Family farming and sustainable rural development: a case study in a settlement in the Brazilian Amazon

Carlos Alberto Paraguassu-Chaves[1], Osvaldo dos Anjos[2], Allan Kardec Duailibe Barros Filho[3], Fulvia Vera de Martinez[4], Fabrício Moraes de Almeida[5], João Viana Fonseca Neto[6] Charlles da Silva Barata[7] Lenita Rodrigues Moreira Dantas[8] Fabio Robson Casara Cavalcante[9]

[1]PhD in Health Sciences - University of Brasília - UnB, Brazil; PhD in Science - University of Havana (Cuba); Post-Doctor in Health Sciences - UnB and Degli Studi D'Aquila University - IT. Professor at the Federal University of Maranhão, Brazil. E-mail: carlos.paraguassu@gmail.com

[2]Master in Environmental Management - University of São Carlos - Paraguay. Researcher at the Higher Institute of Health Sciences and Environment of the Amazon – AICSA, Brazil.

[3]PhD in Information Engineering. Universidade de Nagoya – Japan; Post-Doctor. The Institute of Physics and Chemistry (RIKEN), Japan. Professor at the Federal University of Maranhão, Brazil.

[4]PhD in Education sciences. Inter-American University – Paraguay. Professor at the University of San Carlos, Paraguay.

[5]PhD in Physics (UFC), with post-doctorate in Scientific Regional Development (DCR/CNPq). Researcher of the Doctoral and Master Program in Regional Development and Environment (PGDRA/UNIR). Leader of line 2 - Technological and Systemic Development, and Researcher of GEITEC — Federal University of Rondônia, Brazil.

[6]PhD in Electrica Engineering. Federal University of Paraíba, Brazil. Professor at the Federal University of Maranhão, Brazil.

[7]Master in Geography - Federal University of Rondônia. Researcher at the Higher Institute of Health Sciences and Environment of the Amazon – AICSA.

[8]Graduated and Specialist in Geography. Graduated in Law. Researcher at the Higher Institute of Health Sciences and Environment of the Amazon – AICSA, Brazil.

[9]PhD in Sciences: Socio-environmental development - NAEA / UFPA. Associate professor, Federal University of Rondônia – UNIR, Brazil.

Abstract

The struggle for a fair distribution of land consolidated social movements and put pressure on the Brazilian government to carry out agrarian reform. The government allocated rural workers to the settlements and created programs to strengthen family farming. The global concern with the sustainability of the planet has led scholars to think that family farming is an alternative for the reduction of poverty and for the preservation of the environment. Based on this principle, the ***objective*** *of this study was to analyze whether family farming used in the family units of the Joana Darc III settlement in Rondônia contributes to sustainable development.* ***Materials and methods****: The research is characterized as descriptive and a case study. We use an instrument developed by Anjos[17], semi-structured, divided into 6 blocks:*

Identification of the profile of farmers; Characterization of the production unit; Characterization of crop production; Production commercialization; Financing and infrastructure and, Life conditions. The sample granted for accessibility was a group formed by 30 (26.3%) rural farmers from the Joana Darc III settlement who cultivate different crops, harvested from a population of 114 farmers. For the sample size, the systematic sampling formula presented by Barbetta[26] was used. The research project considers the ethical aspect and is in accordance with CNS Resolution 196/96. ***Results****: The results showed that the settlers received financing from Pronaf for investments in increasing production and technical assistance from EMATER. However, the production system adopted is traditional, with the use of pesticides in crops and the use of pesticides in animals and they practice burning to clean the land. This practice goes against the principles of clean agriculture, which aims to preserve the environment. It was also found that the settled farmers sell their products below the market price, reducing their profit margin. However, all were unanimous in ensuring that they would have better living conditions compared to the life before the settlement and believe in improvements in the future.* ***Conclusions****: It was rejected the hypothesis that family farming used in the family units of the Joana Darc III settlement in Rondônia contributes to sustainable development.*

Keywords: Family farming. Sustainable development. Rural settlement. Rondônia. Brazilian Amazon

I. INTRODUCTION

Family farming can be defined as the set of agricultural productive units with exploitation under a family economy regime, comprising those activities carried out on small and medium-sized properties, with labor from the family itself[1]. For these authors, family farming is fundamental for the sustainable economic development of rural areas. Family production is the main economic activity in several Brazilian regions and needs to be strengthened, as the potential of family farmers in generating jobs and income is very important.

According to Martins[2], family farming is an institution for the reproduction of the family, whose core is in the direct relationship with the land and with agricultural production. According to Bittencourt[3], it is necessary to stimulate the participation of family farmers in public policies in Brazil, guaranteeing them access to land and credit, conditions and technologies for the production and sustainable management of their establishments, in addition to guarantees for commercialization of their products, agricultural or not.

For Abramovay[4] family farming is one in which management, property and most of the work come from individuals who maintain blood or marriage ties. This definition is not unanimous. It is perfectly understandable, since the different social sectors and their representations build scientific categories that will serve certain practical purposes: the definition of family farming, for the purpose of granting credit, may not be exactly the same as that established for the purpose of statistical quantification in an academic study. The important thing is that these three basic attributes (management, property and family work) are present in all of them.

Family exploitation must be analyzed as a whole, that is, taking into account several entities that structure it. Understanding its functioning means highlighting the different logics according to which the farmer determines his fundamental choices. These logics are defined in relation to a certain number of systems[5]. In this sense Abramovay[6] understands that family farming is not such a widespread phenomenon that it cannot be explained by the historical peasant heritage, in fact, in some existing cases, in fact, the State was decisive in shaping the current social structure of the agrarian capitalism of nations central. Family farming, highly integrated into the market, capable of incorporating the main technical advances and responding to government policies cannot be characterized as a peasant by any means.

For Martins[2], reproduction strategies are not limited to reproducing, that is, subsisting and remaining. They also address new needs and new challenges that are continually generated by economic and social changes. Family farming characterizes a form of production organization in which the criteria used to guide decisions related to exploration are not only seen from the angle of production / economic profitability, but also consider the objective needs of the family, says Hecht[7].

According to Brazilian legislation (Law 11.326 / 2006) family farmers are those who practice activities in rural areas, have an area of up to four fiscal modules, family labor and income linked to the establishment itself and management of the establishment or enterprise by family members. Also included in this classification, in addition to agrarian reform settlers, are foresters, aquaculturists, extractivists, fishermen, indigenous and quilombolas. According to Abramovay[4], family farming has the following characteristics: a) Management is done by the owners; b) Those responsible for the company are linked by kinship; c) The work is fundamentally family; d) The capital belongs to the family; e) The assets are subject to inter-managerial transfer within the family; f) Family members live in the production unit.

In the 1990s, the family farming category was adopted by the Brazilian State itself, when formulating a vast support program for farmers (PRONAF), whose activity was organized by and for the family[8]. The National Program for Strengthening Family Agriculture (PRONAF) has the purpose of promoting the sustainable development of the rural segment made up of family farmers, in order to provide them with an increase in productive capacity, the generation of jobs and the improvement of income[9; 10].

According to Mattei[11], PRONAF was structured with the following specific objectives: a) to adjust public policies according to the reality of family farmers; b) make the necessary infrastructure feasible to improve the productive performance of family farmers; c) raise the level of professionalization of family farmers through access to new standards of technology and social management; d) stimulate these farmers' access to input and product markets.

According to the Government of Brazil portal, family farming plays an important role in the Brazilian economy. With annual sales of US $ 55.2 billion, if the country had only family production, it would still be in the top 10 of the world agribusiness, among the biggest food producers, behind only China, India, Indonesia, Nigeria, Pakistan and Japan.

These data are part of a comparison between data from the World Bank and the Ministry of Agriculture, Livestock and Supply. In Brazil, when adding family farming to all food production, it goes from eighth to fifth position in the world, with revenues of US $ 84.6 billion per year. It is evident that the growth of Brazil goes through family farming. According to the Brazilian Agricultural Census, family farming is the basis of the economy of 90% of Brazilian municipalities with up to 20 thousand inhabitants.

In addition, it is responsible for the income of 40% of the economically active population in the country and for more than 70% of Brazilians employed in the countryside. Family farming produces 70% of Brazilian beans, 34% of rice, 87% of cassava, 46% of corn, 38% of coffee and 21% of wheat. It is also responsible for 60% of milk production and 59% of the pig herd, 50% of poultry and 30% of cattle.

When it comes to family farming and sustainable development, most authors remember that the term sustainable development was used for the first time in 1987 by the United Organizations (UN) when presenting their study entitled "Our Common Future" that recommended actions to preserve the environment. In the document, the UN defines sustainable development as one that meets present needs, without compromising the ability of future generations to meet their own needs.

In Brazil, concern for the environment is recorded in Article 225 of the Brazilian Constitution of 1988, which says: everyone has the right to an ecologically balanced environment, a common use of the people and essential to a healthy quality of life, imposing power public and the community the duty to defend and preserve it for present and future generations[12].

This initiative brings Brazil into conformity with the global concept of sustainable development, as it combines the preservation of the environment through the conscious use of natural resources and the preservation of the quality of life of individuals. Requires the development of individual and collective actions with the participation of society to reverse climate change. Individuals were invited to participate in environmental preservation and contribute to a better and more sustainable world.

Due to its complexity, sustainable development crosses the frontiers of environmental issues and embraces social and economic issues. This tripod, called the sustainability tripod, aims that the actions of companies must be economically viable, socially just and ecologically correct[13]. In this logic, companies to be competitive would have to worry about people, as the author said, "If they want to stay in the market, companies should also think about the well-being of society, which includes preserving natural resources, using them properly and without compromising well-being "[13].

Thus, the challenge of producing ethically was launched, considering the balance between man and nature. Since the dawn of humanity, man in the search for survival has sought to dominate nature and in this struggle, he committed irremediable abuses that at the present moment compromises the permanence of individuals on the planet. Trying to minimize this damage has become the goals of nations that organize and discuss ways and actions to reverse the damage caused to the environment, as well as less harmful forms of production. Regarding agricultural production, it has been proven by several studies that agriculture is also largely responsible for the ecological imbalance.

In Batalha[14]'s view, "The effects of agriculture on the environment have become the subject of great discussion and concern [...]". This statement starts from verifying the use of technologies used in Brazilian agribusiness. It is noticed that agriculture as it has been developed has not adopted measures for the conscious use of natural resources[15]. Concerning the environment today has become a competitive differential for properties (companies), as this attitude generates a positive image and highlights the product in the market. Producing sustainably, respecting the conditions of the environment allows rural producers to reduce production costs and enter new markets with an environmentally friendly product, gaining a competitive advantage.

The preservation of the environment, the conservation of water resources must be a priority

for rural agriculture, however, very little has been done for its effectiveness. Adaptation initiatives for sustainable agriculture most often meet economic interests contrary to their implementation. In this vein, Pedroso[16] states that "the paths to building a sustainable rural development model in Brazil are the expansion, viability and strengthening of family farming and the promotion of ecological technology that conserves natural resources". In this sense, producing without harming the environment and contributing to local development has become an objective for all producers and for family farming.

According to Anjos[17], the debate around the importance of family farming as an element conducive to sustainable development has evolved in recent years. For Damasceno, Khan and Lima[18], family farming has contributed strongly to the country's economy. According to these authors, family farming plays a fundamental role in the social development and balanced growth of the country. The millions of small producers that make up family farming make it an expanding and vitally important sector for Brazil. Every year, family farming moves billions of reais in the country, producing most of the foods that are consumed on Brazilian tables. In addition, it contributes to job creation, income generation and distribution and a reduction in rural exodus.

According to Martins[2], despite the importance of family farming, these workers who work on a small plot of land, usually using family members as labor, face difficulties ranging from particular needs, going through economic issues to technical issues related to vocational training. land management and care. For Anjos[17], the settlers of Joana Darc III are workers who together (as a family) migrated from other regions in search of a piece of land to cultivate and live on family farming. According to Sousa, Passos and Khan[19] family farmers in general face great difficulties to produce and also to drain their production, as well as to have a quality life in rural areas. When dealing with settled farmers, the difficulties increase, since they are located in regions that are never inhabited and, consequently, lacking all that is necessary for a dignified life.

For Anjos[17] in the Joana Darc III settlement, infrastructure issues and support public policies are in need of a solution since its foundation. Public agricultural costing policies are essential for the development of the settlement, not only for the economic aspect, but also for the social aspect, as it would strengthen family farmers. The Joana Darc III settlement was established based on the population strategy of the State of Rondônia and was formed by farmers from various States and municipalities in Rondônia.

According to Anjos[17], land conflicts in the Amazon, especially the conflict known as the “Corumbiara massacre”, which occurred in 1995 in the municipality of Corumbiara, in the state of Rondônia, and the conflict that occurred in Eldorado dos Carajás, in Pará, were historical events that strengthened and inspired workers in the struggle for land and in the strategy for the occupation of non-productive land in the Amazon. And it was due to pressure from society and international repercussion, that the Brazilian government authorized the creation of some settlements in the Amazon and in this political effervescence the Joana Darc III settlement was born. In this sense, the research aims to analyze the family farming used in the family units of the Joana Darc III settlement, in Rondônia and its contribution to sustainable development in the Amazon.

II. MATERIALS AND METHODS

2.1 Study Type

The research is characterized as descriptive and a case study. Gil[20], states that the descriptive research aims to study the characteristics of a group: it describes the population and uses standardized data collection techniques such as, questionnaire and systematic observation[20; 21; 22; 23]. Bruyne, Herman, Schiutheete[24] says that case studies allow the application of equally varied information gathering techniques (observations, interviews, documents) to generate an analysis of an organization or measure some performance. In Yin's[25] view, the case study type of research seeks to broaden and generalize theories based on theoretical analysis and not only from a statistical perspective.

2.2 Semi-structured instrument model used in the research

We use an instrument developed by Anjos[17], semi-structured, divided into 6 blocks: (a) Block I - Identification of the profile of farmers; (b) Block II – Characterization of the production unit; (c) Block III – Characterization of crop production; (d) Block IV – Production commercialization; (e) Block V – Financing and infrastructure and (f) Block VI – Life conditions.

Block I - The identification consists of the following variables: Genre, Age Range, Marital Status, Number of children, Education, Birthplace, Position in the family, If you own the land, Some family member receives some external income, Some family member works outside the settlement, Someone in the family resides outside the settlement, Before the settlement he worked in agriculture, What is the main source of income, Main performance as a farmer, How did you discover the existence of the settlement and How was the participation in the struggle for land.

Block II - characterization of the production unit consists of the following variables: Property size, Size of planted área, Unused área, Reserve área, Area reserved for use of pastures, Way to develop productive activities, Collective use of machinery and equipment and Equipment socialization / Association.

Block III - characterization of agricultural production with the following variables: Temporary crops, Permanent crops, Has environmental concern, Uses chemical fertilizers and Receives technical help from EMATER.

Block IV - production and consumption with the following variables: Most commercialized products, Production distribution, Where do you sell products and What are the difficulties in marketing the products.

Block V – Financing and infrastructure with the following variables: Access to financing credit, Financing credit amount, Purpose of the credit, Credit source, Bureaucracy for access to credit, Settler status is a privilege for acquiring credit and Bureaucracy for the settlement of credit.

Block VI – Life conditions with the following variables: Home, Health service, Access to water, Access to credit, Food, Education, Recreation, Income, Work conditions, Physical security, Religious practice, Outlook for the future and Residence structure.

2.3 Sampling Number

The sample granted for accessibility was a group formed by 30 (26.3%) rural farmers from the Joana Darc III settlement who cultivate different cultures, harvested from a population of 114 farmers

residing in the rural settlement. To calculate the sample size, it is necessary to use some statistical method. In this sense, the systematic sampling formula presented by Barbetta[26] was used, being:

$$n0 = \frac{1\ n = N\ .\ n_0}{(E0)^2\ N + n0}$$

Where:

N = size (number of elements) of the population,

n = sample size (number of elements),

n0 = a first approximation of the sample size,

E0 = tolerable sampling error.

Toledo and Ovalle[27] defines the sample as a subset of the population from which a value judgment is created regarding universal characteristics. According to Kazmier[28], as the sample size increases, the distribution of the mean sampling approaches the form of the normal distribution, whatever the form of the population distribution. This author argues that, for a sample to be meaningful, it must contain 30 or more elements in the research universe.

2.4 Inclusion and exclusion criteria

The survey included workers who owned areas in the Joana Darc II family farming project, regardless of gender and who offered to sign the Free and Informed Consent Form. Workers under 18 and those who did not sign the Informed Consent Form were excluded.

2.5 Ethical Aspects

The research project is in compliance with Resolution 196/96, which deals with research with human beings, of the National Health Council of Brazil. The participating subjects are volunteers and were submitted to the interview and application of the forms after signing the Free and Informed Consent Form.

2.6 Research Location

The Joana D'Arc III settlement is located on an area of 17,509,0145 hectares. Of these, 6,634,5052 ha, was reserved for the six agrovillages that make up Joana Darc III. Each agrovila can house 24 settled families. The Rural Settlement Joana D'Arc III, is located 100 km from the urban perimeter of the municipality of Porto Velho in the State of Rondônia. The settlement is located in an area that is difficult to locate. Access is possible through the Federal Highway BR 319 that connects Porto Velho to Manaus, State of Amazonas or through the Federal Highway BR 364 that connects Porto Velho to Rio Branco in the State of Acre.

According to records from the National Institute of Colonization and Agrarian Reform (INCRA), the Joana D'Arc III Rural Settlement was created on June 9, 2000. The deliveries of properties by INCRA started in April 2001, however, before going to agrovilas, the settlers were camped in the District of Jaci Paraná where they stayed for approximately one year.

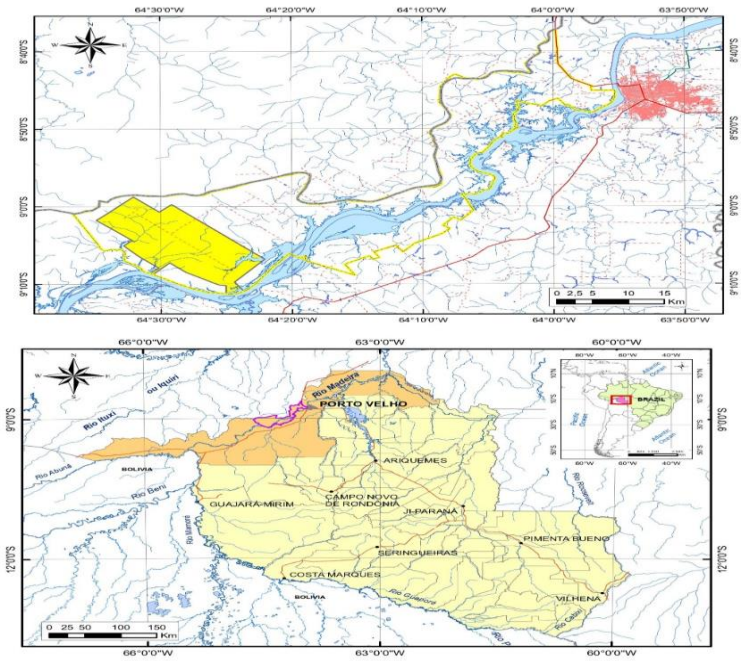

Figure 1: Map of the geographical location of the Joana Darc III settlement project in a rural area in Porto Velho, Rondônia.

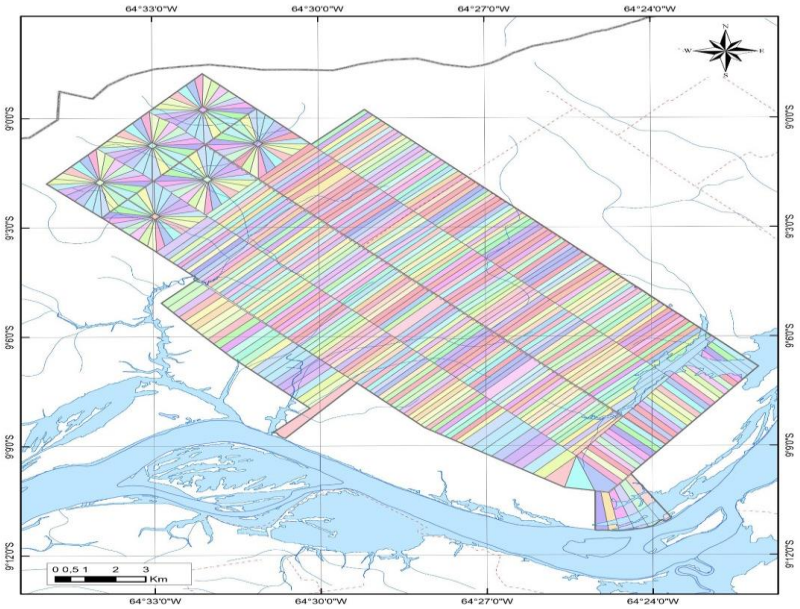

Figure 2: Map of the Joana Darc III settlement project location.

2.7 Data Collection Technique and Analysis Model

Gil[20] asserts that the data collection technique in a case study is used to: a) explore real-life situations whose limits are not clearly defined; b) describe the situation of the context in which a given investigation is being carried out; c) explain the causal variables of a given phenomenon in very complex situations that do not allow the use of surveys and experiments. Lakatos and Marconi[21] adds that the technique for collecting data in research in the case study model is carried out by combining several processes, of which, direct observation, document analysis, the interview and the life story are the most

used. The questionnaire was adopted as the first choice, however the difficulty of understanding of some respondents due to the low level of education, in some cases assumed the character of an interview.

Gil[20] points out that it is common to use more than one instrument in this type of case study research. Several researchers have been working to study family farming production methods. Therefore, the data collection instrument was semi-elaborated, contemplating some questions considered essential to identify the settlers and answer the research questions of this study.

2.8 Statistical Analysis of the Data

The data were tabulated and then compiled into an Excel Microsoft Windows 10 table, in order to facilitate understanding and trace the understanding of what occurs in the researched settlement and thus respond to the research objectives[23].

III. RESULTS AND DISCUSSION

(a) Block I - Identification of the profile of farmers

From a universe of 114 farmers settled in the Joana Darc III agricultural project, 26.3% of the landowning farmers were interviewed, 70% male and 30% female. Male farmers still predominate in rural settlements and agricultural production activities. As for the age group, it was found that 10% of respondents are in the age group between 30 and 40 years, 50% are between 41 and 50 years and 40% are in the range of 51 to 60 years.

Farmers of both sexes under the age of 50 correspond to 60%, that is, according to the study sample, farmers constitute a young and productive population. Regarding marital status, 90% were married (in a stable relationship) and 10% had divorced. All divorced / separated were female, where their husbands (partners) abandoned them. These women have become breadwinners and continue to work in agriculture. However there are also women even though they are not divorced they are family leaders.

Regarding the number of children, 20% have no children, 20% have only 1 child, 30% have 2 children and 30% have 3 children. It was found that farmers follow the same pattern as urban families, where the number of children is increasingly reduced. In the study by Bezerra and Schlindwein[29], an average of three people per rural property was found, with a minimum of one resident and a maximum of seven residents. Referring to the school level, 20% of the respondents have high school level and 80% have only the elementary school level. This reality highlights the need to train rural farmers, with education focused on the countryside. It is noticed that most farmers do not have technical training, an essential characteristic for their activity.

Thirty percent of family farmers have their origin in the State of Minas Gerais (Southeast Region of Brazil), 20% were born in the State of Amazonas (North Region of Brazil) and 50% were born in the State of Rondônia, coming from several municipalities. All farmers participating in the sample are primarily responsible for supporting the family, as it says in Brazil, they are the heads of families. They are also the owners of the land. No member of the family receives any kind of foreign aid. No family member works in another activity outside the rural settlement. No family member resides outside the rural settlement.

As for the bond with the land, 20% planted on their parents' land, 10% already owned land and planted on their own land and 70% carried out their plantations on rented land. It is evident in this matter that the land is generally not owned by those who cultivate, hence the struggle for land reform and for more equitable use and possession of the land.

The family's source of income comes from agriculture and none of its members has help from third parties or the government. Keeping their family formation, they work together since they received the land and live on what they can produce. Only one farmer claimed that a son left the settlement and went to live in another city in order to study. The rest remain with the whole family working in the fields. Regarding his role as a farmer, 90% identified his main occupation as a farmer and 10%, his main occupation was livestock.

This quantity is valid for this research since it considered the answers from the perspective of farmers. As for the knowledge of the existence of the settlement, 80% had this information through the association, 10% knew about the formation of the settlement through friends and 10% were resettled, that is, they came from another camp or settlement, having not been asked the origin. As for the struggle for land, 80% fought together with the association / union and 20% replied that they did not fight to establish themselves in Joana Darc III.

Table 1: Identification of the profile of settlers.

Genre	**Fa***	**Fr%**
Male	21	70.0
Female	9	30.0
Age Range	**Fa***	**Fr%**
30-40	2	10.0
41-50	15	50.0
51-60	12	40.0
Marital Status	**Fa***	**Fr%**
Married	27	90.0
Separated / Divorced	3	10.0
Number of children	**Fa***	**Fr%**
Do not have children	6	20.0
Has 1 child	6	20.0
Has 2 children	9	30.0
Has 3 children	9	30.0
Education	**Fa***	**Fr%**
Complete primary education	24	80.0
High school	6	20.0
Birthplace	**Fa***	**Fr%**
Amazonas	6	20.0
Minas Gerais	9	30.0
Rondônia	15	50.0

Position in the family	Fa*	Fr%
Householder	30	100.0
Not householder	0	0.0
If you own the land	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0
Some family member receives some external income	**Fa***	**Fr%**
Yes	0	0.0
No	30	100.0
Some family member works outside the settlement	**Fa***	**Fr%**
Yes	0	0.0
No	30	100.0
Someone in the family resides outside the settlement	**Fa***	**Fr%**
Yes	0	0.0
No	30	100.0
Before the settlement he worked in agriculture	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0
What is the main source of income	**Fa***	**Fr%**
Agriculture	27	90.0
Agriculture + Livestock	3	10.0
Main performance as a farmer	**Fa***	**Fr%**
Farmer	27	90.0
Livestock	3	10.0
How did you discover the existence of the settlement	**Fa***	**Fr%**
Farmers Association	24	80.0
Friends	6	20.0
How was the participation in the struggle for land	**Fa***	**Fr%**

By the association	24	80.0
Did not participate in movement for land	6	20.0

Fa* Absolute frequency **Fr%** Relative frequency

(b) Block II – Characterization of the production unit

According to research data, farmers received an area of 50 hectares of land for use, that is, each family received an area of the same size without distinction of the size of the family (Table 2). The transfer of public domain land was carried out by INCRA, the government agency responsible for this activity. On this subject Francisco[30] announces that the agrarian reform aims to provide the redistribution of rural properties, that is, to effect the distribution of land for the realization of its social function. This process is carried out by the State, which buys or expropriates land from large landowners (owners of large tracts of land, most of which are not usable) and distributes it to peasant families. In the study by

Bezerra, Schlindwein[29] the size of rural properties varied from 1 hectare to 100 hectares. The average size of the surveyed properties was 14.76 hectares. The highest percentage (52.20%) corresponds to properties with up to 10 hectares, which represents a concentration of people with little space (ha) to produce. When properties ranging from more than 10 to 60 hectares are analyzed, only 46.70% of the sample falls within this range and 1.1% has more than 60 to 100 hectares[29]. According to data from Sangalli[31], the average hectares of family farmers in the Lagoa Grande settlement, located in the municipality of Dourados, MS, is 25.9 ha and, based on INCRA data[32], the average hectares of farmers belonging to the Amparo settlement, also in the municipality of Dourados-MS, is 16.8 ha. Given these data, different authors point out that a limiting factor for the production of family farming is the small area of land[33; 34]. Each family of farmers produces and uses the land according to their perspectives.

Thus, the planted areas are thus distributed: 20% use only 5ha for cultivation; 10% use 10ha; 10% produces in 10ha; 20% produces in 20ha; 10% produces in 30 ha and 30% cultivates in 40 ha. (Table 2). When asked about the condition of the area, 40% said they had unused area on their plot and 60% claimed that all areas are used. (Table 2).

Regarding the reserve area, 40% claimed that their land has a reserve area and 60% that their land does not extend into the reserve area. (Table 2). Regarding the area intended for pasture, 30% claimed that they reserve 10 ha for pasture; 10% says to reserve 20 ha; 20% says to book 30 ha; 10% says to reserve 35 ha; 10% says to reserve 40 ha e 20% says to reserve 45 ha for pastures. (Table 2).

This data draws our attention to the amount of hectares reserved for cattle pastures. This can lead to the demystification of the idea that agrarian reform is carried out for the cultivation of land. Although the study portrays a specific situation in the analyzed settlement, it raises interest in evaluating other settlements to compare the reality. It was observed that the use of the territory for grazing does not include sustainable methods. There is only an economic concern. Regarding the way to carry out the productive activities, everyone produces and performs the tasks individually.

The only situation in which he performs collective work is in the socialization of the equipment used in the association, where 60% share the equipment with 15 more members and 40% share the equipment with 20 more members. Regarding the collective organization of farmers, Roos[35] warns that

the settled peasants, organized or not in Movements of the Land, see in the collective associative actions in the settlements a way to guarantee their maintenance and existence in the countryside. This organization of the settlers does not take place only in the productive sphere, but also in political and solidarity relations, that is, through collective struggles such as protests, walks, varied assistance in land occupations, road closures, joint efforts, etc.

Although they carry out their production individually, farmers are organized to strengthen themselves and demand better working conditions and quality of life. The area received by the farmers was the same size for everyone, however, when asked about the planting area, the answers came out unevenly, since each settler produces and uses the land according to their perspectives.

Table 2: Characterization of the production unit

Property size	**Fa***	**Fr%**
50 hectares	30	100.0
more than 50 hactares	0	0.0
Size of planted área	**Fa***	**Fr%**
5 hectares	6	20.0
10 hectares	3	10.0
15 hectares	3	10.0
20 hectares	6	20.0
30 hectares	3	10.0
40 hectares	9	30.0
Unused área	**Fa***	**Fr%**
Yes	12	40.0
No	18	60.0
Reserve área	**Fa***	**Fr%**
Yes	12	40.0
No	18	60.0
Area reserved for use of pastures	**Fa***	**Fr%**
10 hectares	9	30.0
20 hectares	3	10.0
30 hectares	6	20.0
35 hectares	3	10.0
40 hectares	3	10.0
45 hectares	**6**	**20.0**
Way to develop productive activities	**Fa***	**Fr%**
Individual productive activities	30	100.0

Individually grown products	30	100.0
Collective use of machinery and equipment	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0
Equipment socialization / Association		
With 15 associates	18	60.0
With 20 associates	12	40.0

Fa* Absolute frequency **Fr%** Relative frequency

(c) Block III – Characterization of crop production

The surveyed farmers temporarily grow 10% crops of pineapple, pumpkin, banana, vegetables, yams, oranges, coffee, papaya, corn and watermelons respectively and, as a permanent crop, 50% grow cassava, 20% concentrate on Galician lemon plantation and 30% of farmers produce coffee. Although 100% say they are concerned with environmental preservation, in the same relative frequency (100%) of farmers make use of chemical fertilizers (pesticides). One hundred percent of farmers receive technical assistance from EMATER. According to Almeida and Kudlavicz[36], land is synonymous with life and work and, without a doubt, family farmers have been working hard to achieve a decent life in rural areas. Through the cultures they cultivate, they seek different strategies, such as diversification, to generate income. Production in the Joana Darc III settlement follows the characteristics of family farming, with the cultivation of various crops and in small quantities.

According to data from the Brazilian Agricultural Research Corporation - EMBRAPA[37], cassava has a slow initial development, which allows, when intercropped, that other crops take better advantage of growth factors. It is recommended to plant cassava in a double row system, spaced 2.00 m apart. In this space, you can place three rows of beans or, still, two rows of corn. The rotating use of crops contributes to soil preservation and should be used following appropriate techniques. It was observed that settlers carry out plantations of temporary products and permanent products, but in both cases, the choice is made more by the seasonality of the product than by a technical choice, not taking advantage of the benefits that the crop rotation technique can provide.

According to Fancelli[38] to guarantee the efficiency of a crop rotation system, there are some basic principles, such as: alternating between plant species that have different nutritional requirements and that are not susceptible to the same types of pests; alternation between species with different root systems in terms of architecture, distribution and depth of soil exploration; use of at least one species with a high capacity to produce plant residues, which promote soil protection. The crop rotation technique allows the soil to remain in balance and to recover with the diversification of planting.

For Arnhold, Ritter and Balbinot[39] the application of an adequate crop rotation system has several advantages, among them: provides diversification in production; improves soil characteristics; assists in disease and pest control; makes the system more productive; promotes nutrient cycling and helps restore degraded areas. The proposed benefits of crop rotation would help surveyed farmers to have cleaner

production without using pesticides. Taking them to migrate from traditional production to organic production. The production and consumption of organic food represents significant values for the Brazilian economy and for the health of the population, being a form of social and economic sustainability of family farming[40]. According to farmers, EMATER provides them with technical assistance, however, it is not aimed at sustainable planting. They follow traditional farming methods, using chemicals to combat pests and insects, including ticks on animals. Disregard the damage that this practice can cause in the medium and long term for those who are exposed to these poisons. Farmers replied that they are concerned with conserving water sources. Unanimously, all respondents had the same answer regarding water preservation. They are unaware, however, that the use of fertilizers and insecticides in animals will end up in the soil and consequently in streams, streams and rivers contaminating the environment[41].

Table 3: Characterization of crop production

Temporary crops	**Fa***	**Fr%**
Pineapple	3	10.0
Pumpkin	3	10.0
Banana	3	10.0
Vegetables	3	10.0
Yam	3	10.0
Orange and coffee	3	10.0
Papaya	3	10.0
Manioc	3	10.0
Corn	3	10.0
Watermelon	3	10.0
Permanent crops	**Fa***	**Fr%**
Manioc	15	50.0
Galician Lemon	6	20.0
Coffee	9	30.0
Has environmental concern	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0
Uses chemical fertilizers	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0
Receives technical help from EMATER	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0

Fa* Absolute frequency **Fr%** Relative frequency

(d) Block IV – Production commercialization

Cassava with 60% is the main product produced in the settlement, corn is the second product with 30% and coffee the third product with 10%. Of these products, 90% are sold and 10% are for own consumption. This also constitutes sustainable development, as the farmer supplies himself with his own harvest and, therefore, does not need to invest in the purchase of the basic basket of processed foods. Farmers sell 80% of their products in open markets and 20% in the rural settlement itself. The commercialization and distribution of products is a critical factor in any business and rural settlement is a concern. It is not enough to produce, it is necessary to plan the flow of production and therefore planting and marketing decisions must have the same importance.

According to Mendes and Padilha Junior[42] commercialization is a continuous and organized process of forwarding agricultural production along a commercialization channel, in which the product undergoes transformation, differentiation and added value. According to Walquil et al[43] the rural producer must face the inherent adversities not only to the production and financing of the operational costs of the activities, but mainly to the future expectations regarding the quotations of the prices of agricultural products, influenced by historical trends, production seasonality and speculative movements causing significant price fluctuations.

According to settled farmers, when products are traded in the rural settlement itself, prices are very low. However, when the settler (producer) has a customer (buyer) it generates some tranquility. According to the settlers, this partnership sometimes turns into a financial aid, since when a financial emergency arises, they turn to the client and provide them with an advance. All production is consumed in the regional market. EMATER, the state government agency that supports the settlement, in partnership with the Joana Darc Producers Association (ASPROD'ARC), organizes a weekly fair, where producers can take their products and sell.

To become competitive, farmers seek to establish partnerships, collaborating mutually in the supply chain to generate value for the customer. The partnership can be understood as an arrangement between two or more parties that establish a cooperation agreement between themselves to achieve common interests. For the settlers, because they produce fruits, vegetables and other perishable products, disposal means total loss, so to avoid losses, a price reduction is carried out so that the product is sold, thus avoiding the cost of transportation back.

The greatest difficulty encountered by farmers in the marketing of their products is the transport of the goods. In this sense, 70% of the settlers claim that transportation is the main cause of difficulties in marketing, 10% claimed to have difficulty with the price and 20% of settlers said they did not have marketing problems. The price can be a factor of success or failure of a certain product, therefore, when pricing, internal and external variables must be considered. Transport is a problem, as EMATER only makes available a small truck, which does not meet the needs of all producers.

Logistics is vital for any business. It is what will make the product reach the right place, at the right time, adding value to the customer, however, 60% of the logistical costs, it is up to the transport raising the cost of the product and competitiveness in the market[44]. The main role of transport logistics is to minimize the distances between producers and their respective customers by ensuring that the correct product is delivered as established in the contract. As the distance between the settlement and the fair is

large, producers use private cars and attach a body to be able to take the products. It is known of the great difficulty that family farmers face to produce and also to drain their production, as well as to have a quality life in rural areas[29]. It was verified that in the rural settlement there is no storage of products. Distribution occurs directly from the harvest to the final consume.

Ballou[45] defends this situation. According to this author, this condition avoids the accumulation of stock that can be transformed into a loss due to perishability, burden logistics costs and thus reducing the profit of the producer. The logistical costs are linked to the activities of planning, implementing and controlling all materials and services from the moment of entry, through the moment of transformation until the moment of departure considering, from the place of origin to the final place of consumption, including also the discard[14]. The surveyed producers sell their products at a price lower than that practiced in the market by approximately 30%, however, judging by the 10% of the dissatisfied and by what is observed in loco, there is no study on pricing in this way, since the costs of production are unknown, the price charged may be causing losses to the producer.

Table 4: Production commercialization

Most commercialized products	**Fa***	**Fr%**
Manioc	18	60.0
Corn	9	30.0
Coffee	3	10.0
Production distribution	**Fa***	**Fr%**
Product Sales	27	90.0
Own consumption	3	10.0
Where do you sell products	**Fa***	**Fr%**
Free fairs	24	80.0
On site	6	20.0
What are the difficulties in marketing the products	**Fa***	**Fr%**
Transport	21	70.0
Low price	3	10.0
See no problems	6	20.0

Fa* Absolute frequency **Fr%** Relative frequency

(e) Block V – Financing and infrastructure

Every business needs financial resources to run production. Working capital is the necessary resource that the farmer needs to carry out his daily activities. In general, working capital stems from the difference between the farmer's available money and the money that will be used to settle his debts, be they fixed or variable expenses, expenses necessary to perform services, for marketing, among others.

The small rural farmer suffers from a lack of working capital and although there are lines of credit available for his category, they often do not have access due to the bureaucracy imposed by financial

institutions. In Brazil, to strengthen family farming, the government adopted a financing policy with the lowest market rates, ranging from 0.5% per year to 4.6% per year[46; 47]. In the case of settlers, financing is essential for their permanence in the rural rural area, which is why the Government, through financial institutions, creates programs that grant credits to finance the production of settlers in a less bureaucratic way, through associations or cooperatives. The surveyed farmers declared that they invested the credit received in the production. The values of the credit granted by PRONAF are varied[47].

The reason for this variation or the criteria for release of the amount has not been researched. For the surveyed settlers, 10% obtained a credit of R$ 40,000.00; 40% received R$ 45,000.00; 20% received R$ 50,000.00; 10% received 70,000.00; 10% received 80,000.00 and 10% obtained 95,000.00 credit. In this study, all settlers had access to PRONAF credit financing and used it to increase production. All claimed that there was no difficulty in acquiring the credit and that the fact of being a Joana Darc settler helped a lot in releasing the values. When asked if it was difficult to repay the loan, 90% of respondents claimed that no, only 10% settlers said they had difficulty paying off the debt.

Table 5: Financing and infrastructure

Access to financing credit	**Fa***	**Fr%**
Yes	30	100.0
No	0	0.0
Financing credit amount	**Fa***	**Fr%**
R$ 40,000.00	3	10.0
R$ 45,000.00	12	40.0
R$ 50,000.00	6	20.0
R$ 70,000.00	3	10.0
R$ 80,000.00	3	10.0
R$ 95,000.00	3	10.0
Purpose of the credit	**Fa***	**Fr%**
Production	30	100.0
Other activities	0	0.0
Credit source	**Fa***	**Fr%**
Pronaf Investment	30	100.0
Another source of investment	0	0.0
Bureaucracy for access to credit	**Fa***	**Fr%**
Yes	0	0.0
No	30	100.0
Settler status is a privilege for acquiring credit	**Fa***	**Fr%**
Yes	30	100.0

No	0	0.0
Bureaucracy for the settlement of credit		
There was no difficulty	27	90.0
There was difficulty	3	10.0

Fa* Absolute frequency **Fr%** Relative frequency

(f) Block VI – Life conditions

Andrade et al[48] clarifies that the term seated denotes the action of third parties on workers, hiding a previous action from those who, before being allocated, fixed, settled, fought hard for the right to cultivate the land. Before being settled, they were bóias-frias, squatters, small landowners who lost their land, small tenants, all in search of land to cultivate. These workers are never remembered by the state bureaucracy as occupiers, which implies a recognition of their action aimed at transforming idle land into cultivated land. In characterizing them as settlers, the State emphasizes its own action on those who insist on considering them as beneficiaries and not as subjects.

In the criticism of Andrade et al[48], the settler is seen as the individual who received help from the Government and not, the citizen who turns idle land into productive land, as occurs in the Joana Darc III settlement. Respecting the individual history of each one, the farmers of Joana Darc III organized themselves and fought for better living conditions based on an inhospitable reality. Although they faced great obstacles in arriving at the settlement, they managed to improve living conditions in several aspects. The negative aspect was leisure, where 60% of the interviewees stated that it worsened after arriving at the settlement and 40% said that they remained in the same condition as the previous place of residence.

Although there is a central (circular) connection area for all leisure areas, no public policy or initiative by the settlers has been carried out to transform this space into a common leisure place for everyone in the settlement. Leisure is necessary for human life, as it brings health benefits, improving the quality of life. According to Melo[49] "there is a direct relationship between leisure and health, leisure and education, leisure and quality of life, which cannot be neglected". In this way, it is necessary to create actions that can minimize not only the lack of leisure, but also deficiencies in education, physical security and religious practice. It is worth mentioning the improvement in the structures of the residences and in the perspective of the future, where all respondents pointed out that there was an improvement. It is evident when analyzing table 6 that there was a general improvement in the quality of life of the respondents and a recovery of their citizenship.

Quality of life is the process used to assess the living conditions of a human person, that is, it is the set of conditions that collaborate for the physical and spiritual well-being of individuals in social life[50]. The improvement in the living conditions of the settlers was evident, however, the data collected were insufficient to assess the public improvement policy that presents the conditions of access to food, education, leisure and security, as pointed out in the data.

Table 6: Life conditions

Life conditions	Improved	Worsened	Equal
Home	30		
Health service	20		
Access to water	30		
Access to credit	30		
Food	27		3
Education	21		9
Recreation		18	12
Income	30		
Work conditions	30		
Physical security	9	6	15
Religious practice	3	3	24
Outlook for the future	30		
Residence structure	Improved	Worsened	Equal
Current brick house construction	30		

Fa* Absolute frequency

Family farmers are of great importance for the growth of Brazil[46; 47]. It is up to the agriculture to be efficient and effective in the use of natural resources and to have the capacity and flexibility to adapt to environmental demands, minimizing negative impacts. It must realize and produce within a sustainable agricultural system what, in the definition of Farshad and Zinck[51], is a system that is politically and socially acceptable, economically viable, agrotechnically adaptable, institutionally manageable and environmentally sound.

Corroborating with the aforementioned authors, Avarenga, Fernandes and Campos[41] add that sustainable agricultural systems allow for productive, financial and environmental sustainability and provide food security for the rural population. It should also be noted that family farming currently maintains around 12 million people economically active in the countryside, who contribute to the development of the interior of the country and still ensure quality food for Brazilians[46; 47]. When analyzing the mode of production of family farming, it is noticed that they are mixed modes, since several characteristics are included in their way of producing.

The sustainable practice and the criteria to be adopted transport us to the primitive mode where the cultivation and the result of the harvest were carried out collectively (today, by the family nucleus). The means of production are minimal, but they have a great responsibility to conserve the soil, water resources, fauna and flora resources, without causing impacts on the environment. Sustainable production becomes a challenge since it is not limited to the technological issue, but also to socioeconomic determinants that determine what is produced, how it is produced and for whom it is produced. These new strategies must have technological, social and economic dimensions[52]. Therefore, the changes would be a

form of organization of production that, by including elements of another technical pattern of production, forms another character in agriculture: the alternative-sustainable farmer[53].

The production method aimed at sustainable development in terms of agricultural practices, according to Veiga[54] stands out for the long-term maintenance of natural resources and agricultural productivity; minimal adverse impacts on the environment; adequate returns to producers; production optimization with minimal external inputs; meeting human needs for food and income; meeting the social needs of families and rural communities. When discussing the mode of production in the perspective of sustainability, Carmo[54], states that those who have little land and use diversification in food production are better able to develop sustainability in agriculture, because they can and are able to operate on a smaller scale , with the diversification and integration of agricultural and livestock activities, in addition to working and managing the establishment itself.

For small producers, diversifying agriculture is not a cultivation technique, but rather a measure of survival, since diversified systems reduce investment, costing and technological adequacy expenses. Crop rotation allows for a greater balance in income due to different crop periods. The results pointed out in the research leave evidence that, in practice, the triplet of social, economic and ecological components and their bearable, viable and equitable variables still cannot achieve the efficiency of sustainable development. The cultivation model of traditional culture, the excessive use of pesticides, the practice of burning to clean the area, insecurity in marketing, difficulties in accessing the consumer market, are still obstacles to be overcome.

IV. CONCLUSIONS

Understanding the issue of family farming as a factor of sustainable development is a major challenge, as the conditions for obtaining it are not yet fully met. The agrarian reform format adopted in Brazil fails to solve the problems that impact family farming, although family farming is a prominent sector in Brazil's economic and social development.

The proposal to revalue the rural environment as a space for production, housing and leisure, and with the emergence of the discussion on food and nutritional security, created an opportunity for those peripheral regions that are characterized by strong social inequalities, to organize structural reforms. In this perspective, the settlements become a conducive to the development of family farming, being seen as the social form capable of producing food, with the objective of guaranteeing food and nutritional security for society.

The accomplishment of this work enabled the understanding of the construction process, evolution and current configuration of the agrarian space of the Joana Dar III settlement in Rondônia, as well as the ways of planting, production, commercialization and the living conditions of the settlers.

The agriculture practiced by family farming in the settlement, does not contribute to sustainable development, since it disregards the environmental pillar and 60% of the settlers practice production in a traditional way, although EMATER offers cultivation improvement techniques. Despite the improvement in the living conditions of farmers from living in the settlement, sustainability has not yet taken place as a result of the forms of cultivation.

Public policies aimed at family farming are incipient. Permanent cultivation is based on the production of cassava, coffee and corn, crops that do not require major investments, care or irrigation and which are the main source of commercialization. There is a reflex of improvement in the quality of life of the settled farmers, although it is based on the conception and perception that the family farmer has of himself and his history and previous life condition.

The results of the study refute the hypothesis that family farming used in the family units of the Joana Darc III settlement contributes to sustainable rural development, in the full sense of the concept and definition of sustainability.

However, it is evident in this context that the settlement of family farming in the Amazon is a fairer form of land distribution and an instrument capable of reducing social injustices in the rural area. However, it is not enough to have only the land. It is necessary to be able to live on this land and for that it requires articulating with other organizations that contribute to the population of the settlement to have a dignified life condition.

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