan on relatively low price compared to the fertilizers can be purchased on the market. The farmers who receive fertilizer to grow castor beans only pay for the fertilizer after harvesting the castor beans at the end. The GEE deducts the loan from farmers when they supply the castor beans for sell to the GEE. The farmers growing castor beans have revealed that there has not been huge pressure from the GEE in compelling them to pay back the fertilizer unless they harvest the castor beans. When their castor bean production failed, in 2008 and 2009 farmers were not forced by the GEE to repay back the down payment they took for chemical fertilizers. Farmers consider this as a big motive to voluntarily participate in the contract farming project with the issuance of fertilizer by the GEE with relatively low price as a loan.

However, forgiving loans to the farmers has an implication on the credit environment in the area. It might have untended consequences in that farmers will turn to defaulters next time. Farmers might consider loans as grants and it might promote aid dependency in the area. In the long term, if the credit environment is affected, the GEE will have difficulty in its activities in the area. By forgiving farmers the loans, the GEE didn't fulfill the contractual agreement. The contractual agreement states that any input that the GEE gives to farmers as a loans will be collected when farmers supply castor beans to the GEE afterwards.

In most cases the farmers didn't mention directly that fertilizer as a motive for growing castor beans. Instead they mentioned fertilizer as motive when they were asked why they didn't not stop growing castor beans if it was not seem as beneficial to them. Some farmers clearly identified fertilizer as an incentive for them to grow castor beans. For example, Alemu, a farmer in *Damot Woyide Woreda, Sura Koyo* Kebele clearly puts his motive to grow castor beans as follows:

> *"Since we don't have enough money to buy fertilizers, we opted to join this project to benefit from the fertilizer as well; apart from the benefit we get from the castor bean…That is why we agreed to join the project.*" Alemu)

On similar issue of fertilizer as a motive, Kedir, a farmer in *Kindo Koyisha Woreda* also stated that:

> *"The land I have used to grow castor beans did not give yield as such without application of fertilizer. I grew castor beans on land with lower soil fertility. If the GEE stops operation we will be affected. We use the fertilizer for both castor beans and other food crops as we intercrop other food crops together with the castor beans.*"(Kedir)

The above quote shows that getting fertilizer is an important motive to participate in growing castor beans. Farmers low capacity to buy fertilizers on the market has partly influenced them to produce castor beans in a contractual agreement with the GEE. Farmers also state that the production of food crops would increase in the following year as a result of applying fertilizer on the castor bean fields.

4.5.3 Intercropping and increased soil fertility

Growing two or more crops on the same farm land together with the castor beans has been adopted as one of the strategies used by farmers interviewed in order to increase the yields. This possibility of intercropping as a strategy of getting benefit from growing castor beans and food crops came out

as one of the incentives for farmers to participate in the contractual farming project. In year 2008, farmers were not allowed by the GEE to intercrop other crops with castor beans. However, due to complains from farmers on low benefits from the year 2008 without intercropping, the GEE allowed intercropping in the following year (2009). In line with this some of the farmers' opinions are taken from the interview in the following sections.

> *"In year 2009, I grew both castor beans and haricot beans and benefited from both crops. GEE workers trained us, to leave two lines between the castor beans And I sow haricot bean within the castor beans on the open space between the castor beans and I harvested good yield of haricot bean, which helped to feed my family for about a month. I realized that castor beans improve fertility to the soil."* (Alemu)

> *"It is good if the company continues with the project. But we are not happy with the price. The other thing is we are allowed to grow crops together (intercropping), so it would give us extra income."* (Bekele)

> *"From my point of view, the price is a big concern for us. Otherwise, it is good for the soil. Previously people used to associate castor beans with bad fortune. For instance, there is a saying "Have castor in your garden "beguaroh xema yibikel". It means it is a kind of plant that has no benefit at all. It was considered as bringing bad fortune. But now it is a source of income. …it is also good for the soil."*(Ebba)

> *"Because of the fertilizer I applied on the castor bean farm last year [2008] there was increase on the fertility the following year. The soil fertility has increased and gave me good yield…. If farmers grow castor beans, they benefit from increased soil fertility"* (Girma)

> *"In some areas farmers claim that they grow castor beans on land that is not suitable for growing other food crops…But in my case, the land I have is very suitable for production of other crops…Although, castor beans are good for soil fertility, the benefit I have got compared to other crops is not good. If I grow other crops, the benefit I would get is much better."* (Hailu)

According to the above quotes, intercropping is welcomed by the farmers. It helps to diversify risk of crop failures. In addition, farmers would benefit from harvesting castor beans and food crops.

Intercropping also improves soil fertility as castor beans fix nitrogen to the soil. Farmers seem aware of these benefits and seem to stick to this strategy as they continue to grow castor beans. However, they persistently insist that they are not motivated to continue growing castor beans in the years to come due to the low price incentive for castor bean product, which they raise again and again.

4.6 Reasons for farmers to stop growing castor beans

Although, the aforementioned quotes show that some farmers still would like to continue growing castor beans in spite of dissatisfaction with the benefits they actually get from the project, there are reasons for some farmers to quit from the project. The contractual agreement does not specify whether farmers who joined contract farming of castor beans with the GEE can quit the project whenever they want. Rather the contract states that they would not sell the castor beans to any other buyers in the next six years. Meanwhile, there were four farmers out of 12 farmers who already decided to stop growing castor beans in 2010 production season. Those farmers who declared that they will not grow castor beans any more explained their reason to stop in the following way.

> *"I don't think I will grow castor beans next year [2010]. I haven't been satisfied with the yield so far [in 2008 and 2009]. In some places I also heard that farmers grow castor beans as fences instead of land that would be suitable for food crop. I don't have land, which is not suitable for food crops. So I will not grow castor beans."* (Fikru)

> *"I am a student and I didn't have time to do farming on the castor bean field and also because I am not satisfied with the yield and benefits from castor beans, I stopped engaging in the project already."* (Girma)

> *"I have decided to stop growing castor beans from now on. I have grown castor beans twice and I have seen the pros and cons. I guess that many other farmers will also stop. I grew castor beans for the second time expecting that the second year would be better in terms of price."* (Hailu)

> *"I am not happy with the returns I have earned from the castor beans. So I better grow other crops instead. I don't have marginal land that can be used to grow castor beans .Therefore; I choose to grow food crops."* (Kedir)

To summarize the reasons why farmers decided to stop growing castor beans among others include: dissatisfaction with the yield, small land size, low price offered by the GEE for castor beans, lack of time to work on castor bean farm, less benefit of castor beans compared to the benefits that farmers can obtain from food crops on the same type of land.

CHAPTER FIVE

5. DISCUSSION AND CONCLUSIONS

In this section, the results of the study that have been presented in chapter four will be discussed in relation to concepts presented in chapter two and with respect to research questions asked in chapter one. At the later section of this chapter, some conclusions will also be drawn from the finding of the study.

5.1 DISCUSSION

Smallholder farmers and contract farming

It was learned that the GEE calls the castor bean production project "the community project" to grow castor beans. However, from literatures and based on my understanding, the project is more of contract based farming in order to grow castor beans for biofuel production. In order to call the project a "community" project the characteristics of a community should be in place. According to Bartle (2010), "Community is a "sociological construct." It is a set of interactions, human behaviors that have meaning and expectations between its members. Not just action, but actions based on shared expectations, values, beliefs and meanings between individuals." (Bartle, 2010). The farmers who are producing castor beans to supply to the GEE are located in different woredas and kebeles. They don't have strong interactions among each other. What they share in common is that they are all smallholder farmers, who have been contracted by the GEE to grow castor beans. That is why I use the term "contractual farming" instead of "community farming". The contractual agreement is the basic institution that dictates how the project of the production of castor beans operates.

All the farmers who are engaged with castor beans production in wolaita zone are smallholders, who have small land ownership. Some writers characterize smallholders as those rural cultivators practicing intensive, permanent, diversified agriculture on relatively small farms in areas of dense population (Netting, 1993). In smallholders, the family household is the major social unit for mobilizing agricultural labor, managing productive resources, and organizing consumption (ibid). A smallholder farmer usually produces a significant part of its own subsistence, and it sells some agricultural goods in the market (Netting, 1993). The farming practices in smallholder farmers in

wolaita zone are operating under the premises of contractual farming arrangement between the farmers and the GEE. The GEE argues that it is introducing modern agricultural technologies, appropriate land use, creating market opportunities and other related benefits to the farmers contracted to grow castor beans. Some researchers identify the advantages and disadvantages of contractual farming in context of biofuels crops production. For example, Cotula et al. (2008) notes that in general terms contract farming schemes offer price stability and technical support to farmers, but have the disadvantage of locking both sides into arrangements that may be perceived as less fair and advantageous as market conditions progress over time. Some writers argue that while contract farming promises significant benefits for growers in many cases, there are circumstances in which only limited gains can be realized by contract farming (Glover and Kusterer, 1990; Little and Watts, 1994; cited in Key, N. and Runsten, D., 1999).

The discussion of biofuel development is usually raised in the context of poverty alleviation and/or reduction in developing countries (Peskett, et al, 2007). In developing countries smallholders dominate the overall agricultural activities. One of the major rationales for promoting alternative income generating schemes is taken as one of the strategies in alleviating and/or reducing poverty in developing countries. It has been noted that biofuels could be a potential income generating opportunity (United Nations Department of Economic and Social Affairs, 2007). For instance, Dauvergne and Neville (2010) note that preceding the 2007 food crisis, biofuels are seen as a pathway towards more sustainable development, with the potential to support small-scale farmers, develop rural economies, and reduce greenhouse gases. However, this study shows that such claims should be considered in the context of different factors such as what kind of land is allocated, the level price offered to the biofuel crop produced and who and how the price of the crop is determined. In the following sections, I will briefly discuss the observations made from the interviews in relation to related studies of biofuel development.

Changes in local farming practices and farmers' response to growing castor beans

The major changes in local farming practices that have been observed in light of producing castor beans, among others include: intercropping, using relatively less productive land for castor beans, growing castor beans as fences to food crops. These farming practices have been welcomed by the farmers in the study area. The training the farmers get from the GEE staffs has been also helping those farmers who have involved in the castor bean growing project. Farmers receive training on

issues such as how to prepare land for maximum harvest from both castor beans and food crops grown through intercropping on a given plot of land; how to apply fertilizers and pesticides and other related better agricultural practices. There is claim that one of the advantages of contractual farming is that better agricultural practices could be transferred to farmers. For instance, according to Glover (1984) some studies of out grower schemes involving smallholders and public or private corporations in less-developed countries suggest the potential value of contract farming arrangements in facilitating transfer of technology, access to markets and other benefits for growers.

This study observed that some of the activities taking place with respect to castor bean production might have undesirable long term implications in the rural development efforts in the area. For example, the farmers were not forced to pay back loans they took in connection with castor bean production, when they failed to do so. It was stated by GEE field officers and some farmers, when the farmers failed to repay back the loans (e.g. cost of fertilizer), they were not forced by GEE to repay back. This practice might promote dependency syndrome and is not in line with the contractual agreement, which states that every farmer should repay back the loans taken from the company to grow castor beans. According to the contractual agreement, if a farmer fails to repay his loans, GEE will use legal enforcement mechanisms to regain what it gave for partner farmers as a loan in producing castor beans. Wolaita Zone is known for its aid dependency during the past couple of years due to food insecurity situations in the area (UN-OCHA, 2003). Letting the farmers not to repay the loan adds on the culture of aid dependency that seems pervasive in the area.

One of the major agricultural practices developed with respect to growing castor beans for biofuel is the practice of intercropping. Intercropping castor beans with other crops is viewed as a good practice among the farmers since it enables them to get benefit from both castor beans and food crops. There are several crops that farmers started to intercrop with castor beans. Most farmers combine haricot beans and castor beans to maximize the production from both crops. Farmers believe that such changes in farming practices have also improved the soil fertility. According to the farmers who practiced intercropping, the yield of food crops were improved as a result of increased soil fertility on the land that was used to grow castor beans in the previous years. However, such changing practices are not taking place with carefully planned and introduced technological orientations to change the traditional farming practices. This study in wolaita zone shows that there are no major intended technologically oriented agricultural practice changes which have been

brought up as a result of biofuel development that would significantly affect the smallholders in efforts to bring rural development in the area.

The changes in better agricultural practices are expected by rural development experts in order to improve the underdevelopment of the smallholders in the rural areas of the global south (White and Dasgupta, 2010). In light of biofuel development, it has been assumed by developing countries governments that better agricultural development would come and smallholders will revive from less development to better development. For example, a study made under the International Food Policy Research Institute (IFPRI), by Ewing and Msangi (2008) argues that application of biofuel conversion technologies would enable farmers in developing countries to market their crops beyond the traditional food, feed or industrial- processing uses, by which the income of farmers and employment opportunities would be raised. What has been observed in wolaita zone is that the agricultural practices introduced in relation to biofuel development are not as such in a position to transform the traditional farming practices to modern ones and improve the welfare of the farmers significantly. At present time it is hard to find studies that fully agree with biofuel development for the promises of rural development in developing countries. A recent study by White and Dasgupta (2010) suggests that the claim that biofuels have the potential to revive peasant agriculture and stimulate rural development, which has been made time and again in popular as well as academic writings, should be examined. The rhetoric of sustainability creates a discourse that is difficult for critics of biofuels to challenge, as it appeals to widely accepted norms and goals of the international community (Dauvergne and Neville, 2010). However, the ways in which production of biofuel crops is taken up tends to exclude the perspectives, interests, and livelihoods of marginalized communities, especially those with insecure land tenure (Ibid). The arguments that have been overwhelmingly raised with respect to benefits of biofuels in promoting rural development in developing countries such as Ethiopia need to be supported with concrete studies from the field.

Farmers' views on biofuel crops with respect to food security and local livelihoods

Many recent studies (for example, Oxfam, 2008; FAO, 2008; Canali and Slaviero, 2010; Havnevik, 2009) have discussed the recent rise in prices of food globally in relation to the increase of biofuel crops production. One of the major issues that have been raised by farmers along with castor bean production in wolaita zone is its direct or indirect effect on food security. According to the farmers interviewed, the issue of food security is the main issue in wolaita zone in recent times. It has been

stated by farmers in the study area that the role of castor beans in supporting food security is minimal. The interviewed farmers claim that since they started growing castor beans their food insecurity situation has not been improved. However, it is difficult to fully attribute the food insecurity situation in the area to biofuel crop production. But what has come clearly from this study is that the income farmers earn from selling the castor beans is too low to buy food products, in times of food shortages.

In this study it was found that allocating fertile land for biofuel crops could have negative effect on the food security situation in the long run. With respect to this, globally there are concerns raised by various concerned organizations and researchers. Some have attributed the increase in food prices with the shift of land allocation from food production to biofuels. For example, FAO (2008) has pointed out that shifts in land allocation from traditional food production systems to biofuel production are one of the causes for increased food prices and for creating global food shortages. In the same manner, Oxfam (2008) also argues that biofuels could exacerbate food insecurity, deepen poverty and hunger in developing countries as a result of increased competition of land between food crops and energy crops unless precautionary measures are taken by concerned bodies. Some other studies even hugely claim that the contribution of biofuels to energy security is minimal, if any. For example, a study made in FAO claims, biofuel production cannot in any significant degree improve the energy security of developed countries -to do so would require so vast allocation of land that it would become impossible (Eide, 2008). In the case of wolaita zone, allocating huge land is impossible as the land available is needed for food production. Recent studies also argue in the same manner. The biofuel crops production, even when expanded to cover all available land on the globe it would make only a small contribution to global energy needs at current levels of consumption (White and Dasgupta, 2010).

It is often claimed that agricultural crops for biofuels can offer new income opportunities for smallholder farmers (United Nations Department of Economic and Social Affairs, 2007). Castor beans are one of non edible crops that are currently used to produce biodiesel. Non-edible crops are considered as income opportunities as they can be grown and harvested for biofuels on arable and marginal lands that are not under cultivation (ibid). Such claims that cites the fact that non-edible crops are considered as income opportunity is usually based on mere assumption that unused land is available in many developing countries (Fassil, 2008). In the situation of smallholders in areas where there is high population density in Ethiopia, such as wolaita zone, the availability of “marginal” land

is one of the major issues to be considered by biofuel companies when they choose their area of operation.

In wolaita zone, the land size that farmers own is very small compared to land holding size in other parts of Ethiopia. The Wolaita Zone Finance and Economic Development Department (2009) states that the average land holding size of farmers in wolaita zone is only half a hectare per a farmer. However, this zone is known for better agro ecological conditions to attract investors in areas such as growing biofuel crops. The better agro ecological condition and suitability to grow castor beans is one of the major reasons for the GEE to choose wolaita zone as one of its project area.

Taking into account the average size of land the farmers own in wolaita zone, allocating part of land for the production of castor beans can have negative effects on the farmers' food security situation. It might result in the decline of the availability of food in the area. For instance, Amartya Sen (1986) claimed that the decline in availability of food might not necessarily bring food insecurity. If the farmers are able to generate good income from castor beans, they might overcome the food insecurity situation by exchanging their money with food available in the market. However, as shown earlier, the income the farmers have earned from the production of castor beans is low to buy food on the market in the case of food insecurity situations. At least in the current situation, the income that farmers earn from selling the castor beans can't entitle them to access food on the market due to insignificant income earned from the castor beans. The farmers claim that there is high increase in food prices in the area in recent years. In the case of high prices, the farmers who don't have enough food could not be entitled to acquire enough food, even though food is available in the market. So the argument here is that in light of food security of participating farmers in the production of castor beans through contractual farming, the price issue should be taken into account as well. The price of castor beans is predetermined in the case of wolaita zone and there is a monopoly situation by the GEE, a biofuel company, in which farmers have no any other choice except selling the castor beans to a company that contracted them.

It has been noted that in many developing countries, most poor people are net consumers of food-even on farms in rural areas (Peskett, et al, 2007). This also applies for the majority of farmers in wolaita zone. Apart from how much farmers produce for consumption, the income generated from producing the castor beans is of great concern in farmers' effort to secure food at the household level. It should be noted that food prices are as important as food availability (ibid). Usually literatures that

assert the potential benefits of biofuel development to smallholders do not emphasize the importance of prices offered to farmers by the companies contracting farmers to grow biofuel crops.

It is also important to discuss the situation of producing castor beans for biofuel in wolaita zone in relation to the Biofuel Development Strategy of Ethiopia. The Biofuel Development Strategy of Ethiopia states that the cultivation of biofuel crops should focus on "marginal" lands and on those lands that would not be suitable for food crop production (MoME, 2007). However, it has been observed among the farmers interviewed that many farmers used fertile land to grow castor beans. The five farmers interviewed in the *Damot Woyide* woreda, for example, claimed that they don't have "degraded" or "marginal" lands that they could use to grow castor beans. Rather the land they allocate to grow castor beans is the same type of land, which can be used to grow food crops. The study shows that fertile land has been used to grow castor beans, which is contrary to the claims of Biofuel Development Strategy of Ethiopia. The issue of "marginal" land with respect to biofuel development is more of rhetoric. It is noted, for example, that in Ethiopia when policy makers and biofuel developers claim "idle/marginal" land they usually tend to impose a narrow definition of economic interest, utility and value attached to land usually from their point of view (Melca Mahiber, 2008). In smallholder farmers' case, at least in the case of the interviewed farmers in this study, it was rather difficult to find "marginal" land, as the land they own is mostly used for the production of food crops. One of the worrying scenarios with regard to biofuel development is that the conversion of land to biofuels, which has had an effect on rising food prices and increased food insecurity in many developing countries. In a recent draft paper by Havnevik (2009) it has been stated based on FAO (2009) estimate that the number of hungry people globally were estimated to rise to 1.02 billion in 2009, which is a record high, compared to the previous years. Havnevik (2009) also claims that in 2009, about 265 million of the world's hungry people were from Africa.

Recently studies are coming out in abundance being critical to the benefits of biofuel crops to the smallholders. Some argue that the expansion of biofuels to the smallholders is an effect of global demand than appropriateness in terms of benefits to smallholders. For example, White and Dasgupta (2010) argue that the global demand for agrofuels is stimulating land grabbing and expropriation, and of incorporation of smallholders in contracted production. Dauvergne and Neville, 2010) also argue that as the biofuel sector grows, it will become more difficult for states and local communities to derive public benefits from production, rather than concentrated private benefits. Some researchers, for example (Dubois, 2008) notes that it is important to ensure that

biofuel developments at least should not harm if it doesn't favor the livelihood strategies of small-scale producers and communities in rural areas.

Access to land in contractual farming with smallholder farmers and its implications

In Ethiopia, land is state owned, which is usually termed as "public ownership". In the case of state ownership of land, individual landowners have only usufruct rights (Crewett, Bogale and Korf, 2008). The usufruct rights exclude the right to sell or mortgage the land (ibid). The aim of such land ownership arrangement in Ethiopia has been aimed to protect the rural smallholders from selling off their land to wealthy individuals leaving them landless and without source of livelihoods.

Land is the basic asset for the livelihood of smallholder farmers in Ethiopia including in wolaita zone. The basic arrangement that GEE uses to access land from smallholder farmers in wolaita zone to grow castor beans is through contractual agreement with farmers. The GEE, the biofuel company, has also access to relatively larger size of land through lease from the state. The national, zonal, woreda and kebele offices have roles in mediating the access to land by collaborating with the biofuel company. According to information obtained from the GEE operation office in wolaita, through contractual agreement with smallholder farmers, GEE accessed, for example, a total of about 1,130 hectares of land from 11,651 farmers in wolaita zone in year 2009. As identified by the GEE officials, GEE has not started to grow castor beans on the land received from the state due to various reasons, which include: failure to secure loan from State Banks to invest on the land; low infrastructure such as roads and failure experiences from previous similar initiatives (for example, a Biofuel company called Sun-Biofuel PLC) in wolaita zone. Instead of developing large scale farms for biofuel development, GEE has chosen to stick to small scale biofuel development through contractual farming with smallholder farmers. The GEE officials believe that the contractual arrangement helps to spread out the risks both to the company and contracted farmers.

The contractual agreement between farmers and the GEE specifies the maximum size of land that one farmer should allocate to grow castor beans. According to the contractual agreement, the maximum amount of land that a farmer should make available to grow castor beans must not exceed one-third of land that a farmer owns. The strategy of GEE to maximize harvest of castor beans is to have as much as many smallholder farmers as partners in the contractual farming project. As a strategy of accessing more land for the production of castor beans, GEE reaches out as many farmers as possible rather than demanding larger land from few farmers. However, the lands that

farmers make available to grow castor beans were found to be arable lands instead of the so called "marginal" lands. This study has observed that the contractual agreement could create a monopoly situation as indicated earlier. The contractual agreement explicitly put that farmers who became partner of GEE couldn't sell castor beans produced to any other company except the GEE for six years since the time that the farmers agreed to join the contractual farming. GEE claims that partnership is based on solely volunteerism on the one hand, but the contractual agreement is characterized by having intention of monopoly on the other hand. In the contractual agreement, the GEE declared itself as the only buyer of the castor bean produced by the farmers under the contractual agreement. In some previous studies on contractual farming, critics were made stating that contract farming can serve as a tool for agro industrial firms to exploit an unequal power relationship with growers (Key and Runsten 1999). Usually farmers enter into contracts voluntarily but they face limited exit options and reduced bargaining power, which may force them to accept less favorable or ``exploitative" contract terms and also overreliance on cash crops can also make households more vulnerable to food shortages and price fluctuations (Ibid).

In the biofuel development strategy of Ethiopia, it has been stated that arable lands could be used for more productive and economically viable purposes (MoME, 2007). As shown in previous sections, farmers in wolaita zone haven't accepted castor bean production as economically viable option yet. Even though farmers anticipated more economic return from their lands by growing castor beans, most farmers practically didn't get the benefits they anticipated when they joined the project. Instead, some farmers believe that using their parts of land for castor bean production has negatively affected their benefits from the land as they could have gained more economic benefits if they had grown food crops. Without considering such effects, encouraging biofuels only because they are assumed to be of higher value adding could result in a serious competition of resources for growing food and energy (Lakew and Shiferaw, 2008).

GEE's policy to encourage farmers to produce castor beans on fertile land seems to contradict with the objective of the Biofuel Development Strategy of Ethiopia, which emphasizes that biofuels development should be carried out on "marginal" or degraded lands. The strategic document states that less fertile, or 'marginal' or degraded lands should be used for cultivation of energy crops that are particularly used for production of biodiesel (MoME, 2007). The strategic document emphasizes cultivation of biofuel crops on degraded land with the aim of avoiding unintended consequences on

various issues among which, avoiding effects on food security and land access for food crops are the major ones (Lakew and Shiferaw,2008). Lakew and Shiferaw (2008) also claim that in strategic document for biofuel development, it seems that it is not clear as such what is meant by 'marginal' land. In wolaita zone, some farmers interviewed in this study identified "marginal" land as part of those lands that are situated along the road, which is usually susceptible to cattle intrusion.

Even globally, the issue of "marginal land" has been quite debatable. According to Dufey et al (2007), even though many governments have taken steps to identify 'idle' land and to allocate it for biofuel crops production, yet there are doubts about the concept of 'idle' land. In many cases, lands perceived to be 'idle', 'marginal' or 'abandoned' by government and large private biofuel development companies provide a vital basis for the livelihoods of poor and vulnerable groups (Dufey et al, 2007; Cotula et al, 2008).

The rationales behind farmers' decisions to grow crops for biofuels (join biofuel development schemes)

Although most farmers claim that the benefits from growing castor beans have been marginal, many farmers have continued to grow castor beans in partnership with the GEE. From the very beginning the reasons that the farmers gave to join the project of castor beans production was to improve their livelihoods through improved income from the castor beans. All the farmers mentioned improved livelihoods as their major motive in the beginning. However, the result from the interview shows that most farmers are not satisfied with their income from the castor beans. Basically, the dissatisfaction came as a result of low price of castor beans compared to other crops the farmers produce for their livelihoods. However, nine farmers who started production of castor beans in 2008 continued to grow in 2009 as well. The other three farmers joined the contractual farming project in 2009. It was estimated that eight farmers out of the total twelve farmers will continue to grow castor beans in 2010 as well. But the question is why the farmers still chose to continue growing castor beans in spite of their claim that the economic incentive to grow castor beans is very low? This study identifies that there are some reasons. The reasons behind the continuation of growing castor beans by the farmers depend on the context. From direct and indirect answers of interviewed farmers the reasons include: the use of fertilizers; considering castor beans as an opportunity for income generation and diversification; and the expectation of increased price for castor beans.

Farmers are increasingly aware of the role of castor beans in improving soil fertility. The increase in soil fertility due to nitrogen fixation in the soil by castor beans was also one of the reasons to continue growing castor beans by farmers. Farmers claim that although the direct economic benefits from castor beans are low due to low price compared to other crops, they have observed that there is an indirect benefit from the soil fertility in the next year, when they grow other food crops. Castor bean is a leguminous plant, which contributes for nitrogen fixation.

At national level, the major motive in promoting biofuel development in Ethiopia is basically to ensure energy security and also promote export through producing biofuels (MoME, 2007). Lakew and Shiferaw (2008) note that Ethiopia considers biofuel as an opportunity to enhance the export sector and reduce the import of petroleum oil by substituting it with domestically produced biofuels. What has been observed in wolaita zone is that GEE produces castor beans only for export market. The only value adding made by GEE is to remove the coats of the seeds. With the current situation, it is difficult to say that biofuel development is taking place. Rather it is export of another agricultural product. In Ethiopia, although biofuels are regarded by development professionals and policy makers as having enormous potential in replacing imported oil and oil products to meet the growing energy demand in the country and also benefit the out growers, it is still in its early stage to meet such potentials as shown in this study. As claimed by Dufey et al (2007) the potential for value to be created and retained from biofuels in rural areas depends strongly on whether agrofuels are being developed for local and sub-regional markets with small-scale production, or for large-scale commercial production for national or global markets,

During this study it was observed that the biofuel development officials in government offices such as the Ministry of Mines and Energy of Ethiopia, Ethiopian Investment Authority and Ministry of Agriculture and Rural Development promote biofuel development quite passionately. They do so believing that biofuels are hopes to the needs of energy security, improving rural livelihoods and improving the wellbeing of society. The Ministry of Mines and Energy of Ethiopia has designed a strategy which is meant to facilitate biofuels development and utilization in the country with proper consideration of remedies to avoid any unintended social, economic and environmental consequences (Lakew and Shiferaw, 2008). However, in order to put into practice the strategy lacks specific guidelines. For example, in this study it was found that GEE doesn't know about the strategic document on biofuel development in Ethiopia. Recent studies show that many governments in developing countries are so ambitious on the use biofuels. However, such ambitions

could not be fulfilled by biofuels at least with the present level of technology and ways of production of biofuels. In their recent studies, White and Dasgupta (2010) claim that biofuels development for energy security are efforts made, which are driven by the need for developed country governments, to find a 'quick fix' to their energy and environmental security needs. White and Dasgupta (2010) also note that the attempts of developing country governments to find new ways to revive rural and agrarian development through biofuel development are short-term profit than bringing long term solutions. As demonstrated by some studies, that I have cited as well, the expansion of agrofuels production can have (and is already having) a negative impact on local livelihoods (Ibid).

5.2 CONCLUSIONS

This study concludes the production of biofuel crops through contractual farming offers little benefit to smallholder farmers. In order to be one of contributing factors to rural development, biofuel development needs to be considered in the context of different factors such as what kind of land is allocated, the price offered to the biofuel crop produced and who and how the price of the crop is determined.

The economic incentive to grow castor beans is found to be very low among the interviewed farmers. When the farmers started to grow castor beans, they grew on fertile land expecting good yield, which enables them to improve their livelihood. Parts of fertile lands that earlier were used for food crops have switched to castor beans production. This could have significant implications on food security in the area in the long run.

In smallholders' scheme through contractual farming, growing castor beans might not necessarily be a feasible opportunity for the farmers, who are producing the crop. Braun and Pachauri (2006) have pointed out that the enormous potential of biofuels is not a guarantee that small farmers and poor people in developing countries would benefit from. In this study it has been found that all farmers unanimously agree that the price of castor beans, which is predetermined by GEE, is very low compared to the other crops they produce on their land. The farmers claim that they don't have power to determine the selling price of castor beans or to influence the price of castor beans. The price of castor beans is determined by the company and the farmers are price takers. The contractual agreement obliges the farmers to sell the castor beans with already predetermined price. Furthermore, farmers do not have the right to sell castor beans to any other buyer except the GEE. This creates

monopoly situation which can put the smallholder farmers on the losing side in the contractual farming arrangement.

Taking into account the average size of land the farmers own in wolaita zone, allocating part of land for the production of castor beans can have negative effects on the farmers' food security situation and livelihoods. It might result in the decline of the availability of food in the area in the long run. As the income the farmers have earned from the production of castor beans is low to buy food on the market in the case of food insecurity situations, selling the castor beans can't entitle them to access food on the market. Furthermore, the high increase in food prices in recent years could aggravate the food insecurity situations by the farmers involved in producing biofuel crops.

The biofuel development strategy of Ethiopia considers the allocation of less fertile land for biofuel crops, if the return from the land is economically feasible. However, as shown in this study, the claim that allocating fertile land for growing castor beans for biofuel production would be economically viable could be questioned. It has been observed in this study that allocating fertile land to grow castor beans doesn't comply with the objective of the Biofuel Development Strategy of Ethiopia, which emphasizes biofuels development on "marginal" or degraded lands. The concerned government officials in biofuel development offices such as the Ministry of Mines and Energy of Ethiopia assume that farmers allocate their land for biofuel crops production, if they find it an economically viable option. However, such assumptions by concerned government offices were not realized practically in wolaita zone, which is densely populated and land is a scarce asset. It has been found that biofuel companies choose to grow biofuel crops in areas where suitable agro ecological conditions exist as businesses might not be profitable on "degraded" or "marginal" lands. Meanwhile, farmers should be advised on the benefits and loss in allocating land to grow castor beans on their limited land

Having small land size and the recurrent drought due to rainfall failure especially in 2008/2009 season is one of the main contributing factors that negatively affected the food security situation in wolaita zone. As the result of recurrent droughts, food insecurity and rural poverty are pervasive in wolaita zone. Generally, poverty is widespread in the woredas, where the study was made. Because of rampant poverty, many farmers in the study area were found to be desperate to involve in the castor bean production project hoping that the project would help them to improve their food security and livelihoods. However, the farmers' ability to improve food security and livelihoods through income gained from the selling of castor beans is relatively insignificant.

The major reasons as to why farmers produce castor beans include the benefit from fertilizers provided to farmers and the benefits from practice of intercropping. Furthermore there has been less pressure from the company to repay the loan of fertilizer, and also the farmers have benefited from the fertilizer through the food crop intercropped with the castor beans. From what the farmers asserted it is possible to conclude that farmers view access to cheap fertilizers as an important motive to participate in growing castor beans. However, letting farmers not to repay loans might affect the credit environment negatively in the area and might also promote dependency syndrome in the long run. Forgiving defaulters of loan is not also in line with the contractual agreement, which states that every farmer should repay back the loans taken from the company to grow castor beans.

Growing castor beans with contractual farming is found to be surrounded by a lot of uncertainties. The low economic incentives that farmers have had to grow castor beans, the relatively smaller land size available in wolaita zone, the limited options that farmers have in selling the castor beans produced, the monopoly market situation for the castor beans and related other reasons could lead to stop growing the castor beans by farmers in the coming years. If the returns from the production of castor beans continues to be unsatisfactory to farmers involving in contractual castor beans farming project, concerned stakeholders of biofuel development in Ethiopia should consider evaluating the pros and cons of such projects to smallholder farmers before replicating them in other areas.

It has been shown in this study that local contexts and different factors such as what kind of land is allocated for biofuel crops production, the level of price offered to the biofuel crops produced and by whom and how the price of the biofuel crops are determined seems important factors. This study concludes that considering biofuels as a potential to support smallholder farmers and claiming that biofuel development helps to develop the rural economies should be supported by facts from the field.

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Annex I: Semi-structured Interview Guide

The objective of this study is to contribute to the understanding of the implications of the current smallholders' biofuel developments by exploring farmers' experience in the process of growing biofuel crops in general and castor bean in particular. The study is made for the fulfillment of Master of Science in Rural Development and Natural Resource Management at Swedish University of Agricultural Sciences in Uppsala, Sweden. The interview data will be used for academic purposes and the confidentiality of the interviewees will be kept as agreed at the time of interview.

This semi- structured interview guide has been used as guide for interview with the farmers selected for this study. It has been used flexibly taking the context of the interview dynamism. More of probing and follow up questions were used based on the responses of the interviewees.

1. Basic information

1.1 Name of the Farmer…….

1.2 Woreda……

1.3 Kebele…….

1.4 Family size……..

1.5 Educational level…….

1.6 Occupation…….

1.7 Main source of income……..

1.8 Other sources of income……..

2 Land and Harvest

2.1 Land ownership…….

2.2 Total size of land owned……...

2.3 Land allocated to grow castor bean:

2008……2009…….. …2010…….

2.4 Yield of castor bean:

2008……2009……..2010…….

2.5 Income earned from castor:

2008……..2009…….2010……..

3 Farmers' Perspectives on growing castor bean/community farming project

3.1 How do you describe castor growing in community farming project?

3.2 What the castor project has brought for you so far?

3.3 Are there any changes in local farming practices as the result of involving in growing castor bean since you have started producing it?

3.4 What have you seen as advantage of growing castor bean?

3.5 What have you observed as disadvantage of growing castor bean?

4 Views of farmers on castor bean production with respect to food security and local livelihood strategies

4.1 Does castor bean production affect your food crop production? If yes, in what ways?

4.2 Has the castor bean production been beneficial in supporting food security at the household level? How?

4.3 Does growing castor bean support your livelihood? How?

4.4 Has the castor growing project affected your livelihood? In what ways?

4.5 Are there any other problems in relation to food security and livelihood that have been occurred as a result of castor bean production?

4.6 Are there other issues that you want to raise about castor bean production in relation to food security and/livelihood?

5 Rationale for farmers to participate in castor bean production Project

5.1 When did you join the project?

5.2 Why did you become a member of community farming project to grow castor?

5.3 How did you know about GEE or castor bean community farming project?

5.4 Are there any other reasons than the benefit from selling castor bean which motivated you to participate in this project? Please explain in detail.

5.5 To what extend you have benefited from growing castor bean?

5.6 Are you planning to continue participating in the castor bean production project in the years to come as well? Would you give the reasons for why to continue and/or discontinue your participation in the project? Please motivate your answer.

6 Problems and recommended solutions

6.1 What were the major problems you have encountered in producing castor bean during the past years?

6.2 How did you overcome the problems?

6.3 Are there still problems with respect to the castor growing project? If yes, please explain?

6.4 What do you think are the solutions that you recommend for the problems you have raised?

7 General remarks from farmers

7.1 What are the general remarks you forward on the community project of castor production based on your experience so far?

7.2 Are there any issues you want to add in addition to issues that we have discussed?

7.3 Are there any other points that you want to raise that you think are important in relation to this project?

Thank you very much for your participation!