

Potentials and limits to generate employment and income by the National Programme for Production and Use of Biodiesel

Potencialidades e limites na geração de ocupação e renda no Programa Nacional de Produção e Uso de Biodiesel - PNPB

ABSTRACT

This study analyses the National Programme for Production and Use of Biodiesel launched by the Brazil Federal Government in 2005 as a public policy to generate sustainable employment and income within the context of development of new alternative sources of energy. It also verifies the impact of PNPB on occupation and income rate of farmers participating in the projects of production of biodiesel through field research carried out on 93 family farms participating in projects already implemented in the State of Goiás. The choice of producers was made at random from a list of all producers who had already gone through a complete cycle of production and stretched across 33 municipalities in the second half of 2007. The survey data was obtained through a closed-ended questionnaire which was designed to ascertain: 1) the increase of occupation and income regarding producers participating in the projects, 2) ways of including these farmers into the programme, 3) technical assistance offered to them (according to the guidelines of the programme) and 4) the evaluation of the programme by participating farmers. The SPSS software was used for processing and data analysis. The results show that most of the objectives of the programme, such as generation of occupation and income by family farming, are being achieved.

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RESUMO

O presente trabalho analisa o Programa Nacional de Produção e Uso de Biodiesel, lançado pelo Governo Federal em 2005 como uma política pública sustentável de geração de ocupação e renda, e inserido em um contexto de desenvolvimento de novas fontes de energia. Verifica os reflexos do PNPB na renda e na taxa de ocupação dos agricultores familiares que participam dos projetos de produção de biodiesel, através de uma pesquisa de campo feita com 93 produtores familiares participantes dos projetos já implantados no Estado de Goiás. A escolha dos produtores foi feita aleatoriamente em uma relação de todos os produtores que já tinham passado por um ciclo completo de produção em um total de 33 municípios no segundo semestre de 2007. O levantamento dos dados foi feito através de questionário fechado pelo qual se pretendia conhecer: 1) aumento de ocupação e renda para os produtores inseridos nos projetos; 2) a forma de inserção desses agricultores familiares no Programa; 3) a assistência técnica oferecida aos mesmos (segundo as diretrizes do Programa) e 4) a avaliação do Programa pelos agricultores participantes. Utilizou-se o software SPSS para o processamento e a análise dos dados. Os resultados mostram que grande parte dos objetivos do Programa, como a geração de ocupação e renda para a agricultura familiar, estão sendo alcançados.

Palavras-chave: biocombustíveis; biodiesel; agricultura familiar; política pública.

Key words: biofuels; biodiesel; family farm; public policy.

1 INTRODUCTION

A new energy cycle is starting. The concern that the oil reserves could run out in the next 30 or 40 years and several studies published about global warming force the country into a race against time in search for new renewable and inexhaustible energy sources. At present, the main alternative sources of energy are - on a smaller or larger scale - solar, wind, hydroelectric, biomass, biogas, fuel cells and biofuels (BARKER et al., 2007, UNITED NATIONS, 2007).

Currently, Brazil can be considered a privileged country in terms of opportunity to exploit these new sources and economic events of the past contributed to the development of this sector in the country. Recently, we have seen the development and launch of PNPB by the Brazilian government, which follows the global trend of reducing dependence on petroleum fuels and the consequent increase of these new sources in the country's green energy matrix (Brazil, 2005a).

The PNPB is a public policy which seeks the integration and strengthening of Brazilian family farming

which becomes part of the biodiesel production process (ABRAMOVAY & MAGALHÃES, 2007). For this, the government developed instruments with the guidelines of the programme to address this challenge. The main instrument is the Social Fuel Seal (SFS), which offers industrial producers who obtain it, tax benefits and opportunities for sale of biodiesel through public auctions conducted by the National Agency of Petroleum, Natural Gas and Biofuels (ANP). In addition to that the government offers special conditions of funding offered by the National Bank of Economic and Social Development (BNDES), if SFS holders purchase raw material from family farmers, establish contracts with estimated income, timelines and guarantees of technical assistance and training. This way, the government involves the private sector in its policy of rural development with the objective of distributing the income to be generated in the emerging market to family farms (BRASIL, 2005a).

Thus, the benefits generated by the production and use of biodiesel go beyond the savings on imports of diesel oil and earnings from its export. Besides the environmental preservation, one of the PNPB's guidelines is the generation of employment and income in the rural area as well as benefiting and including small family farms into the Brazilian agribusiness in a sustainable way. The government's objective is to make small farms, which represent 85% of total agricultural establishments (IBGE, 1996), major suppliers of raw material for production of biodiesel.

In principle, the PNPB is an alternative for thousands of families living in precarious conditions on farms, excluded from any agricultural production chains. What should be examined, however, is this programme's ability to generate wealth in the form of sustainable, socially just and economically viable way.

Therefore, this study aims to evaluate the National Programme for Production and Use of Biodiesel as a public policy to generate employment and income expected to be achieved with the inclusion of family farms into the production chain of biofuels, especially of biodiesel. Thus, we tried to check its impact on income and employment rate of farmers participating in the projects of production of biodiesel in the State of Goiás.

We begin with a theoretical review and a discussion of the involved issues: family farming and public policies in the rural area in Brazil as well as an explanation of biofuels and PNPB. Then we present the methodology used in research and further we present the obtained results. Finally some considerations are made about the impact of PNPB on family farming.

2 FAMILY FARMING IN BRAZIL

The inclusion of family farming into the production chain of biodiesel is one of the goals of PNPB launched by the Federal Government in 2005. The government believes that tax incentives combined with lines of funding devoted to the small farmer could revolutionize the current situation in the country, generate employment, income, local development and get thousands of farmers out of poverty (LIMA, 2004).

Because of its peculiar characteristics, the definition of a family farm generates some discussion in academia. But in this work, the definition is the one adopted by INCRA / FAO (2000) according to which in such establishments: a) work is carried out by the producer, b) the family work is superior to hired work c) the income of the family comes predominantly from rural property. The family production model is also characterized by diversified production, concern about the sustainability of resources, quality of life, supplementing the income with employment and others. At the other extreme is an *entrepreneurial* model, identified by more centralized organization, complete separation of management from labor, specialized and standardized production, predominance of employment etc. These models also in different ways affect the organization of economic and social environment in which they are embedded. Studies of the FAO / INCRA, 1994 and 1996, show that the *entrepreneurial* model favors the concentration of income and social exclusion in addition to employing a limited number of residents, while the family model leads to greater sociocultural equality because of better income distribution. It is for these and other reasons that the federal government has restructured and invested in policies that benefit the family farm (BROSE, 1999; VEIGA et al., 2001).

The figures of the Agriculture Census of 1995-1996, which are not different from the 2006 Census, later collected and analyzed in the *Novo Retrato da Agricultura Familiar – O Brasil Redescoberto* (INCRA / FAO, 2000), confirm the importance of this segment in the Brazilian agriculture. The country has approximately 4,139,369 family-run establishments, occupying an area of 107.7 million ha and producing 18.1 billion (BRL – Brazilian reals). In other words, these numbers mean 85% of all establishments, 30% of the total area and nearly 38% of the gross value of production (GVP).

According to Buainain et al. (2003) the insertion of small family properties into selected productive chains guarantees their sustainability because a large number of

establishments do not exceed five hectares, what hampers sustainable management of rural properties. Moreover, the other half of the producers, whose production is for consumption, is little or completely not integrated. According to Silva and Corrêa (2005), these less integrated farmers were 'eliminated from the process of modernization and had no access to credit system', or in other words, the relationship they had in the past with their local markets or at temporarily offered work decreased significantly because of low investment in production. This exclusion occurred as a function of mechanization of production and increased market demand for supply of more uniform products. The lack of public policies targeting this marginalised group of farmers increased their exclusion from the economic system.

The social and economic omission faced by many farmers has led them to search for non-agrarian sources of income. An increasing number of people living in rural areas dedicate their work to other activities classified as non-agricultural or rural non-agricultural (ORNA - ocupações rurais não-agrícolas), such as hodman, caretakers, drivers, maids etc. Still, it is of fundamental importance to discuss how to improve the situation of thousands of farmers on a sustainable basis, not only with short-term emergency measures, but with public policies that facilitate the integration of these producers in a way which is socially fair and economically viable. Thus, policies that allow the maintenance and creation of jobs are needed. They ought to promote new economic activities, pluriactivity in family agriculture, stability of family income, preservation of the environment, active participation of people in decision-making processes in their economic areas and new forms of public management etc. (BROSE, 1999. SACHS, 2004; VEIGA, 2005, SEN, 1999). According to the authors, the concept of development goes beyond economic growth; it includes other factors such as access to: formal education, opportunities for training, professional specialization, a less degraded environment and others.

One of the factors related to local development based on family farming is a form of state intervention in public policy. Throughout modern history of the development of agriculture, public institutions were present, but it was only from the 90s that these institutions started to seek reduction of inequalities and services which could improve the quality of life of families in various rural areas in Brazil (MAGALHÃES & BITTENCOURT, 1997).

It is precisely at that time, 1996, when the National Programme for Strengthening Family Agriculture (PRONAF) emerged. Its main objective is to promote a

sustainable development of family farms, increase their productive capacity, generate employment and income, and, by doing so, provide the quality of life of producers (MAGALHÃES et al., 2005). In other words, the PRONAF can be seen as a point of detachment from the former Brazilian agriculture policy which frequently supported medium and large properties by offering credits, benefits, exemptions and subsidies.

In general, the PRONAF consists of four basic elements: (a) lines of special credit, lower interest rates and fewer guarantees required by banks, (b) financing investments in economic infrastructure to support the farmers, (c) technical assistance of beneficiaries, (d) opportunities for professional training.

According to Abramovay and Veiga (1999), the existence of a credit policy aimed at family farming is a consequence of the phenomenon known as *market failure* (author's emphasis). It takes place when two basic factors inhibit the positive contribution of this sector to generate employment and income on farm: the lack of appropriate infrastructure to raise the value of labour and the barriers imposed by the banking sector in this segment where possessing few capital assets prevents small farmers from offering the required guarantees and as a consequence from being part of their regular clientele.

Considering the role of the state at different levels and the importance of farmers' participation in resource management of their environment, Veiga (2001) and Schneider (2004) support rural development based on strengthening family agriculture, incentives for local entrepreneurship and development of other activities related to the rural economy. This vision of the most dynamic and organic process of rural development would result in growth, poverty reduction, socio-economic inclusion and conservation of the environment (GRAZIANO, 2001; Passador, 2006).

Knowing the important role of family farming in the Brazilian economy and the observed changes in public policies aimed at socioeconomic development of this segment give a better understanding of the environment on which the PNPB is being built. This framework helps to understand the objective of this study which is analysis of the impacts of the programme on improving lives on a small family farm.

3 BIODIESELAND PNPB

Biodiesel is a fuel derived from biomass, which is renewable, biodegradable, which can replace all or part of the mineral diesel oil in compression ignition engines. The

first studies on biodiesel in Brazil, led by Professor Expedito José de Sá Parente, took place in the 1980s and resulted in the first world patent of biodiesel and kerosene-type jet fuel (LIMA, 2004).

The most common raw materials for the production of biodiesel come from oleaginous plants, such as soybeans, sunflower, peanuts, cotton, palm, babassu, jatropha, peanuts, castor and others. Animal fats (beef tallow) or oil and grease waste from cafeterias, industrial or residential kitchens can also be used.

In the current context of global warming, biodiesel as an ecologically correct alternative to replace one of the main culprits of global warming: the burning of fossil fuels. In European countries, biodiesel has been produced and used since the 90s. According to the European Economic Community in 1998 500 thousand tonnes of biodiesel were produced, while in 2002 this number rose to 1.06 million tonnes - more than doubling the production over four years. The 30 Directive of the European Parliament, May 2003, sets a target for the member countries to replace 5.75% of fuel used in transport by biofuels and by 2020 around 20% of all fuel used by alternative sources (biofuels, natural gas, hydrogen and others) (IEA, 2004). These percentages were ratified by the same forum at the end of 2008. In order to achieve the objectives, there are incentives which come in the form of tax exemptions to biofuels what should make it more competitive on the fuel market.

In Americas, the production of biodiesel in the United States is worth highlighting. The programme of US biodiesel is based on small farms, where soybean is used as the main raw material. In an attempt to reduce its heavy dependence on oil as an energy source, the US government has encouraged research, production and consumption of biomass fuels such as biodiesel and ethanol. According to Lima (2004), the biodiesel production capacity on US soil is between 210 and 208 million litres per year.

In general, climate change, social pressures and high oil prices led many countries to define strategic plans for the production of alternative energy. Italy, Argentina, Malaysia, Japan, Australia, India, among others, have defined their goals of replacing fossil fuel by renewable energy sources, which indicates the potential of this market in the future. Despite recent falls in oil prices, virtually all countries maintain their incentives for the production, marketing or use of this fuel.

Encouragement to produce biodiesel in Brazil on an industrial scale came in the form of creation of the federal government's National Programme for Production and Use of Biodiesel (PNPB). In addition to lining up with the

worldwide trend of investments in alternative energy sources, the programme aims to explore the Brazilian potential in this sector and promote the social inclusion of a family farm. Favourable climatic conditions (high temperatures, regularity of rainfall), the diversity of raw materials, cutting-edge technology to produce plant-derived fuels provide a greater potential for renewable energy production in the country. Not surprisingly, the Brazilian energy matrix is considered one of the cleanest in the world. In 2003, approximately 35.9% of energy in Brazil came from renewable sources, while in the world that does not exceed 13.5% (IEA, 2004). In 2005, the share of renewable energy in the Brazilian energy matrix reached 44.7%.

To meet demand, the National Programme for Production and Use of Biodiesel is based on exploitation of Brazilian biodiversity and the potential existing in family farming. There are many options for production of biodiesel in Brazil, such as palm and babassu in the north; soybeans, sunflower and peanuts in the southern and south-eastern regions and in central-west regions castor and jatropha. These crops are adapted to semi-arid regions and may also be adjusted and presented as an alternative to other regions in the country.

The commercial production of biodiesel is recent in the country. Only 12 production plants were approved and in operation in 2008. There was a significant yield increase from 2005 to 2007, when only in the month of January 2007, 10.87% of all fuel produced in the previous year was made. However, new production plants are constantly being opened and with it the demand for raw materials and opportunities for small family farms have increased. However, the success of PNPB lies in the competitiveness of biodiesel with mineral diesel oil. That is why it is necessary to create a policy of tariff exemptions and government subsidies until the market reaches balance. Costs should be reduced with increase of production and know-how. Some actions have been taken by the federal government, both regarding the reduction of taxes to encourage the purchase of raw materials from family farms and to encourage producers to sell biodiesel at a more affordable price.

Tax exemption is one of the forms used by the federal government to encourage producers of biodiesel to buy part of their raw material from family farms. Besides the economic benefits resulting from lower taxation, the producer of biodiesel who promotes social inclusion and regional development will receive the Social Fuel Seal granted by the Ministry of Agrarian Development (MDA).

The guidelines for granting the Seal to production projects of vegetable oil are in the Normative Instruction

No 01 and No 02 of the MDA, released in July and September 2005 respectively. One of the points defined in the documents states the minimum percentage of purchases of raw material from family farms used by the producer of the fuel, namely 50% for the Northeast and Semi-arid, 30% for South and Southeast regions, and 10 % for the North and the Midwest. Also, the producer of biodiesel holding the seal has the obligation to honour prior contracts with all family farmers or their agricultural cooperatives specifying the commercial terms of business (time, value of purchase, conditions of delivery of raw materials etc.) and also provide technical assistance and training to all rural families producing the oil.

On the other hand, the federal government provides some benefits to producers holding the Social Fuel Seal, as reductions in federal taxes (PIS / PASEP and COFINS), facilitation in obtaining credit from the BNDES or its affiliated institutions as BASA (Bank of the Amazon), BNB (Bank of Northeast Brazil) and BB (Bank of the Brazil).

The granting of exemptions and tax stamps contribute to the sustainability of the Programme of Production and Use of Biodiesel in the whole national territory. It promotes the inclusion of small farmers into the market for biofuels, more equitable way of distributing the income and encouraging the exportation of Brazilian biodiversity.

The National Programme for Production and Use of Biodiesel (PNPB) is hence a public policy for rural development based on the inclusion of family farming, making it part of a major strategic project for development of alternative sources of energy, particularly biofuels.

Therefore, we can say that the PNPB is an attempt by the federal government to meet the new demand for policy development and integration of farmers, especially family farming that plays a key role in the economic, social and environmental areas. Many authors are unanimous in saying that the basis for rural development lies precisely in family farming because of its ability to generate income and employment in rural areas, high productivity and assiduity towards the environment. To Abramovay (1998, 1999) family units should have access to basic services in order to monitor the dynamics of the market, competition and constant technological improvement and thus strengthen the basis for development. Another point highlighted by the author is the construction of new markets for products or services generated in the countryside - similar to what is happening with the growth of demand for raw materials for production of clean and renewable energy - which depends greatly on the organization of producers and support of social movements and public power.

4 METHODOLOGY

To analyze changes in the pattern of income and employment of the producers participating in PNPB in the state of Goiás, qualitative and quantitative in nature research was conducted, seeking thereby to find measurable evidence to justify these changes.

The population on which the research was conducted are farmers included into the PNPB Goiás and had completed at least one production cycle. Thus, 807 producers were considered. The procedure for selecting the sample was conducted through simple random sampling and came down to 132 producers what means that 14.8% of the total participants of the project met the requirements of the research. This calculation found 8% of error and confidence interval of 95%. During conducting the research only 93 producers were found, who resided in 33 municipalities which have been analyzed.

The choice by the state of Goiás to implement the research is justified by the number of companies that have the Social Fuel Seal, the lowest number of producers involved in the projects. In the Midwest region the minimum percentage of farmers in each project is 10%, while in other regions this percentage is much higher (BRASIL, 2005a). Thus, it is expected that there is greater uniformity of subjects participating in research, not only in relation to the criteria set out in legislation, but also the reality of economic and social conditions of producers.

The data collection instrument was pre-tested closed-ended questionnaire, subsequently applied in the period of September-November 2007. The basis of the information was the season 2006/2007.

The data from this study were analyzed using the SPSS statistical software for statistical analysis of each variable and the relationship between some selected ones for an improved analysis.

The analysis sought to find the correlation between: income and employment with an area of similar size on which oleaginous plants are cultivated for biodiesel, type of oil produced, frequency of technical assistance and assessment of the program.

For these tests, five groups of variables related to the objectives of our research have been established, each containing a number of elements, all components of the questionnaire of this research. They were: the researched producer profile, insertion of the family producer into PNPB, income and employment of the producer in the program; PNPB technical assistance and an assessment of the program made by the farmers.

5 RESULTS AND DISCUSSION

5.1 Income

We tried to measure the level of variation in income and employment of producers included in PNPB. The adopted criterion was the income reported by the producers which came from his activities, in addition to other activities that were being developed, according to the signed contract to supply raw material for biodiesel.

We adopted the response of the producer as a criterion for measuring his income before and after entering the PNPB. Chart 1 shows the annual average income obtained prior to the program and the percentage of producers involved in each activity, according to them.

As we can see, the highest values reported by producers in the composition of family income came from production of soybean, cotton, corn, beans and milk. However, the significant presence of family farmers is indeed in production of soybeans, corn, livestock and milk (GOIÁS, 2003). Although the production of soybeans provides the highest average income, it also has the highest

costs and requires larger areas, what does not allow the producers to solely concentrate on this monoculture.

Livestock and milk production, which has a much lower value, is present in more than half of the properties surveyed. The system of production with the participation of livestock breeding and milk production was also discussed by Guanzirolí et al. (2001) as one of the most important in the Midwest region and consequently for the State of Goiás.

We also found that the weighted average annual income, calculated for all crops shown in Chart 1 was BRL 24,630.00 or US \$ 2,052.50 monthly. By a previously used measure on area of 67.99 hectares, the farmers earned BRL 362.26 per hectare.

The producers were also required to inform their estimated family income, before entering the program. In Table 1, one can observe the data at this point of research.

As we can see, therefore, that of 65.6% of producers who reported the values of household income, 42.62% have family income of up to ten thousand BRL annually and 60.66% have up to 20 thousand. Those who obtain between 50 and 100 thousand are only 6.56%, which demonstrates that there is a major difference of income

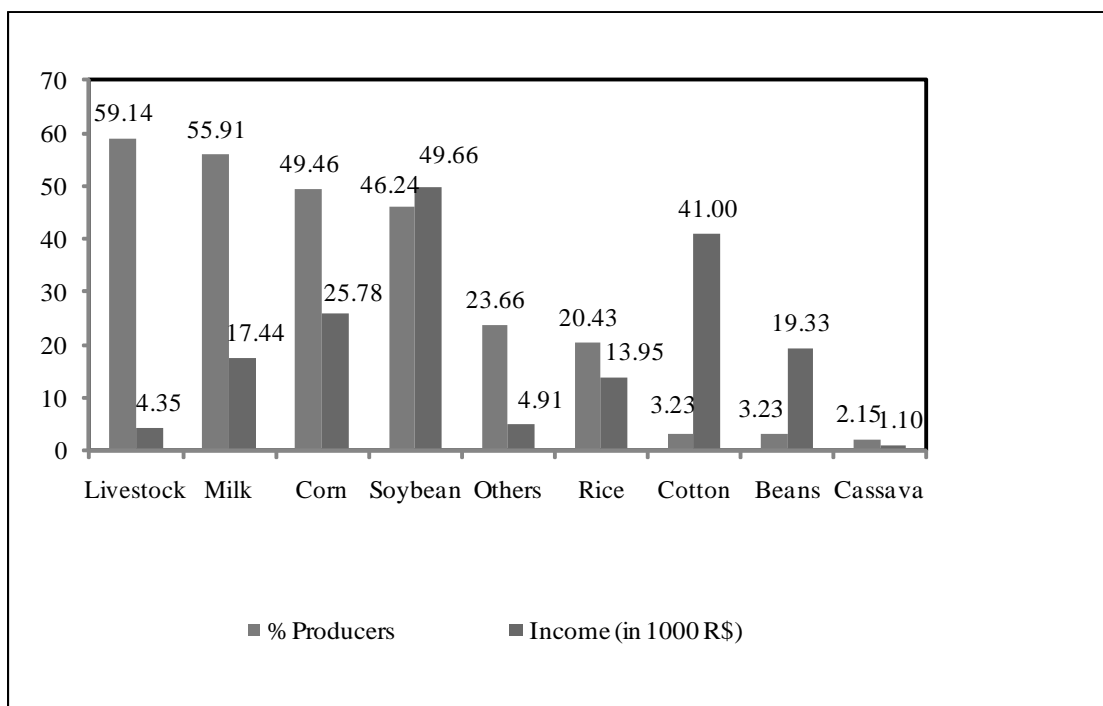


CHART 1 – Income and participation of producers in each activity.

Source: field research (2007).

among the family farms in Goiás (GUANZIROLI et al., 2001; ABRAMOVAY and VEIGA, 1999).

Another set measure is the average yield per hectare from the average area informed by producers. The data obtained showed that the producers produce on average on 67.99 hectares, the equivalent, in our study, of BRL 307.11 per hectare on average. Thus, there is a decrease from 362.26 / ha of previously performed calculations based on the participation of each crop in family income, to 307.11 / ha when the information was given directly by producers.

Regarding changes in activities after entering PNPB, only 60% of producers said to have other activities. This change in the structure of production of these producers is justified because part of their area was intended for the production of soybean and castor for biodiesel, which for them often seemed more profitable. Consequently, it was found that the area devoted to other agricultural activities had a reduction of 77.11% over the previous size of 67.99 ha.

In relation to the area used for production of biodiesel, Table 2 shows the distribution of these areas, for all the surveyed producers.

Almost 30% of producers who use up to 5 hectares for the production of biodiesel cultivate castor as the dominant crop, since it is not grown in the Midwest region (Brazil, 2007). It is also known that the soybean crop is not suitable or economically feasible on small areas, so the producers of soybeans are more concentrated in areas that are between 20 and 100 hectares, adding up to more than 50% of surveyed producers. This makes the average area destined for biodiesel considerably large when it comes to family farms, 42.16 ha.

It may be noted that there is a division of areas between those contracted to produce only raw material for biodiesel and those for other crops. This opting of farmers, whose specialization in the production of soy may occur because of interest from companies, is a contrary movement to what is happening with the crops destined for biodiesel. Table 3 shows the presence of other crops in the examined properties.

As the producers could indicate more than one activity in their response, we could not add neither the number of producers nor the corresponding percentage. It should also be noted that only 6.45% of producers have castor in the composition of their income, although the sample in this research registered nearly 30% of producers producing castor, which means that most of the producers received no income from this activity in first production cycle. Reduction, in all activities, of the number of

producers when compared to the previous chart may be also noted, with the obvious exception of castor which is cultivated by 6.45% of the producers, what did not exist previously. By the same token, the number of soybean producers increased and now stands at 65.59% compared to 46.24% previously.

The largest reduction occurred in corn, with a negative variation of 55.74%. Because corn and soybean crops are two major areas that require the producer to sign contract to produce soybeans, the producer would have to reduce the maize area or increase the production area. The percentage of cattle and milk decreased on a smaller scale, which is also justified by activities that are, in part, dependant on maize for their production (GUANZIROLI et al., 2001). Therefore, there is consistency in the data presented above *vis-à-vis* the previous period which precedes the presence of the contracts within the rules of PNPB. Producers were also requested to inform the participation in each type of production in the composition of their income, and the obtained data are shown in Chart 2 below.

From Chart 2 we can see that the soybean, corn, milk and rice are the most important activities both in terms of income and the presence of family farms, as discussed in Table 3. It may be observed that there was no change in the structure of production units. Regarding production, the PNPB contracts, meanwhile, have caused little change, because the soybean crop was already a part of the activities performed by producers, and castor is also insignificant. Moreover, one can understand that this may be good for producers, as they continue to produce crops with which they have experience.

This may also mean that most producers are not changing the business, except for those producing castor, even on small areas. A complete shift of crops with which they are accustomed could pose a major risk for the farmers and contracting firms, which justifies the decision to produce soybeans and some castor on small areas.

Regarding the cultivated area, it can be observed that there was a small change. Producers slightly increased the area, somewhere around 20%. On average, to produce 42 ha of crops for biodiesel, they had to reduce the area destined for other activities. This demonstrates another characteristic of the family farm – there is not available land for expansion. They explore their land intensively and, to produce a crop for biodiesel, they lack area to conduct other activities (GUANZIROLI et al., 2001).

Thus, the producers did not see in activities related to biodiesel an only alternative to increase their income, a

TABLE 1 – Income presented by farmers.

Previous income as informed – (in reais)	N°	%
100 – 1,000	8	13.11
1,001 – 10,000	18	29.51
10,001 – 20,000	11	18.04
20,001 – 30,000	6	9.83
30,001 – 40,000	9	14.76
40,001 – 50,000	5	9.18
50,001 – 100,000	4	6.56
Total	61	100.0
Weighted average annual income (in reais)	20,880.00	

Source: field research (2007).

TABLE 2 – Area occupied by biodiesel crops (in ha).

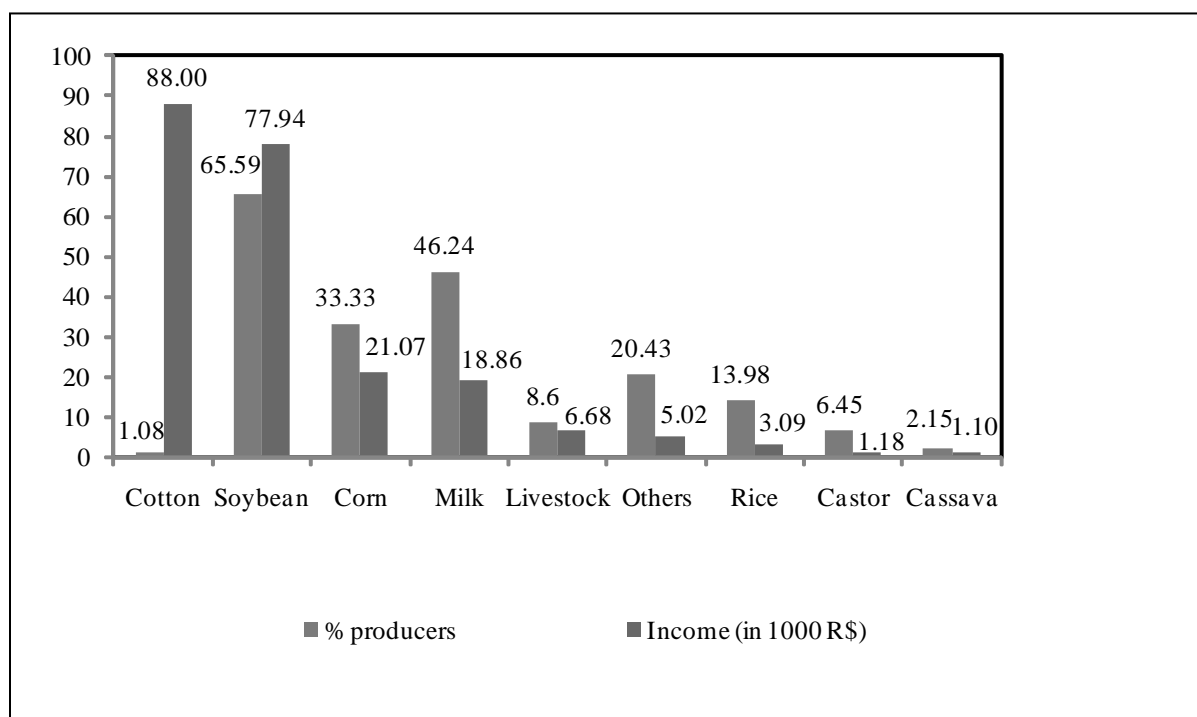
Area used for biodiesel	N°	%
0,5 - 5 ha	26	29.55
6 - 10 ha	3	3.40
11 – 20 ha	8	9.10
21 – 50 ha	25	28.40
51 – 100 ha	20	22.73
More than 100 ha	6	6.82
Total	88	100.0
Average area used for biodiesel (in ha)	42.16	

Source: field research (2007).

TABLE 3 – Main activities that make up the income of surveyed farmers

Present activity	N°	%
Animals	48	51.61
Milk	48	51.61
Corn	31	33.33
Soybeans	61	65.59
Rice	13	13.98
Castor	6	6.45
Sorghum	6	6.45
Cotton	1	1.08
Cassava	2	2.15
Other activities	19	20.43

Source: field research (2007).

**CHART 2** – Producers' income and their participation in each activity

Source: field research (2007)

decision that shows that producers prefer to diversify their activities rather than to concentrate on a single source of income. Therefore, biodiesel represents an alternative source of income for family farmers. This aspect differs the integration of family farms into the biodiesel market from other traditional sectors (BELIK; PAULILLO, 2001, DIAS, 2004).

For an analysis of the income of producers, we calculated the weighted average annual income for all surveyed producers who responded to questions about income. The obtained result is BRL 35,350.00 or BRL 2,945.33 monthly. When related to land we found the amount of BRL 435,29 / ha, a positive variation of 20.16% over the previous amount of BRL 362.26 / ha. To confirm that the producers' income increased, the *Wilcoxon* test of statistical significance was done (MARTINS, 2006), using for that the SPSS software (HAIR et al., 2005). Total income before entering the programme was compared with total income after the first revenue within the programme. The performed and presented test in Table 4 validates the calculations.

There was a separate analysis of the total income of producers related to soybeans and castor where a significant difference between these two groups was found. The producers of castor had already had lower income from producers of soybeans and the situation remained equal after signing the contract for the production of castor. This fact shows that they are small producers, probably, settled by the Land Reform, who in this research represent almost 30% of all participants.

For a more focused on production for biodiesel analysis, data regarding the volume of production (in bags) delivered to the manufacturer of biodiesel, the unit values (BRL / bag) and cost of production was gathered from the producers. There was then a calculation of net income gained by the producers from the two crops grown for biodiesel. The calculated values are in Table 5.

From the analysis of table 5, it appears that the net income obtained from the crops produced for biodiesel varies from BRL 243.00 for 15.6% of producers, to BRL 58,715.00 for 6.2% of producers, which shows the distance between those who gained more and those who earned less. By using cross analysis, we concluded that the type of crop that leads to lower net income is the castor, which confirms data already presented.

Based on the analysis, we can therefore come to conclusion that there are two distinct groups of PNPB producers in Goiás: well structured from the economic point of view, producing soybeans, and other more economically weak, producing castor.

This major distinction between the family farms who are entering PNPB in Goiás may contribute to the distortion of one of the main objectives of the Programme, which is to produce biodiesel in a technically and economically sustainable manner, thus promoting social inclusion through the generation of employment and income for family farms (MARTEL, TRENTO, 2004, BRAZIL, 2006; RATHMANN et al., 2005; Bonomo, 2004 apud PENTEADO, 2005).

5.2 Employment

We also tried to calculate the change in level of employment on family farms, and the data are presented in table 6.

Table 6 shows that half of family farmers hired labour temporarily. It is understood that permanent hiring by farmers did not occur, which is not a common feature of a family farm (GUANZIROLI et al., 2001; VEIGA et al., 2001; SACHS, 2004). The most common type of crop for biodiesel – soybeans - is a temporary crop and castor is still cultivated on small areas, as already presented in this study.

For a better understanding of the employment issue, the following table 7 shows a distribution of the average number of persons hired by the family farmers.

What can be seen in table 7 is that of the 49.46% who hired labour during the harvest, the highest frequency of 54.35% had hiring one person. The hiring of up to two people occurred in 80.44% of cases. The average was 1.72 of hired per producer. Thus, it may be concluded that there was a positive aspect in relation to employment, with half of the producers hiring labour, even if temporarily, to assist them in their activities.

Guanziroli et al. (2001) also noted that, eventually, the family farm uses hired labour in its activities. As one of the goals of PNPB is to promote employment (BRASIL, 2005a), the Programme is reaching this goal. In Goiás, half of the farmers hired workers to complement their activities because family labour was not enough. It was determined that 65.59% of the producers hired services of third parties to complement their activities, with emphasis on the services of preparing the soil, harvest, storage and technical services.

Based on information on employment and income, it appears that there was a positive reflection on income and employment of family farms. This, however, does not necessarily guarantee that the situation will remain. Economic sustainability of family farms may not be secured, because, as already discussed, the production of raw material for biodiesel is based on soybeans, what may not

TABLE 4 – Wilcoxon statistical test

	Total income after – Total income before
Z	-2,271(a)
Asymp. Sig. (2-tailed)	,023

Source: Martins (2006).

TABLE 5 – Net income from crops cultivated for biodiesel

Values (in Brazilian Reais)	%
243	15.6
4,504	31.3
8,439	46.9
14,923	62.5
27,656	78.1
39,786	93.8
58,715	100.0

Source: field research (2007)

TABLE 6 – Recruitment of labour

Recruited labour	N°	%
Yes	46	49.46
No	47	50.54
Total	93	100.0

Source: field research (2007)

TABLE 7 – Distribution of average number of employed workers

N° recruited	N° producers	%
1	25	54.35
2	12	26.09
3	7	15.22
4	1	2.17
5	1	2.17
Total	46	100.0
Average of recruited per producer	1.72	

Source: field research (2007)

be a good alternative in the medium and long term for this category of producer for the reasons already discussed, which are scarcity of land, level of technology and others (GUANZIROLI et al., 2001; BUAINAIN, ROMEIRO & GUANZIROLI, 2003).

It is possible that if the contracts did not exist, the tendency of income and employment would be maintained at the previous level. Thus, one can say that the entry of the producer into the Programme, in Goiás, caused a change in their level of activity and income. It shows the development of differentiated policies for agriculture, especially for the family farm, as Pronaf (1996) and more recently, the PNPB (2005) - goal of which is to generate development by job creation and income - may in fact helped with the inclusion of a large contingent of farmers (SACHS, 2005) who in the absence of such instruments would be without support.

In this case, the data and discussions on employment and income of farmers included in PNPB in the state of Goiás, developed so far, indicate a positive change of the reality of these producers.

6 FINAL CONSIDERATIONS

The research results indicate that the PNPB is partially reaching one of its key challenges: promoting the development of family farming. Shortly after examining the profile of the family producer who is entering the programme it could be found that the vast majority of them are still composed of a more developed group of family farms, which is demonstrated when we observe the income level of producers. This finding indicates that the PNPB as public policy has not yet reached those who most need the state, the poorest farmers. That is, the PNPB has been working for established farmers, but for those who are still in initial stage, it still has flaws. Technical assistance, which is an important element of PNPB, is not being provided properly, what complicates the development of primarily new producers.

In the analysis of income, we found good results for producers, both when individually considering the income reported by the producer from each activity and the calculations comparing revenues and expenses related to the production of crops for biodiesel, also analyzed individually. What stands out is a finding of a very large distinction in the aspects of cultivated land, income and level of employment between soybean and castor producers.

Regarding the employment, the research showed that there was a positive change, even if it only occurred

during the harvest. Again, the soybean crop was responsible for the greatest variation. Although the soybean is not a labour-intensive crop, its production for biodiesel in the State of Goiás, in this respect, was satisfactory both for signed contracts and a greater demand for complementary services.

Family agriculture, which accounts for much of the employment in the rural area, gets a boost with new activities aimed at the production of biodiesel. Even though its size does not reach the dimension projected by the government, as seen showed in the search, PNPB can help increase the level of employment in the industry.

The potential for employment and self-employment created by new activities related to biodiesel, as presented in this research, albeit on a smaller scale than the most optimists expected, means a new reality. Only the fact that the producers participated in the Programme, as contracted by biodiesel producers, already shows an increase in the level of their activities. The number of contracts found in the research is good, even considering the low absorption of labour by the activities of production of soybeans, as already indicated.

It was not expected that producers would hire a lot of labour; it would not be consistent with their reality. The main aim of the programme in this aspect is to generate self-employment, which means that stimulating farmers to create work and income for themselves would fulfil the objectives of PNPB.

It can be concluded that the PNPB is a policy that allows the access of family farmers to markets without determining how. However, there is a distortion, because the research showed that most producers who participated in the Programme are in the traditional sector, which already produces corn, soybeans, beef cattle and milk. That means that the Programme is not achieving the goal of shortening the path to market for those who have not been able to access it, as for example the producers who took part in the Agrarian Reform.

Of course PNPB, using the large demand for biodiesel and the interest of large investors, develops processes to support family farms. It is a step forward as a public policy because biodiesel could be developed without such participation of family farms.

PNPB may be an appropriate policy to generate employment, self-employment and income, but there must be a diversification of the production of raw material. In the production of soybean, we know that there is not much space for small production. In the production of castor – yes - but more study is needed so that producers have

more security to produce this crop. Production of castor in the Northeast, where the crop is traditional, is different from production of castor where there is not knowledge gained from years of cultivation.

PNPB, or any other public policy for family agriculture, aims to generate employment and income, however, without setting any parameters that can clearly contribute to the concept of income. Income may only provide subsistence. Is that enough? Or is a more appropriate definition of income for the family farm required?

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