

## **The Brazilian Cotton Agribusiness: Environment and Sustainability**

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### **Abstract**

**Statement of Issue/Problem:** This paper investigates in which ways Brazilian cotton, cultivated in an extractive model of monoculture in large properties and with strong use of fertilizers and pesticides, acquires the quality of a sustainable product. Spreading throughout the Cerrado, the second largest biome of South America, Brazil has become one of the four biggest cotton producers in the world and the second biggest global exporter. The main goal was to unveil the process through which the cotton agribusiness hegemony and its sustainability discourse is built, gaining ground and acceptance in the fashion field, and reaching the consumer market.

Therefore, the object of this study is how different social agents represent and build the environmental problems coming from the Brazilian cotton agribusiness.

Brazil has a prominent position in the history of cotton for it has been part of it since colonial times. In the last years it regained the second position as the biggest cotton global exporter, the first in the Better Cotton Initiative (BCI) rank, having the fourth largest garment manufacturing park, and being the fifth biggest textile producer and second biggest producer and third biggest consumer of denim. The country is also the biggest full-scale textile chain of the West, from the fiber production to fashion shows, passing through mill, weaving, manufacturing, and retail.

Sustainability is an important object of dispute in the local cotton market. There is the monoculture model lead by large scale producers using highly mechanized tools and based on the usage of pesticides and fertilizers; on the other hand, the agroecological family-based model anchored in Agroecology without the use of pesticides and supplying for food safety as an alternative to fight poverty and inequality in low-income countries. Both social groups quarrel for the authority and recognition of sustainable practices, although the agribusiness group has the supremacy of the narrative, turning the debate into a high-level conflict.

The main questions to conduct the research are:

1- How and why sustainability became an object of dispute and a fundamental element in the power relations between social groups in the cotton field? What role certifications play in the quarrel for dominance?

2- How the cotton agribusiness group gains acceptance in the Brazilian fashion field to its political project?

**Originality:** This paper is relevant because it reveals that the claims of “sustainability” by the BCI cotton do not correspond to the definition of the concept as we know since the Brudtland report, that means “the capacity of meet the needs of the present without compromising the ability of future generations to meet their own needs”.

As will be seen in the following pages, the BCI Brazilian cotton does not meet the main socioenvironmental requirements of reducing inequalities nor preservation of biodiversity. The topics covered in this paper consider important transformations that the Brazilian fashion industry is going through in the sense of more transparency, traceability, and lower environmental impact practices. Despite that, the cotton agribusiness producers reached the hegemony of the sustainability narrative in the fashion field, posing a big risk to the building of effective parameters of transformation in the sector.

**Methodology:** The methodology combines critic and theoretical studies with qualitative analysis of reports from the researched institutions and available academic studies on Brazilian cotton.

The approach of the problem is made from the thought of Bruno Latour, Ulrich Beck and David Harvey, authors that take the environmental issues as systemics to capitalism and therefore as part of its own genesis and historic evolution.

The concepts of *field* and *habitus* from Pierre Bourdieu are applied to analyze how the agribusiness group configured the new power field, its relations, and the consolidation of its hegemony. We describe how the rules of the game are established, the disputed objects, the groups involved and the *habitus*, defined as a capital and a knowledge built because of the relationship between the agents, in the social structures.

Bruno Latour and the revision of the concepts of Nature and Culture; Ulrich Beck and the definition of “risk society”; and David Harvey with the notion of exponential growth associated with the displacement of Nature from peripheral countries to the global North, as the essence of the Capital’s ecosystem, were central ideas to this study.

#### **Summary of Results:**

1 - Sustainability is the main strategy for getting the hegemony in the field. It is a new value that is introduced in the 2000s by the idea of environmental risk transferred to individuals.

2 - The certifications (Brazilian Responsible Cotton – ABR and Better Cotton Initiative – BCI) became regulatory instruments of the field and validators of sustainability attributes. The certifications control the production risks.

3 - The sustainability discourse of the Agribusiness group sustains its hegemony and is efficient and tends to be considered the only one existent.

4 - The neocolonial mechanism of appropriation of Nature is now being replicated in a new guise, modern and sustainable, using elaborated persuasion strategies and having more acceptance among other social groups to its hegemony project.

5 - Agribusiness cotton is the fruit of unsustainable development because it is based on exponential growth without considering the earth boundaries. The extraction from Nature to global markets results in a strong and continuous ecological imbalance in countries from the global South. The most benefiting from this model still are the large-scale producers, the countries that import from manufacturers, and chemical industry conglomerates.

**Keywords:** sustainability; cotton; agribusiness; Cerrado; Certification; extractivism; Fashion; Biodiversity

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## 1. A Green Revolution and expansion of the cotton agribusiness

In Brazil, cotton farming, benefiting from the growing internal and external demand, had a fast expansion to the Cerrado in the beginning of the 2000s. The Cerrado, located in the Brazilian Midwest, is the second largest biome of South America, occupying an area of about 22% of the Brazilian territory. Since the 1970's it has been suffering serious environmental impacts due to mines and agriculture occupation. The cotton production completely changed its productive chain moving from the semi-arid region, where it was located since colonial times, to the Cerrado region rotating with soybeans, which is the biggest exportation commodity. With this regional shift, cotton farming began the exploration of large areas (from 100 to 3.000ha) with minimum use of labor force, intensive use of inputs and complete mechanization of harvest and direct trading with the textile industry with no mediators.

In 2009, Brazil has reached the first place in the pesticide consumer rank and the seventh position concerning quantity per planted hectare. However, it's not the main producer worldwide: "Currently Brazil is the largest pesticide consumer globally, in absolute numbers, what can result in problems of environmental contamination and for the human health through food contamination or by the direct exposition of the workers to these products. The pesticides can be very toxic, in addition to being persistent and movable through soil, water and air, tending to accumulate in the soil or biota, and its residues can reach superficial waters by drainage, and to the groundwater by leaching<sup>i</sup>."

Among the producing industries of pesticides 92% are controlled by foreign capital enterprises, setting the international monopoly of the sector: Monsanto (USA), Syngenta (Sweden), Dupont (USA), Dow Chemical (USA), Bayer (Germany), Novartis (Switzerland), Basf (Germany) and Millenia (Netherlands/Israel). The German pharmaceutical and agrochemical group Bayer has converted into the world leader of seeds, fertilizers, and pesticides by buying the American Monsanto, and today Brazil is their top client. This merger created a company with the control of more than a quarter of the global market of seeds and pesticides, considering that all the ones mentioned here represent together more than a half of all the pesticides commercialized worldwide. Often these companies look for concessions in the law of south global countries to amplify the consolidation of markets with products that many times have restricted used in their countries of origin.

According to the important work of the geographer Larissa Mies Bombardi<sup>ii</sup>, the use of pesticides has increased in 100% in the whole world between 2000 and 2001, and in Brazil this growth was of 200%. Within this context *glyphosate* corresponds to half of the volume of pesticides sold until 2014, date of the research. Glyphosate, according to the ANVISA's (the Brazilian National Health Surveillance Agency) assessment from 2008, has been a subject of concern because of its cancerous components and other hazards to human health, and because of that it will be banished from some European countries till 2022.

It's important to highlight that the most affected directly by the usage of chemical products are the ones who manipulate them, namely the rural workers and peasants and their families.<sup>iii</sup>

A study on the production of the cotton crop of 2010/11 showed that the cost of production can reach 61% of pesticides and fertilizers, while the global average is estimated around 16%. In Brazil those chemical components benefit from tax exemption, unlike other countries that over tax agrochemicals depending on their toxicity.

Brazil gets the second place in the world in the usage of genetic modified products (GMOs), in which the altering of DNA made by genetic engineering happens by inserting a gene of a species into another species causing an alteration in its genetic code. There's a direct relation between transgenic seeds and the excessive use of pesticides, capable of attacking and preventing cotton plagues efficiently without destroying the harvest by using poisons, considering that the new seeds are highly resistant, especially to glyphosate. However, the pesticides do not attack only the cotton, but the whole biodiversity of the ecosystem.

Created during the military regime, the Brazilian Agricultural Research Corporation (Embrapa) and the Embrapa Cotton represent the transformation of scientific knowledge into technologies applied to industrial agriculture growth, having a central role in the so called "Agricultural Revolution" that happened in Brazil in the 1980's. The Brazilian state promoted the interests of the big properties with the multinational capital through tax exemption in the agrochemical industry and by creating scientific research organizations like Embrapa, creating a relation of extreme dependency.

Embrapa had a decisive role in the transference of the cotton culture from the Semi-arid to the Cerrado in the 2000s, guiding the agribusiness in the adaptation of the cotton culture in a naturally low fertility and high acidity territory. Between 1965 and 2010, the Brazilian cotton culture increased in 200% by area unit, and this is due to improvement of cotton species programs, and also the enlarged use of pesticides, fertilizers and mechanization of production.

With the market dominated by transgenic seeds and few possibilities of generating its own seeds, the farmer suffers from the concentration and monopoly of the productive chain by multinational companies from the planting to the harvesting. And it is also him who risks his health by manipulating poisons without having clear norms of application and manipulation.

## **2. Sustainability as a new business value**

Until the end of the last century Cerrado's economy was centered on subsistence farming and livestock, and only a small part of the land was deforested. This scenario began to change from the second half of 1990s, and today almost half of the territory is occupied by grassland or cultivated land. In this new region, the national cotton production jumped from 1,5 million tones in 2006 to 6,9 million tones in 2019.<sup>iv</sup> The model implies in a large-scale production with high production costs, favoring planting in big properties.

All this growth came along with pressure from international markets and the public opinion demanding for more transparency on the socioenvironmental practices on the supply chain. The spreading of the concept of sustainability at the end of 1990s made the agriculture sector develop strategies capable

of responding to the increasing pressures from the global market that it aimed to reach. Between the available alternatives, the standardization of production chains through certifications seemed to be a safer path to reach this goal.

Nationally organized around the Brazilian Association of Cotton (Abrapa) and many other regional associations, the Responsible Brazilian Cotton Program (ABR) that was created in 2012, started to work as a gateway to the “sustainable cotton” international market, benchmarked with the Better Cotton Initiative (BCI). Since the release of the program Brazil became the biggest BCI cotton supplier in the world.

Sustainability is then a value appropriated by cotton agribusiness agents as a strategic way of conquering both national and international markets and of forging a position as an innovative social group for the national economy. The outcomes from the implementation of the ABR and BCI certifications led Brazil, in 2019, to the position of second biggest cotton global exporter, just behind the United States.<sup>v</sup>

Such growth made Brazil the leader of certifications worldwide as an outcome the efficiency of the Better Cotton Initiative program, responsible for 30% of the global demand in 2020.

The strategy adopted by Brazilian Midwest cotton producers to achieve the hegemony reveals a social group with a *habitus*<sup>vi</sup> that implies knowledge and recognition of the ground rules and objects of dispute. The group of Brazilian soy producers has taken the lead of this field, reorganizing the positions of the cotton agents, objects of dispute and the conservation and subversion strategies in the field.

The acknowledgement of pressures related to socioenvironmental practices in the cotton production coming from the market created certification strategies, transformed in differentiated capital that affirms positions of power. In this new configuration sustainability becomes the main value to guide the strategies to dominate the field as a symbolic space where the agents determine and validate representations.

Besides the recommendation of reducing the agricultural defensives and the recognition of the potential damage to human health and contamination of water and of other food crops, the BCI: “[...] adopts a position of “neutrality in relation to the technology” in which concerns the GM (genetic modified) cotton. This means that the BCI will not encourage farmers to cultivate it or will try to prevent the access to it if it is made available legally.<sup>vii</sup> A certification that protects the environment and the workers from risks and at the same time was neutral about green cotton culture technologies, was the perfect way to the fast growth desired by the producers.

The fast technological progress was responsible for unemployment and for the exclusion of part of rural workers in the market, enlarging the social inequalities in cotton producing places. The cotton culture that was part of the Green Revolution corresponds to a small percentage of rural producers, owners of large tracts of land with reduced use of workforce, not generating much employment, but receiving public benefits created to push its growth and consolidate its economic hegemony. This is a result of its bonds to the Ruralist

Bench, able to direct favoring policies to these organized social groups that are highly active in the defense of their interests.

### **3. Social conflict and environmental risk**

Sustainability, based on technological modernization and high productivity per hectare, emerges as an important object of dispute by which we can apprehend the power relations and the tensions that move the fight for hegemony in the cotton industry. In one hand we have the monocrop planting led by producers in big extensions of land, highly mechanized and based on the use of pesticides and fertilizers; and on the other side there is the family agriculture model, anchored in Agroecology, built on traditional cultures without using pesticides and providing food safety. This format comes as an alternative to fight poverty and inequality in low-income countries. The smaller group of agroecology represents only 1% of the national production and it is formed by family farmers who grow cotton in their small properties in consortium with other crops, organizing themselves in autonomous cooperatives.

Both social groups dispute the authority and recognition of sustainable practices with the big producers having the hegemony, thus making the debate a high point of conflict in the power field. The idea that every field implies confrontation, fight, tension, and power, is shown by the presence of competitors inside the monocrop cotton culture.

The transition from the conventional cotton to organic planting started at the beginning of the 2000s with the implementation of pilot units developed by Embrapa in the common areas of family settlements in Paraíba that worked as a field school to make the conversion to the agroecological systems<sup>viii</sup>. In the settlements they also benefit the cotton and sell the fiber directly to the textile industry with no mediators. The farmers certify their harvest with less costs, good productivity, anticipated sales, and better prices. This new certification, validated by the joint to which the producer belongs is called OPAC, Participative Organism of Evaluation of Organic Quality, and is a solution created originally in Brazil being able to serve as a model to other countries that also have cotton agroecological consortiums.

The small farmers report that the application of pesticides was made manually in the former system, without use of tractors or proper individual protection, and that women couldn't participate in the activities because of the risk to their families' health. The access to good quality seeds was a problem and they usually ended up using seeds with low resistance to plague attacks. In the organic culture system, the seeds are produced by the farmers themselves, the fertilizers made of organic residues and animal feces, and the cotton is planted in consortium with other crops.

The notion of environmental risk developed by Beck can be an important parameter in the conflict analysis between cotton producing groups: while the use of pesticides is seen as a threat by the agroecology groups, the producers of certified and conventional cotton define the boll weevil plague (that devastated plantations in the semi-arid region in the 1980s) as the big risk that can contaminate and exterminate all their

cotton crops. Many times, the risk of conflict is expressed clearly on both sides, and it is one of the factors that drive the relationships and tensions between the Brazilian cotton producers: “As producers of conventional cotton, we’re not going to take a formula to the government forbidding the production of organic cotton or suggesting the extinction of this cultivation or establishing rules. This is the role of the scientific community, sanitary, state governments, federal and municipal authorities that should be worried about this threat. But we must emphasize the destructive power that it could bring to the entire productive chain”, highlights the executive director of Abrapa, Márcio Portocarrero.<sup>ix</sup>

The socioenvironmental risk defines the conflict relations, the limits of interaction and collaboration between groups. But it is also the triggering factor that unveils conflicting and excluding ways of production in the dispute for economic hegemony. The risk, used as an engine of conflicts between groups, hides deeper socioeconomical factors that are in the core of this conflict, as work relations and how are they organized in each social field. These small cotton producers minimize the socioenvironmental risks offering healthy foods and products, planted in a humane way. This production mode is highly inquisitive of the monocrop model that expropriates the land and concentrates the income and property in the hands of a few people.

The organic cotton producers are not represented by Abrapa and are not a threat to its hegemony, especially because they don’t count on economic, political, or cultural capital to make them able to compete for the authority over the symbolic value of sustainability.

#### **4. Cultural hegemony: the conquest of the market through the “Sou de Algodão” campaign**

Despite the victories reached with the growth of cotton production, in the last years agribusiness seems threatened by the synthetic fibers, especially polyester, that became the main spotlight in the global scenario due to its low price, which is the primary condition to achieve success in fast fashion. In 2015, synthetic fibers passed cotton for the first time in the Brazilian market consumption. Aiming to mitigate these risks, cotton producers moved forward to win membership of the national textile productive chain. And then, by the initiative of Abrapa and the Brazilian Cotton Institute, the *Sou de Algodão (I’m Made of Cotton)* campaign was created, with the goal to inform and raise awareness of the industry and consumers about the lifespan of products and socioenvironmental and economic sustainability of cotton.

Sustainability was defined as the biggest purpose of the campaign, conveying the idea that while adopting cotton, fashion brands and professionals would be also incorporating sustainable practices and values. The *Sou de Algodão* brand was defined and spread by its creators as a movement of awareness to responsible consumption and sought to guarantee the voluntary adhesion through identifying with the same values and purposes.

The achievement of the position of the most sustainable cotton in the world endorsed the feeling of grandiosity and pioneering and was broadly used by Abrapa to seek for more adhesion from social agents. The *Sou de Algodão (I’m Made of Cotton)* reinforces the natural attributes of durability of the fibers,

conscious consumption, innovation, social responsibility, and environmental preservation. However, all these values are also propagated by family producers that enhance the socioenvironmental quality of cotton produced without chemical products. Therefore, agribusiness appropriates values from this antagonistic and minor group, that is limited by an extremely reduced power of action and persuasion than Abrapa's political articulations.

In the fight for the hegemony in the field, cotton agribusiness relies on the combination of its economic (propriety of the means of production), institutional (90% of the cultivated area in an agro-industrial model), and political capital (the appropriation of public goods and services and the representation in the Parliamentary Front of Agriculture), added to the construction, consolidation, and recognition of all the value chain.

The Brazilian fashion field, that was alienated from the global sustainability debate until then, becomes an easy prey for this capital and gives it the authority to define the ground rules, including the relations outside their own field, in the social macrocosm.

The economic capital, used as a way of exchange with the intermediate agents who occupied spaces of power and decision on fashion events, was crucial to the success of the initial steps of the *Sou de Algodão (I'm Made of Cotton)* campaign granting access to important fashion retail companies. Mechanisms of incorporating well-known agents as symbolic leaders, like the SPFW director Paulo Borges, and the designers Alexandre Herchcovitch and Martha Medeiros, who occupy high prestige positions and have international recognition, along with potential financial arrangements, enabled the access to prestigious power positions. The adhesion and immediate obedience of these individuals, without resistance or questioning, reveals not only that the agents could benefit themselves economically, as well as shows symbolic exchanges between groups of different perspectives.

Additionally, to the advantages by financial sponsorships, the adhesion of the fashion field was also fruit from a previous collective invisible practice, especially through ABIT (Brazilian Textile Industry Association) and other legitimizing entities, that amplified the capillarity of its power of persuasion, capable of producing obedience without questioning. The social fashion agents, influenced by the calling of its leaderships who occupy the highest hierarchy on the field, got mobilized in defense of Abrapa's interests, that they then began to share as their own.

It is in the construction of its reputation and affirmation as symbolic capital on the fashion field that were established different benefits and exchanges, depending on the position of the agents. And then a social game is set with not only economic interests at play, but also the interest in being part of a game that is led by an hegemonic group dictating the rules, the rhythm, and who can be part of it: "*interest is 'to be there', to participate, to admit that the game is worth playing and that the stakes created in and through the fact are worth pursuing; it is to recognize the game and to recognize its stakes*" (BOURDIEU, 2011). The conditions to

become a partner of the campaign were to work with cotton and create products containing at least 70% of the fiber.

Under the command of cotton business, sustainability starts to be common to most fashion companies that, together, recognize themselves as participating in the same project, by which all feel strengthened. It became evident in the 2020's *Sou de Algodão* Manifesto, when the campaign started to have real faces of fashion agents well known by the market and engaged in previous sustainability campaigns. The project of restructuring the cotton field, started at the beginning of the 21st century from the pressures of socioenvironmental values, now follows the route from the inside-out, transforming the Abrapa, legitimate representative of agribusiness, in one of the main unifying and structuring forces of the Brazilian fashion field. It returns to the social macrocosm as the spokesman of sustainability values in opposition to the advance of synthetic fibers hegemony that comes from the petrochemistry industry.

## **5. Final Considerations**

The cotton culture dates to the beginning of capitalism and its process of accumulation through extractive economic models was based on slave-labor monoculture in the United States as well as in Brazil. In that period, was established an economic system based on the extraction/exportation in the colonies and importation/manufacture in the European countries where the metropolitan states were. As the first globalized productive chain, cotton played a central role in the formation of the capitalist system, that in that time already provoked devastating effects over the environment of colonized territories and communities where it was deployed.

Some centuries passed and the extractive system was renewed with some different elements that made it look like they represent modernity, supporting the Green Revolution and holding the values of sustainability on the fashion field. The arrival of cotton in the Cerrado during the 2000s and its association to soy in a system of crop rotation can be considered as a neocolonial appropriation by which a symbolic system, built on modern green technology and sustainable values, hides a perverse economic model of exponential extraction from nature without any social benefits. Besides that, the practice of monoculture with intensive use of pesticides adds an continuous ecological unbalance for biodiversity, soil preservation and carbon retention. And to further aggravate this scenario, the close and dependent bond to soy makes cotton part of a productive chain that is suspected to have connections with illegal deforestation, occupation of areas of preservation and degradation of the Cerrado.<sup>x</sup>

The new globalization scenario created an agro-industrial system in Brazil that led to a bigger land concentration, expelling of rural workers, and selecting producers with economic and social power to continue in a game that demands more and more financial investment. The biggest grantees from this model continue to be the big producers, importing countries producers of manufacture and chemical industry global conglomerates, of which the monocrop culture is very dependent upon.

In a recent study Larissa Bombardi<sup>xi</sup> says that this dependency model enhances the asymmetry established by the old international work division regime in which the rich countries exported manufacture and technological products (machinery and agrochemicals, some forbidden in their original territories) while the poor countries exported commodities extracted from nature.

The retaking of the extractive model in the contemporary context is even more dramatic because it feeds the idea of economic growth based on a continuous and linear material progress, not considering the limits of the planet's natural resources. From the scientific and environmental points of view, cotton agribusiness will face challenges to survive in the next decades, because the climate crisis is already an irrefutable fact.<sup>xii</sup> The climatic vulnerability can alter the conditions of the territories where cotton is planted, and the elevation of temperatures can even make its cultivation impossible. The climate changes have potential to alter all the agricultural configuration of the world, what represents a huge challenge to the sustainability of production and ecosystems. Studies project losses in 50% of the Brazilian agricultural production if the temperatures increase in 3 degrees by 2050.<sup>xiii</sup>

In the management of the risks that threaten agribusiness, Embrapa, the public research company, should efficiently respond by formulating a new model for agriculture able to face the challenges of climate change. Two ways seems to be drawn up for the next decades: 1) stay with the current endless extraction of natural resources model in an increasingly degraded environment; 2) create strategies in which extractive activities lose economic importance, accelerating agricultural practices to reduce the greenhouse effect, recuperating forest areas and the biodiversity of the ecosystems, promoting crop diversification, and ensuring food safety in a scenario of increase of poverty.

Given this scenario of future risks, what are the possible outcomes to the *Sou de Algodão* (I'm Made of Cotton) campaign and for the Better Cotton Initiative certification and its status of sustainable cotton?

Having in mind the short time frame to reverse the trends of climate change, according to science, it is expected radical adaptive changes, not only for cotton culture, but also for the agroindustry, otherwise the risk of collapse of the extractive model will become a reality in a short space of time, causing heavy consequences to the Brazilian economy.

## 6. End Notes

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<sup>i</sup> Available in: <<https://www.mma.gov.br/component/k2/item/11294-quantidade-de-agrotoxico.html>>.

<sup>ii</sup> BOMBARDI, Larissa M. **Geografia do Uso de Agrotóxicos no Brasil e Conexões com a União Europeia**. São Paulo: FFLCH USP, 2017.

<sup>iii</sup> "The country in total, during the period between 2007 to 2014, had 1.186 deaths caused by intoxication from pesticides, which means an average of 148 deaths per year or the equivalent of one person dying each two and a half days. That means that in Brazil, according to official numbers, each two days and a half one person dies intoxicated by agricultural pesticides." (BOMBARDI, 2019, p. 58).

<sup>iv</sup> Available in: <<https://censos.ibge.gov.br/agro/2017/2013-agencia-de-noticias/releases/26537-ibge-preve-safra-recorde-de-graos-em-2020.html>>.

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<sup>v</sup> From 147.280 tons of cotton in 2001, Brazil began to export 974.118 tons in 2018 and 1.613.670 tons in 2019, and China passed from the third to being the first destination, with 25% of total volume of Brazilian exportations from 2017 to 2019. The increase of 36% in the last year corresponded to the elevation of 37,8% of cultivated area. Available in <<https://www.fazcomex.com.br/blog/exportacao-brasileira-de-algodao/>>.

<sup>vi</sup> “ The habitus is a kind of practical sense of what should be done in a certain situation – what we call in sports “the sense of the game”, the art of anticipating the written future of the game in the actual state of the game. (BOURDIEU, 1994, p. 42).

<sup>vii</sup> Available in: <[https://bettercotton.org/wp-content/uploads/2014/12/Better-Cotton-Production-Principles-and-Criteria-Explained-2013\\_final\\_por\\_ext.pdf](https://bettercotton.org/wp-content/uploads/2014/12/Better-Cotton-Production-Principles-and-Criteria-Explained-2013_final_por_ext.pdf)>.

<sup>viii</sup> Also, the Embrapa has been acting for almost twenty years, with scarce resources, in the research for the development of Cotton in Agroecological Consortiums.

<sup>ix</sup> Interview available in: <<https://www.canalrural.com.br/programas/abrapa-pede-rigor-fitossanitario-contra-bicudo-producao-algodao-organico-72144/>>. See also: MOURA, Arlindo de Azevedo. Cotonicultura pensada para durar. **Embrapa**. Available in: <<https://www.embrapa.br/conteudo-web/>>.

<sup>x</sup> Available: <<https://brasil.elpais.com/brasil/2020-07-16/um-quinto-das-exportacoes-de-soja-da-amazonia-e-cerrado-a-ue-e-fruto-de-desmatamento-ilegal.html>>.

<sup>xi</sup> BOMBARDI, Larissa Mies, Geography of Asymmetry- São Paulo University, 2021

<sup>xii</sup> Simulations presented in the sixth Intergovernmental Panel on Climate (IPCC) stressed that climate change is unquestionable.

<sup>xiii</sup> National Adaptation Plan to Climate Change (2016).

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