


FAMILY FARMING AND THE CARBON MARKET

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ABSTRACT

There is a consensus on the impacts and effects of global warming and that it is necessary to remunerate those who take measures to avoid or mitigate such effects, since the payments that are made today benefit large farmers, which is not the case for family farmers. The ABC – Low Carbon Agriculture and ABC+ plans have not incorporated research are based on Ordinance 288/2020 of the Ministry of the Environment and investigate the conditions of native vegetation cover of family properties in the municipalities of Juazeiro/BA and Petrolina/PE. This research proposal was theoretically based on classical and postmodernist scholars who work on the themes: environment; climate change; low carbon emissions; family farming; environmental services; carbon sequestration; carbon market; greenhouse gases; zoning of climate risks, and, in the documents: ABC Plan and ABC+ Plan; Reports from the World Climate Forums; Reports from the IPCC - Intergovernmental Panel on Climate Change; Agricultural Censuses of 2017 and 2020; Studies by IPEA - Institute of Applied Economic Research; Kyoto Protocol; World Bank Reports; Reports from the UN – United Nations and Ordinances 288 and 414 of the MMA – Ministry of the Environment, which institutes the Payment for Environmental Services and the Forest + Bioeconomy Modality. The choice for the quantitative-qualitative methodology was the most appropriate path because they are complementary in the elaboration of a contractual model that favors family farmers, where it will imply metrics and tests of its applicability and application of questionnaires or interviews with the farmers surveyed in the settlements already demarcated. It was found in the research that family farmers contribute to the mitigation of climate change by adopting adaptation measures that encourage families to stay in the countryside, managing soils in a sustainable way, preserving natural resources, truly and mostly doing low-carbon agriculture.

Keywords: Family Farming. Carbon Market. Contractual Model. Fair Pay. Environmental Services.

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INTRODUCTION

The readings of the reports on the International Climate Forums, as well as the ABC and ABC+ Plan - Low Carbon Agriculture prepared by MAPA – Ministry of Agriculture, Livestock and Supply, created by Law No. 12,187 (BRASIL, 2009), to support the fulfillment of the commitments assumed by Brazil with the international community in the Paris Agreement, point out that the focus is to contain the increase in the global average temperature by up to 1.5°C above the pre-industrial period and maximum 2.0°C, by 2100. Such commitments are related to the fight against climate change (UN, 2015), and the recommendations contained in the ABC and ABC+ Plans cover only medium and large producers of *commodities* for export, which is worrying, considering that family farming constitutes the vast majority of agricultural establishments in Brazil (LIMA; HARFUCH; PALAURO, 2020; MAPA, 2020).

Analyzing family farming and the various technological itineraries that include the maintenance of vegetation cover, it is possible to admit that it has low carbon emissions, since, in this typology, the fertilization of the plants is almost always done by organic. It is clear, therefore, that the marginalization of Family Farming in the ABC and ABC+ is the result of the capitalist and hegemonic economic development model, which disregards its social and political protagonism, especially in the construction of the Agrarian Reform agenda and Public Policies.

Alongside the initiative of the State and academia, social movements played a fundamental role in the definition of Family Farming as a model of agriculture as a category that aggregates rights and as a unifying political identity of a diversity of family units in the countryside, with emphasis on the struggles of rural women for access to rights and for the construction of spaces of autonomy (CANO, 1998; FURTADO, 1980).

In view of this reality, the carbon market, established by the Kyoto Protocol in 1997 and already duly assumed by international laws as CDM – Clean Development Mechanism, created to assist the process of reducing greenhouse gas (GHG) emissions, or carbon capture, has not benefited family farmers in Brazil, due to the lack of a contractual model that can be used by them and to receive fair payment for the environmental services provided. supported by the ordinance of the Ministry of the Environment of July 2, 2020, which provides for the conditions of native vegetation cover of family rural properties.

According to Article 2, item I, of the aforementioned normative act, the Floresta+ Program was instituted, which aims to foster the "private market of payments for

environmental services in areas maintained with native vegetation cover" and in turn, Article 4, item I, "encourages monetary and non-monetary remuneration for improvement activities, conservation and protection of native vegetation, "complemented by Article 5 and its subparagraphs, which provide for actions that must be achieved:

- I - Establish partnerships with public or private, national or international agencies and entities, with a view to supporting payment projects for environmental services;
- II - Foster sectoral agreements to generate demand for environmental services;
- V - To promote good methodological practices for the valuation, verification, validation, certification and monitoring of environmental services;
- VI - Promote the registration and integration of data from environmental service projects;
- VII- To foster the development of a digital tool for the payment of environmental services;

In addition, MMA Ordinance No. 414 of August 31, 2021, which establishes the Forest + Bioeconomy modality, in its paragraphs, also lists a set of government actions, namely:

- I - The recognition of the direct contribution of sustainable forest management activities, timber or non-timber, to the protection of forests;
- II - The creation of commercial arrangements and promotion of innovation to highlight, recognize and remunerate the environmental services performed by those who work in forest conservation;
- III - The incentive to timber and non-timber forest production from native forests in Brazil, fostering innovation, structuring and development of this chain through Payment for Environmental Services;
- IV - The incentive to remunerate the activities of monitoring, conservation and recovery of native vegetation, enabling the guarantee of income, generating stability and incentives for the maintenance of forest areas; and
- V - Entrepreneurial actions that have the potential to value the market for payments for environmental services.

By Environmental Services, Article 3 of MMA Ordinance No. 288, defines it as the set of activities for the improvement, recovery, monitoring and conservation of native vegetation in all biomes.

FAMILY FARMING AND THE CARBON MARKET

The fact that the ABC and ABC+ Plan have not incorporated specific strategies and goals for low-carbon family farming is serious, considering its particularities and importance. The 2017 Agricultural Census revealed that Brazil has around 5.07 million agricultural establishments, occupying an area corresponding to 351 million hectares. Of these, family farms were 3.90 million (76.8%), occupying 80.9 million hectares (23.0%), which demonstrates the importance of family farming for society and the construction of low-carbon agriculture in Brazil. Given this situation, the question is pertinent: how can ABC+ marginalize almost 4 million rural producers and leave out an area of more than 80 million hectares?

Of the total of 2,322,719 rural units in the Northeast, 1,838,846 units are family farming, which corresponds to 79% of the establishments, and 64.7 thousand agricultural establishments have already adopted production systems for organic agriculture and/or livestock (IBGE, 2017, 2020). These data alone already make important contributions to the reduction of GHG emissions, in addition to improving environmental quality, which demonstrates that ABC+ should have incorporated more incentives for the "organic" and "agroecological" transition in Brazilian agriculture, especially family farmers.

According to the report of group 1 of the Brazilian Panel on Climate Change 2015, for the Caatinga Biome, forecasts indicate an increase of 0.5° to 1°C in air temperature and a decrease of between 10% and 20% in rainfall over the next three decades (until 2040), with a gradual increase in temperature to 1.5° to 2.5°C and a decrease of between 25% and 35% in rainfall patterns in the period 2041-2070. At the end of the century (2071-2100), projections indicate significantly warmer conditions (temperature increase between 3.5° and 4.5°C), and worsening of the regional water deficit with a decrease of practically half (40 to 50%) of the distribution of rainfall.

These challenges are even greater for family farming, which is more susceptible to climate change due to its particularities. Climate change can affect the production of traditional family farming crops, in addition to compromising food security. The performance of beef and dairy cattle can be affected by the increase in temperature and the reduction in rainfall, which can generate greater discomfort to the animals, in addition to the decrease in pasture productivity and the increase in the occurrence of diseases and pests (ANGELOTTI; GIONGO, 2019).

The particularities of the Brazilian agricultural sector, especially those of family farming, in the fight against climate change and in the construction of a family farming with low emissions intensity and more sustainable, demand that actions and strategies be flexible and adaptive. In this context of climate change, the basic principles for building low-emission intensity agriculture should be: promoting resilience and adaptation of agricultural establishments; reduction of emissions and removal of GHGs from the atmosphere; adoption of more efficient production systems and technologies in the use of natural, human and economic resources; productive inclusion; recognition of the particularities and heterogeneities of the agricultural sector (CRUZ *et al*, 2021).

The occurrence of the highest historical temperatures in several regions of the world is already a reality, as well as the greater occurrence of extreme weather events, such as prolonged droughts and heavy rains, incidence of hurricanes, tornadoes, cyclones and melting of the polar ice caps, resulting largely from human action and its choices for the generation of wealth.

Deforestation and deforestation of forests; Burned; Extensive monoculture, abusive use of pesticides and fertilizers, pollution of air and water resources, are part of the activities that directly affect the soil, causing its impoverishment and deterioration, in addition to water scarcity. At the same time, the growing attention of consumers and civil society to health issues, the growing urgency of climate action and the imperative of achieving the Sustainable Development Goals (SDGs), accentuate the need for more sustainable, resilient and safe production systems, a trend reinforced by the COVID-19 pandemic.

Of all economic activities, agriculture is naturally the most dependent and the most sensitive to climate change, but also the one that generates direct and indirect emissions of GHG – Greenhouse Gases into the atmosphere, by various processes, such as: enteric fermentation in ruminant herbivores (CH₄); production of animal waste (CH₄ and N₂O); conventional soil preparation (CO₂); flooded rice cultivation (CH₄); burning of agricultural waste (CO₂, CH₄, N₂O, among others); N₂O emission in soils by the use of nitrogen fertilizers; burning by the consumption of fossil fuels (CO₂) in the production and transport of agricultural products and the use of inputs that, for their production, require high energy consumption in their industrialization (fertilizers, herbicides, fungicides), interfering with global warming (VIEIRA FILHO *et al*, 2017).

In view of this reality, low-carbon agriculture presents itself as a sustainable alternative that aims to reduce the negative impacts of the sector on the environment, which

is why, although it is a topic that is gradually reaching the centrality of the debate, academically it is not yet being the object of the necessary studies and research. His theory is quite advanced for other biomes, however, in the caatinga there is little information available and with regard to practice, the actions are still incipient and, in some cases, non-existent.

THE IMPORTANCE OF THE DEBATE ON THE SUBJECT

Since the 1990s, in the last century, the international community within the United Nations (UN) has tried to articulate actions on a global scale to face the challenges posed by climate change (UN, 2021), however, despite advances in scientific and institutional knowledge regarding global climate change, reversing the trend of increasing GHG concentration in the atmosphere has not been an easy task (IPCC, 2021).

This problem, which the whole world has been concerned about lately, is not new. The concentration of gases in the atmosphere has increased significantly since the dawn of civilizations and, most notably, in the mid-nineteenth century when the industrial revolution began. The use of natural resources such as coal, oil and forested areas, has caused the concentration of gases in the atmosphere, especially CO₂, to increase exponentially to this day. (CERRI and CERRI, 2007).

In the context of industrialization, the conception of the natural environment was not that of something to be contemplated and preserved in its originality, but that of an object of appropriation and manipulation, a resource to be used for material and social development, with environmental impacts being counted as rates of progress and levels of development.

Predatory exploitation, which was considered the price of backwardness, came to be considered the price of progress, establishing the close link between the processes of rural-agricultural and urban-industrial development, because industrial policy depended totally on the natural environment. From the rural came the firewood to supply the furnaces of the factory activities, in addition to the cheap labor, which was exploited to exhaustion. However, climate change is not just an environmental issue, but a market and societal issue. In the capitalist world, producing wealth for profit is what determines what and how to do it. It is only more recently that this paradigm has been contested, with a new understanding that conserving the environment means preserving the viability of the business itself, since, without raw materials and without energy, the activity is not effective.

The greenhouse effect is a natural phenomenon, composed of small amounts of GHGs, which maintains the average temperature of the Earth due to the absorption of infrared radiation, however, the increase in the concentration of these gases can block the exit of thermal infrared rays and greatly increase the average temperature of the planet, causing negative consequences, such as a decrease in water; increase in the desertification process; extinction of plants and animals and decrease in agricultural and livestock productivity. It was from the evidence that the earth's temperature was increasing beyond what was predicted that the environmental issue emerged as a global problem, guiding policies, implementing programs or defining conducts and practices aimed at protecting the environment. The first initiative was the Stockholm Conference or United Nations Conference on Man and Development, held between June 5 and 16, 1972, where the environmental issue and the urgent need to reorient the predominant development style were addressed (MENDES et al, 2014).

In 1987, the World Commission on Environment and Human Development of the United Nations (UN) presented to the international community the *Brundtland* report or Our Common Future, showing that sustainable development is that which satisfies the needs of the present without compromising the ability of future generations to meet their own needs. Subsequently, in 1997, the UN Conference of the Parties approved the Kyoto Protocol, which established a schedule of quantitative limitations for the targets for reducing and limiting GHG emissions: an average of 5.2% below 1990 levels, in the period 2008-2012, as a safety level that would prevent dangerous interference in the climate system and disastrous environmental consequences.

This coercion imposed from outside by international organizations pressured the signatory countries to cooperate with a view to solving the environmental problem, but the solidarity of these actors is driven by interests and advantages, hence why the Kyoto Protocol provided for a financial return for the commercialization of carbon credits for those that did not pollute.

To this end, the protocol included the Clean Development Mechanism instrument, whose eligible activities are afforestation and reforestation, under the allegation that trees reduce climate extremes with carbon sequestration. Through photosynthesis, a tree removes atmospheric carbon dioxide which, with the incidence of sunlight and in symbiosis with water, is transformed into energy to promote the growth and maintenance of the tree's

life, fixing the carbon of the gas in the aerial biomass, in the underground biomass and in the soil (CRUZ et al, 2021).

The carbon market trades two types of assets: *i*) emission allowances allocated in a regime of targets and negotiation of the Kyoto Protocol; and *ii*) emission reductions based on projects that include CDM and JI. On the other hand, in summary, it can be said that the carbon market is divided into two segments: *i*) Kyoto, led by the European Union (EU); and *ii*) non-Kyoto, with the leadership of the United States (CARVALHO, 2010). For Brazil, a signatory country to the protocol and made up of biomes that provide many options for forestry projects, forest carbon sequestration can represent the possibility of restoring degraded protected areas and inducing sustainable land use in the caatinga.

In this way, opportunities are opened to encourage the recovery and enrichment of forest cover in degraded areas, in order to promote sustainable development and contribute to a new modality of agrarian activity and a new concept of rural property productivity.

The Sectoral Plan for Adaptation to Climate Change and Low Carbon Emissions in Agriculture with a view to Sustainable Development (2020-2030) – ABC Plan, led by the Ministry of Agriculture, Livestock and Supply (MAPA), was fundamental for the alignment between productivity and sustainability in the national rural sector. Established in 2010, its results contributed to the 2030 Agenda for Sustainable Development, in particular SDG 2 (Zero Hunger and Sustainable Agriculture) and SDG 13 (Action against global climate change).

A study carried out by the Institute of Applied Economic Research indicated that 95% of losses in Brazilian agriculture were due to drought or heavy rain events, which motivated the creation of the Climate Risk Zoning Program, a public policy adopted by MAPA to guide agricultural credit and insurance (ROSSETTI, 2001).

The international standards for what is popularly known as the "Carbon Market" have as flexibility mechanisms the CDM – Clean Development Mechanism, born from a Brazilian Proposal in 1997 in the international negotiations that preceded the adoption of the Kyoto Protocol. The first methodology approved by the CDM, together with its Executive Council, was "Sanitary Landfills – Salvador, Bahia" and later, the first effectively registered project, also Brazilian, the Nova Gerar Project – Rio de Janeiro. Currently, the CDM takes on truly global dimensions, involving the participation of more than 70 nations (VIEIRA FILHO *et al*, 2017).

Society is being challenged to break with the unsustainable agricultural production model, in order to meet the increase in food demand, while promoting environmental preservation and improvement, in order to guarantee the demands of future generations.

CONCLUSION

Brazil has been able to develop different sustainable agricultural production technologies for the tropical environment, so Brazilian farmers and ranchers already have technological alternatives developed for their edaphoclimatic and socioeconomic conditions, as well as legislation and public policies designed to support the increase in the scale of adoption with a view to mitigating GHG emissions. However, it is necessary to solve chronic problems of Brazilian family farming, such as:

- a. Expand agricultural credit to farmers who produce food for direct consumption;
- b. Strengthen technical assistance to increase productivity;
- c. Expand investments in infrastructure for storage and flow of agricultural production;
- d. Reduce financing restrictions and prioritize development and technology that allow a significant increase in agricultural production in Brazilian territory, minimizing the impacts of global warming in the coming years (MENDES *et al*, 2014)

The construction of low-carbon family farming also involves the adoption of communication, mobilization, awareness-raising, training strategies and, obviously, ensuring access to markets; risk and uncertainty analyses; rural insurance and mechanisms for mitigation and adaptation to climate change. With the adoption of these tools, it will be possible for family farmers, individually or collectively, to seek remuneration for environmental services.

Environmental services are considered to be those that generate environmental improvements with benefits for society, such as CO₂ removal, improvement of water quality, recovery of degraded areas, etc., as long as they can be measured, and can be classified into three main activities: pollution control (atmospheric, water, soil and noise); resource management (emphasis on purification systems and drinking water supply); and technology and products that are clean or efficient in the use of natural resources. Sustainability can only be fully achieved when everyone is aware of their role involving environmental issues, their risks and opportunities.

The strengthening of family farming, in the context of climate change, requires the development of policies that are not only aimed at the technological issue, credit and productivity, but also measures to strengthen actions and policies associated with food and nutrition security. (ANGELOTTI; GIONGO, 2019).

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