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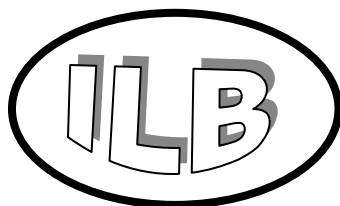
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Contract Farming: Inclusion of Small Scale Farmers in the Brazilian Biodiesel Production Chain ¹

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Abstract

Contract farming is a key element for the Brazilian Biodiesel Program, which aim to promote social inclusion of small scale farmers. The relationship between the industry and the farmers is regulated by a certification called Social Fuel Seal. The seal allows to the biodiesel producers favorable financing schemes, tax exemptions and, especially, the right to participate in specific auctions to sell the biodiesel. By the other side, the basic requirements are: i) acquisition of a minimum percentage of raw material from small scale farmers, ii) enter into contract with the farmers, iii) ensure technical assistance and training to the farmers. The Brazilian biodiesel program, in only five year, has obtained positive results. Although the inclusion of 109 thousand small scale farmers represents a small percentage, having in mind the total number of small scale farmers in Brazil (4,5 million), it is a very expressive figure comparing with 40 thousand sugar cane producers involved in the 40 years old ethanol program. The main challenge of the program is to increase the number of small scale farmers supplying the biodiesel industry with oilseed, especially in the Northeast and North regions of Brazil. The creation of a captive market for small scale oilseed farmers occurs under the regulatory framework of the Social Fuel Seal, which demands a mediated agreement between farmers and the industry. The formalization of a contract can be an important factor helping to organize the oilseed production chain, as the coordination of the production chain, including also the by-products, is a key factor.

Keywords: *contract farming, biofuel, Brazil, small scale farms*

1 Introduction

Contract farming is a key element for the Brazilian Biodiesel Program. Launched in 2004, the PNPB (National Program for the Production and Use of Biodiesel) has established a mandatory mixture of biodiesel to diesel in Brazil, which reached in 2010 the 5 percent blend (B5). The B5 represents a captive market of about 2.4 billion liters of biodiesel per year and the B5 is distributed to around 38 thousand petrol stations throughout the country. Besides economic goals, the social inclusion of small scale farmers is an explicit objective of the program, and the relationship between the industry and the farmers is regulated by a certification called Social Fuel Seal. Currently, there are 109 thousand small scale farmers involved in the program and the certified biodiesel producers can profit from tax incentives and are allowed to participate in exclusive auctions organized by the Brazilian Petroleum, Natural Gas and Biofuel Agency (ANP). These auctions represent 80 percent of the biodiesel commercialized in the country.

The Social Fuel Seal is a certificate granted by the Ministry of Agrarian Development to biodiesel producers who have spent from 15 to 30 percent of its total expenditure on the purchase of oilseed from small scale farmers or on the supply of input or service to these farmers through legally binding agreement. The contract has to be monitored by

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a recognized small scale farmer organizations and it has to safeguard the rural income and provide technical training and assistance to the farmers (Brasil, 2009)

The main challenges of the PNPB are to increase the number of small scale farmers involved in the oilseed chain, especially in the Northeast and North regions of Brazil, and to diversify the sources of oilseed, as soybean accounts for around 80 percent of raw material for the Biodiesel Industry.

2 Biofuels in Brazil

Since the 1970s oil crisis, the energy supply has been the main subject of worldwide economic and geopolitical discussions. The concentration of oil reserves in a few countries, the oil price instability and the insecurity about its regular supply has constantly been the cause of international tensions. In addition, the negative environmental impacts of the use of fossil fuels and the sustainable energy supply for a growing world demand impose huge challenges to national and international energy public policies.

According to the International Energy Agency (IEA), 80 percent of the total world energy consumption is based on fossil sources. Crude oil responds to 36 percent of total energy consumed, and short and midterm forecasts indicate no significant changes in the world energy matrix. Around half of the oil's output is used by the transport sector; and almost 95 percent of its energy demand is supplied by oil industry. During the oil crisis of the seventies, many countries developed programs for fossil fuel substitution. However, the majority of these programs were not implemented. The Brazilian program for gasoline substitution by ethanol (Proálcool) is a rare exception. Nowadays, the ethanol represents more than 50 percent of fuel used in Otto-cycle vehicle in Brazil (Abreu, 2007).

Beside the Proálcool, initiatives for diesel substitution were also proposed during the oil crisis in the beginning of the seventies. The vegetable oils production for fuel use program, the Pro-Óleo, was discontinued due to its economic infeasibility at that time.

The PNPB was launched by the Federal Government in late 2004 and initiated in 2005, when a regulatory law entered into force. The program involves fourteen ministries organized in an executive committee and have four main objectives (i) to structure the supply chain of biodiesel in Brazil; (ii) to produce biodiesel from different oil seeds (such as castor beans, cotton, peanuts, palm oil, sunflower seeds and soybeans) from the diverse regions of the country; (iii) to promote social inclusion and regional development in underdeveloped areas; and (iv) to support the production of a new source of oil supply at competitive prices (Zapata, 2010).

The diversity of oil crops available and the different oil extraction allows the implementation of biodiesel plants all over the country. On the other hand, this diversity increases the complexity of production chain and consequently the importance of analyzing the interrelations inside biodiesel production chains.

From the analysis of different biodiesel production chains in Brazil, the use of byproducts of oil extraction was identified as a key point for the success of any biodiesel project. This point

is directly related to the challenges of supply/price of oil for biodiesel industry and adequate income for family agriculture.

The flow of the main products and byproducts of biodiesel production chain, mainly the flow of vegetal oil/fat and the oil cake is shown below.

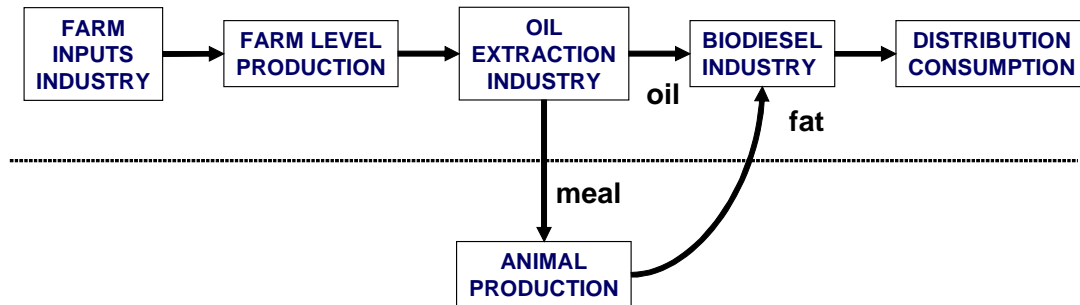


Figure 1. Biodiesel production chain

The oil cake represents more than half of the weight of oil crops and contains high content of protein. This by-product can be used to energy production. However, the high potential price that oil cake can achieve as feedstock is the main difference between the substitution programs of gasoline (Proálcool) and diesel (Biodiesel Program). The schedule below represents the potential impact of the biodiesel in the food supply. The impact on food supply depends on the trade-off between the competition of arable land (and inputs) and the increase of meal to produce animal protein. The existence of a captive market to the oil crops can, potentially, reduce the market risk and increase the supply of nutritional high value foods, like meat, hen eggs and cow milk.

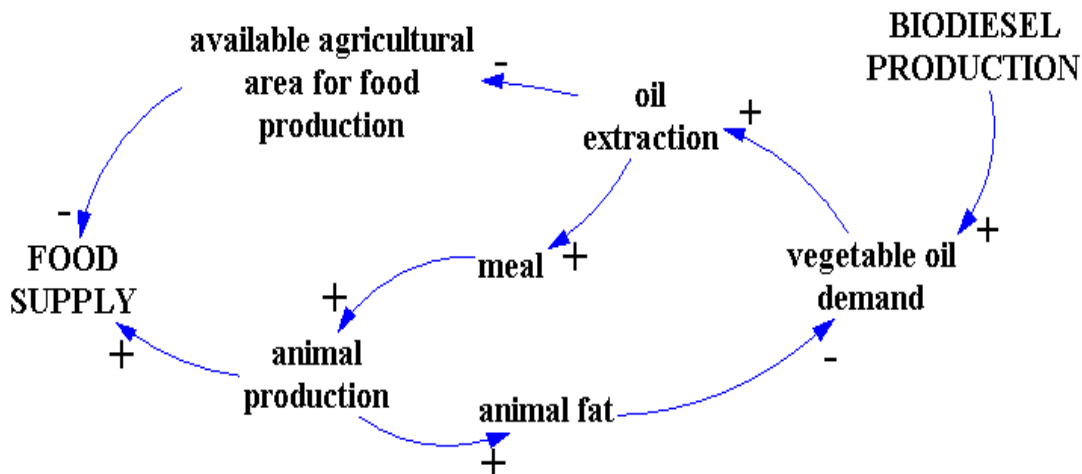


Figure 2. Potential impact of biodiesel production on food supply.

The oil cake sale can allow a vegetal oil price reduction, without compromising farmers' income, since they can be able to implement, through co-operatives, their own oil extraction plants. Coordination is the main critical element for agriculture production level and

extraction industry, and has a very strong potential to affect the competitiveness of the related production chains.

3 Social Fuel Seal

The Social Fuel Seal, created in 2005, is an instrument of the regulatory framework to promote social inclusion of small scale farmers (Brasil, 2009). The seal is a certification granted to biodiesel companies according to the requirements highlighted below. The seal allows to the biodiesel producers favorable financing schemes, tax exemptions and, especially, the right to participate in specific auctions organized by the ANP. The specific auctions for certified biodiesel producers represent 80 percent of the acquired volume. The seal is awarded by the Ministry of Agrarian Development.

The basic requirements of the social seal that have to be followed by the biodiesel producers are:

- Acquisition of a minimum percentage of raw material from small scale farmers. After a norm edited in February 2009, the biodiesel producers are allowed to add to the percentage its expenses on soil analysis, technical assistance, purchase of input and service utilized by the small scale farmers. The minimum amounts depend on Brazilian region, as can be seen in the table below.

Table 1.

Minimum amount of raw material and expenses that can be added to the percentage later, per region.

Region	Minimum amount	Percentage of expense that can be added
Northeast and Semi-arid region	30%	100%
Southeast and South	30%	50%
North	15%	100%
Mid-west	15%	50%

Source: BRASIL, 2009.

- Enter into contracts with small scale farmers. The negotiation of the contract's clauses has to be mediated by a recognized representative body (trade union, association or federation). Each participant has to obtain a contract copy.
- Ensure technical assistant to small scale farmers during all stages of agricultural production.
- Training the small scale farmer on oilseeds production techniques, which not affect the family food security and put in risk its finance situation.
- Stimulate the cultivation of oilseeds only in demarked area, or areas for which there are proved technical recommendations.

Besides the regulatory framework of the Social Fuel Seal, the Brazilian Ministry of Agrarian Development set up the project "Biodiesel Production Poles". The Poles aim to increase the number of small scale farmers in the PNPB, boost and strengthen the rural co-operatives and association, diversify the oilseed crops, and enhance and diversify the rural income.

The Poles are organized on a region or micro-region level, considering the similarities in terms of soil, climate and social conditions. They encompass the main organizations related to the agricultural production, e.g. municipalities, technical assistance services, biodiesel producers, public banks, non- governmental organizations, unions and researches bodies. In December 2010, there were 63 poles involving 1 091 Municipalities throughout Brazil.

In the following sections the contract between small scale soybean and biodiesel producers celebrated under the regulatory framework of the Social Fuel Seal is presented.

4 Contract Between Small Scale Farmers and Biodiesel Producers in Brazil

The mechanism of contract among farmers and agro-industry has been cited in the literature since the 19th century. Eaton and Shepherd (2001) proposed the following models:

- *Centralized*
 - Involves a centralized processor and/or packer buying from a large number of small farmers
 - Is used for tree crops, annual crops, poultry and/or dairy. Products often require a high degree of processing, such as tea or vegetables for canning or freezing
 - Is vertically coordinated, with quota allocation and tight quality control
 - Sponsors' involvement in production varies from minimal input provision to the opposite extreme where the sponsor takes control of most production aspects
- *Nucleus Estate*
 - Is a variation of the centralized model where the sponsor also manages a central estate or plantation
 - The central estate is frequently used to guarantee throughput for the processing plant, but is sometimes used only for research or breeding purposes
 - Is often used with resettlement or transmigration schemes
 - Involves a significant provision of material and management
- *Multipartite*
 - May involve a variety of organizations, frequently including statutory bodies
 - Can develop from the centralized or nucleus estate models, e.g. through the organization of farmers into cooperatives or the involvement of a financial institution
- *Informal*
 - Is characterized by individual entrepreneurs or small companies
 - Involves informal production contracts, usually on a seasonal basis
 - Often requires government support services such as research and extension
 - Involves greater risk of extra-contractual marketing
- *Intermediary*
 - Involves sponsor in subcontracting linkages with farmers to intermediaries
 - There is a danger that the sponsor loses control of production and quality as well as prices received by farmers

Under the Social Fuel Seal framework, the contracts between small scale farmers and biodiesel companies can be classified as a multipartite model, i.e. the participants are represented by the Government (Ministry of Agrarian Development), the recognized representative of the small scale farmers, the farmers itself or their co-operative and the industry.

5 Soybean and Castorbean Farmers

Soybean production in Brazil expanded rapidly in the early 1970s as a result of development program focusing on the savannah region of the country. Currently, Brazil is the second largest world producer, the second largest exporter of soybean meal and the third largest soybean oil exporter. Soybeans are a major source of foreign currency in the country, accounting to about 10 percent of exports value and for 1.4 million jobs. According to the Ministry of Agriculture, the cultivated area of soybeans in Brazil will increase from the current 23.5 million hectares to about 26.5 million hectares in 2018. In recent years, the soybean market has grown at a rate of 7 percent per year, driven mainly by the food industry and animal protein.

Soybean represents from 80 to 85 percent of the oilseed used in the Brazilian biodiesel production chain. Although the majority of the soybean producers in Brazil are classified as large-scale commercial farms, the 16 percent of producers classified as small scale farmers play a key role in the biodiesel program as the biodiesel companies have to rely on the soybean small scale farmers to meet the Social Fuel Seal requirements. Currently, soybeans account for 95 percent of total acquisition of oilseed from small scale farmers in the biodiesel industry.

As depicted in the following figure, 43 percent of 68 million ton of soybean production in Brazil is exported. The processed soybeans produce 25 million ton of meal and 6.5 million ton of vegetable oil. The main product of the soybean chain is the meal, used as feedstock in the production of poultry meat, pig meat, cattle meat, cow milk and hen eggs. The vegetable oil is a secondary product of the soybean chain and the impact of biodiesel industry in the cultivated area of soybean has to consider mainly the poultry and the pig meat market. Currently, 1.9 MT, or 30 percent, of soybean oil produced is used by the biodiesel industry (Abiove, 2010).

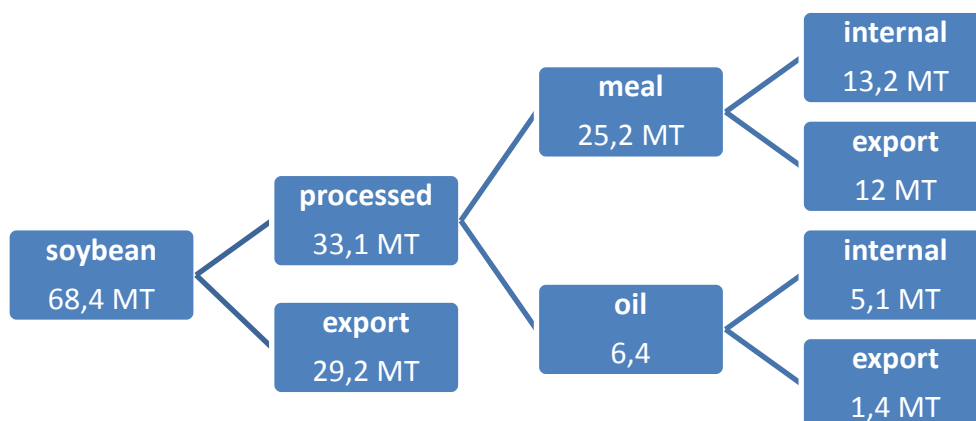


Figure 3. Soybean products in Brazil, 2009/2010. Source: Abiove, 2010.

In the North of Goiás province, biodiesel companies are pushing forward the soybean production with the participation of small scale farmers. 1 672 small scale farmers supplies oilseed (soybean) to the Biodiesel companies, following the contract scheme described in the next section. The COOPAFANA is one small co-operative, formed by rural settlers of agrarian reform in 2001, participating in the biodiesel program. The COOPAFANA can be taken as an example of inclusion of small scale farmers in the biodiesel program.

Several other oilseeds are being considered as source of vegetable oil to the Brazilian biodiesel program, including castor seed, oil palm, cotton seed and *Jatropha curcas*. The castor seed oil has raised great expectation in the early stages of the biodiesel program. Brazil has a long tradition in production of castor seed and was the main world producer in the seventies. Currently, the country ranks third in world production, right after India and China. The production concentrates in the semi arid region of Brazil, where the inclusion of small scale farmers is a priority to the Biodiesel Program.

To date, the expectation has not been fulfilled. The castor seed oil viscosity is a considerable drawback to production of biodiesel. Besides the industrial restrictions, the Brazilian production and productivity of castor seed has considerably decrease in the last three decades. The production has concentrated in Northeast of Brazil, where the farmers do not apply modern input, as seed and fertilizer, owing to lack of training, technical assistance and financial support. Although the failure of initial projects, the castor seed oil can play a direct or indirect role in the biodiesel program. The existence of a captive market for castor seed oil through the Social Fuel Seal, can drive the adoption of modern technology, improve the organization of the production chain and increase the income of small scale farmers by selling the oil crops to biodiesel or to the chemical industry.

6 Contracts Description

The clauses described below are examples of contracts, which follow the Social Fuel Seal basic requirements, between small scale farmers and biodiesel plants. The COOPAFANA contract was taken as base for the following discussion.

Identification of small farmers and sponsors

The sponsor has to provide general information such as address, the identification of a representative and the corporate taxpayer identification (CNPJ). The small farmers have to provide the address, the individual taxpayer identification (CPF) and a document qualifying the farmer for the Brazilian National Program for the Small Scale Farming Production (PRONAF). These document, know as DAF, is emitted by an official extension service or an small scale farm Union.

Trading volume and term in the contract farming

In this clause is defined the trading volume of raw material for biodiesel production, according Table 1.

The contract farming term begins before planting and should cover the entire period until merchandise delivery.

Price formation

This is the most important part of the contract farming. In it is set the price of the trading which will run until the expiration of the contract. There are several ways to stipulate the trading price. The Price Assurance for Small Farmers (PGPAF) is used in the majority of contract farming. Besides, is used the average price of the major markets in the region or market price product.

An important item is the price adjustment, which can be defined in different forms. The most common are: bonus payments per batch of small farmers, being paid by a fixed amount or a percentage of the price that will be practiced, and the movement of prices practiced by Chicago market (CBOT).

Delivery terms product

In the establishment of contracts, it is necessary to define the conditions of the product traded delivery. So, in this part, is defined the place of delivery and the product quality. According to the Ministry of Agriculture, the product must have: up to 14 percent of moisture, 1 percent of impurities, 8 percent of damaged, 6 percent of moldy, 4 percent of rot, 8 percent of green beans and 30 percent broken grains. In case of not fulfilling the criteria of quality, the product may be refused and the contract canceled.

Technical assistance

Technical assistance, by the company, is required by Ministry of Agrarian Development for concession of the Social Seal. So, it must be clearly specified in the contracts farming. Usually it is done in three parts:

1 – *Pre activities* - inclusion of small farmers in the project, through their associations and unions; survey of planting intentions, clarification about the contract with small farmers and the role of the technical team; formation of Groups of producing raw materials for Biodiesel.

2 – *Elaboration of technical and financing projects* - development of technical and financing projects specific to each small farmer.

3 - *Planting and Monitoring of Production* – purchase of inputs and services jointly, reducing production costs; training technicians and small farmers to utilize technology in the planting; production monitoring in all steps of production; meetings for the dissemination of best practices for planting and crop.

In addition, the company must perform a constant monitoring of the small farmers properties to prevent pests and diseases that affect the production and reduce the profit margins of the farmer.

Termination contracts

The contract may be terminated by small farmers or sponsors, regardless of notice, in the following cases:

- 1 - Insolvency, bankruptcy, disappearance, or judicial liquidation;
- 2 – Break of any term of the contract, for any participant;

3 - Non delivery or delay of products and lack of or late payment.

If there is any irregularity, in whole or in part of contracts, the agent will pay fines of 10 percent and interest of 1 percent per month calculated on the value of the negotiated contract.

Clauses related to price, quantity and provision of technical assistance, which are key variable to ensure the participation and the income of small scale farmers, are in general term defined by the Social Fuel Seal regulation.

7 Benefits

The biodiesel chain represents an interesting alternative of production for the small scale soybean farmers in northeastern Goiás State, and throughout the country. The existence of a formal agreement and a captive market reduces significantly the marketing risk associate to huge price fluctuation of staple food, as bean, rice and maize.

The Brazilian Biodiesel Program was designed to include small farmers in the biodiesel market through farming contracts. For this reason, the Federal Government created incentives for sponsors, such as tax exemption and exclusive participation in the exclusive auctions of the ANP (which represent 80 percent of total volume). In 2009, 27 companies producing biodiesel had the Social Fuel Seal, representing 60 percent of the companies in Brazil. In 2010, this percentage increased to 43 companies and, considering the installed capacity, the participation of the companies holding the seal in relation to total production is 90 percent.

The contract farming has enabled the increased participation of small farmers in the biodiesel market, generating rural employment increases. According to the Federal Government, from 2005 to 2010, the number of small farmers who sold to biodiesel companies increased from 16 thousand to 109 thousand (Table 2). Looking at the numbers of farmers involved per region, it is possible to note that the South and Northeast regions have the highest number of small farmers.

Table 2.
Number of small farmers supplying raw material for biodiesel companies, by region.

Region	2005	2006	2007	2008	2009	2010
Northeast	15.000	30.226	6.850	17.187	17.711	40.000
South	0	8.736	27.928	8.767	29.150	54.000
Southeast	914	7	55	27	1.457	6.000
Mid-west		1.441	1.690	1.662	2.550	6.000
North	414	185	223	215	179	3.000
Total	16.328	40.595	36.746	27.858	51.047	109.000

Source: Brasil, 2009.

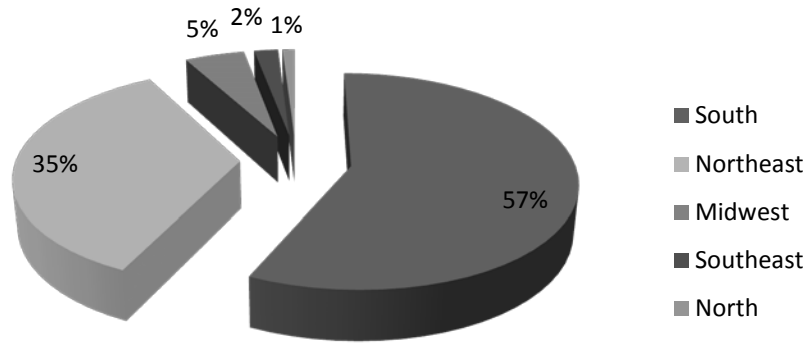


Figure 4. Participation of small farmers in the biodiesel market, in 2009, per region. Source: Brasil, 2011.

According to Figure 2, 35 percent of small farmers are located in the Northeast and 57 percent in the South. The two mentioned regions represent over 90 percent of small farmers who sold oil to biodiesel companies.

The use of contract farming improved the average annual income of small farmers. As shown in Figure 2, the average revenue per participating farmer PNPB increased from R\$1 690 per year per farmer in 2006 to R\$13 270 a year per farmer in 2009, an increase of 600 percent. Table 3 shows the evolution of average income per farmer by region. The Northeast region experienced the highest growth between 2008 and 2009, with an increase in average revenue per household of more than 400 percent.

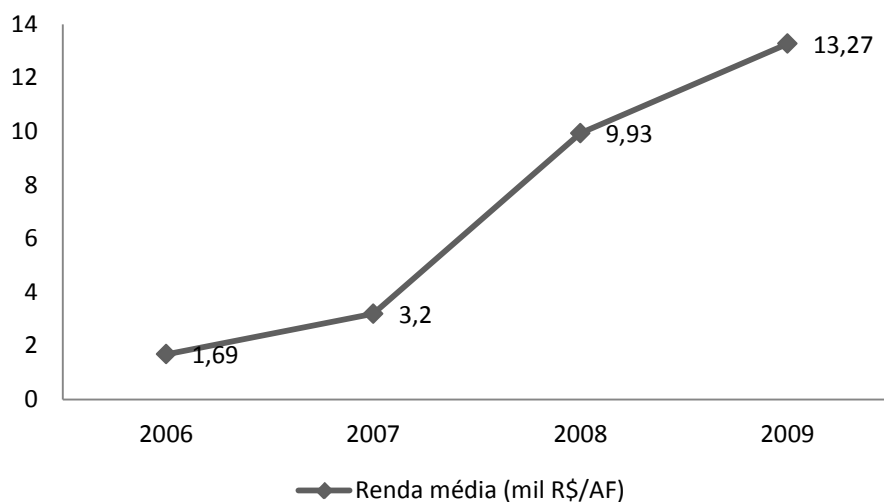


Figure 5. Evolution of the average annual income of small farmers, (thousand R\$/ farmer). Source: Brasil, 2011.

Table 3.
Variation of the average annual income per farmer, per region, from 2008 to 2009

Region	2008 (R\$)	2009 (R\$)	(%)
Northeast	271,83	1.506,15	454%
South	16.443,60	14.534,30	-12%
Southeast	147.463,38	14.965,65	-90%
Mid-west	72.970,65	79.491,06	9%
North	11.389,46	13.867,87	22%
Total	9.926,79	13.268,94	34%

Source: Brasil, 2011.

In addition, farming contracts have great benefits for small scale farmers and biodiesel producers. The farmers sell their output at fixed price and have technical assistance provided at no cost. Additionally, there is the possibility of cultivating intercropped crops, combining the production of oilseeds to produce food for subsistence. Industrial producers of biodiesel can devote resources to attract staff and to improve the productivity of area, having this expenditure as part of its acquisition of raw materials. There are cases where the biodiesel industry, in addition of providing technical assistance, finance family farms, with the advance of seeds, machinery. A bonus for oil seed from small scale farmers has spread throughout the country, represent an important increment in the rural income.

Currency amounts spent on the purchase of raw materials have grown significantly. While in 2006 were spent R\$69 million on acquisitions of family farming, in 2010, that figure exceeded R\$950 million.

8 External Factors

A negative factor for farming contracts of soybeans and other oil seed for biodiesel is the State bureaucracy linked to this sector. To participate in the PNPB, the company needs the Social Seal. To issue the stamp, it is necessary to send multiple documents to a responsible agency, which establishes a deadline of two months for examination and investigation.

After this period, if there is any irregularity on the part of the company, the recommendations and a document resubmission are made. After this process, the institution establishes a new deadline of two months to analyze the modifications of the requirements. This procedure to obtain the seal can be costly and time consuming, which impacts negatively on the establishment of farming contracts.

9 Conclusions

The Brazilian Program for Production and Use of Biodiesel, in only five year, has obtained positive results. Although the inclusion of 109 thousand small scale farmers represents a small percentage, having in mind the total number of small scale farmers in Brazil (4,5 million), it is a very expressive figure comparing with 40 thousand sugar cane producers involvd in the 40 years old ethanol program.

The main challenge of the PNPB is to increase the number of small scale farmers, especially in the Northeast and North regions of Brazil. Another challenge is to diversify the source of raw material, as around 85 percent came from soybean, 10 percent from animal fat and less than 5 percent from other sources. In the semi-arid region (northeastern Brazil), the biodiesel companies enter into contract with castor seed producers, although for these biodiesel companies the soybean oil from other regions is still the main, and sometimes, the unique raw material. The reason is the reliability of supply of soybean, as the soybean chain is well organized.

The Social Fuel Seal is a critical factor for the positive results obtained by the program. The creation of a captive market for the small scale farmers occurs under a regulatory framework, which demands a mediated agreement (multipartite model) between farmers and the industry. The social fuel seal requiring the formalization of a contract can be an important factor helping to organize the oil seed production chain, as the coordination of the production chain, including also the by-products, is a key factor. Contracting farming will continue to be an indispensable and demanding tool for biodiesel producers and small scale farmer organizations.

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