Review

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Institutionalization and Legislation of Organic Production in Brazil

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Abstract: Starting 1994, the debate for regulating organic agriculture in Brazil was officially recognized in May 1999. Still, only in 2003, when the law # 10,831 was instituted, the country reached an effective milestone on organic production, both internally and externally. Since the industry regulation, the legislation underwent many modifications, constantly reviewing and adjusting. The current study examined the institutionalization of organic production in Brazil and what the current regulations can be used as a reference for those interested in this sector. The most recent update of Organic legislation and its implication on practice were also discussed. A case study on production of strawberry in organic system is presented and discussed.

Keywords: organic certification; organic products; organic farming; agroecology; sustainable agriculture; organic farming

1. Introduction

Organic farming is a working model that aims to achieve economic, environmental, and social sustainability in agroecological production systems that is gaining increased ground both on the consumer table and in production areas [1,2]. In 2021, it is reported that global organic production occupies an area of 76.4 million hectares; the number of producers is approximately 3.7 million, and the global financial figures generated from the organic chain are more than 680 billion dollars [3].

Organic regulation and certification systems encounter several difficulties, mainly regarding the very definition of the organic system, making equivalence between countries difficult, among other difficulties [4]. In Brazil, discussions about the organic movement began in the late 1970s through local initiatives that sought an alternative form of agriculture compared to the normally used by farmers. It expanded very slowly between 1973 and 1995, and its regulation began in 1999, with Normative Instruction (NI) nº 007, May 17th, 1999 [5]. Since the subject of organic farming encompasses various particularities [6,7], Brazilian legislation is constantly being reformulated, seeking to adapt to new contexts and realities, and there are still sectors that require regulation, such as the production of organic cosmetics.

This situation represents a challenge for professionals and students in the field, especially for producers, who need to adjust to the continuous changes in the legislation that sometimes lack technical support, making it difficult to know which regulations are in use and what contents they cover.

This study aims to understand the new provisions established by the most recent technical regulation for organic production systems, by the Ministry of Agriculture, Livestock and Food

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Supply (MAPA) Ordinance number 52 of March 15th, 2021 [8], and to assess the main implications of the new regulations. It is also sought to provide an overview of organic farming in Brazil since access to good quality information in the dynamic field of organic farming serves as a tool for more in-depth evaluation, influencing stakeholders throughout the value chain.

2. Characterization of organic production in Brazil

Brazil is the eleventh largest organic producer with a total of 1.48 million hectares of certified and in conversion areas, and ranks fourth among the countries with the greatest increase in organic area compared to the previous year, with an increase of 162 million hectares compared to 2020 [3].

Based on the 2017 agricultural census by the Brazilian Institute of Geography and Statistics (IBGE), there are 5,073,324 agricultural establishments in Brazil, 64,690 have organic farming and/or organic livestock. Among them, there are 36,689 establishments in plant production; 17,612 in animal production, and 10,389 in mixed production (animal and plant). Minas Gerais is the Brazilian state with the largest number of organic farms in the country (10,884), followed by Paraná and Pernambuco states, with 7,056 and 5,072 establishments, respectively [9]. It is important to note that the number of establishments is unrelated to the size and volume of production.

Since 2011, the MAPA has made available on its website the National Register of Organic Producers (CNPO), which lists organic production units in Brazil. The register also identifies organic units by municipality and federative unit, corporate, registration number, and products are updated monthly. In June 2023 (Table 1), Brazil had 24,385 certified organic producers. Paraná state has the highest number of producers (3,773) followed by Rio Grande do Sul (3,749) and Pará states (2,886), respectively. The state with the lowest number of producers is Tocantins (8) in the northern part of the country.

3. Institutionalization and history of Brazilian organic legislation

Certification of organic compliance is an essential element in the production and commercial process, as it gives consumers greater credibility and impartiality to the practices and principles employed in organic production. The institutionalization of organic farming in the world began in 1972, with the creation of IFOAM (International Federation of Organic Agriculture Movements) and the publication of its first regulations in 1978. IFOAM standards served as a parameter for the marketing of organic products worldwide until the 1990s and for implementing different local standards and technical regulations in various countries [10].

In Brazil, debates on organic farming began in the late 1970s through local initiatives that opposed traditional agriculture and sought alternative production models. However, it developed slowly until 1995. In the 1990s, with the first United Nations Conference on Environment and Development, held in Rio de Janeiro in 92 - ECO 92, the debate on sustainability advanced, positively influencing the production and consumption of organic food in Brazil. However, there was no Brazilian legislation for the sector then, and the certifiers defined their own rules [11].

Table 1. Number of organic producers registered by Federative Unit (States) of Brazil in the National Register of Organic Farmers.

Federation Unit- States	Number of Farmers
Acre	83
Alagoas	100
Amazonas	755
Amapá	153
Bahia	1312
Ceará	927
Distrito Federal	254
Espirito Santo	401

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Goiás	234
Maranhão	819
Minas Gerais	935
Mato Grosso do Sul	57
Mato Grosso	246
Pará	2886
Paraíba	721
Pernambuco	959
Piauí	1255
Paraná	3773
Rio de Janeiro	499
Rio Grande do Norte	582
Rondônia	148
Roraima	41
Rio Grande do Sul	3749
Santa Catarina	1407
Sergipe	342
São Paulo	1739
Tocantins	8
Brazil (total)	24,385

Source: National Register of Organic Producers - Ministry of Agriculture, Livestock and Food Supply (MAPA), 2023, accessed on June 06, 2023 [12].

In this context, international pressure erupted in 1994, especially from the European community and non-governmental organizations (NGOs), to define standards for producing and marketing organic products in Brazil. This pressure led to the creation of Ordinance MA (Ministry of Agriculture, after changed to MAPA) nº 178 of August 1994. This ordinance created the Special Commission to propose certification standards for organic products, with the participation of the executive branches and civil society to discuss the guidelines for organic farming [13]. Later that year, MA Order nº 190 of September 1994 established the National Organic Products Committee, tasked with determining the strategies for certifying organic products. Following this decision, MA Order nº 192 of April 1995 stipulated the members who would make up the National Organic Products Committee. After much debate, Normative Instruction (NI) nº 007 was promulgated on May 17th, 1999, which began to regulate the production, classification, processing, distribution, identification, and certification of organic products and production. This was the beginning of regulating organic farming in Brazil [13]. Four years after, through Normative Instruction nº 007/99, and after being discussed in the National Congress since 1996, the Law nº 10,831, known as the "Organic Law", was approved on December 23rd, 2003 [10]. This law establishes the rules for the production and marketing of organic products and presents the concepts of organic production, including different types of alternative systems - natural, biodynamic, permaculture, regenerative, ecological, biological, and agroecological, among others [14,15].

Law nº 10,831 is the only organic farming law, and it was decided to organize Brazilian regulations based on a general, intelligible law and to detail it in decrees and normative instructions, which are easier to amend. On April 15th, 2004, the Sectorial Chamber of the Organic Agriculture Production Chain (CSAO) was set up and officially sanctioned through Ordinance nº 36 of January, 2006. The chamber participated in various segments of the Brazilian organic movement, comprising government and civil society members. The discussions, drafting, approval, and regulation of law

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10,831/2003 occurred through this chamber. In 2008, the CSAO was renamed the Technical Chamber for Organic Agriculture (CTAO), maintaining the same regulations and legislative frameworks [10].

After being processed by the Civilian House and all the ministries involved (MAPA, Ministry of Agrarian Development and Family Farming (MDA), Ministry of the Environment (MMA), Ministry of Health (MS), and Ministry of Development, Industry, Commerce and Services (MDIC)) and after the CSAO assent, decree n° 6.323 was published on December 27th, 2007 [16]. This decree regulates Law 10,831, presenting itself as a more detailed regulatory instrument, addressing concepts, guidelines, and general provisions about organic farming, dealing with issues such as production, marketing, permitted inputs, quality information (identification, labeling, advertising, and publicity), labor relations in organic farming, control mechanisms, conversion, parallel production, responsibility of the parties involved, inspection, inspection documents, administrative penalties, conformity assessment bodies, the Brazilian conformity assessment system (SisOrg), among others. Law nº 10,831 of 2003 and its regulation by Decree nº 6,323 of 2007 made the certification of organic products in Brazil compulsory and nº longer voluntary, bringing significant changes for producers [17]. The deadline for producers to comply was the end of 2008, but it was extended to the end of 2010 by Decree nº 7.048 of December 23rd, 2009, so as not to affect them since the aim of the legislation was to develop the sector, bringing greater reliability and competitiveness to the national and international markets [18].

In 2008, after public consultations, the first Normative Instructions were published, based on Law 10,831/2003 and its regulation by Decree nº 6,323 of 2007: Normative Instruction nº 54, of October 22nd, 2008, defined the structure, composition, and attributions of the Organic Production Commissions, both at national (CNPORG - National Organic Production Commission) and in the states levels (CPORGs - State Organic Production Commissions). The commissions were established to contribute to fundamental actions for the development of organic production, with the essence of integration between the various agents of the organic production network in the public and private sectors and the effective involvement of society in the planning and democratic management of public policies [19].

Normative Instruction nº 64 of December 18th, 2008, revoked NI nº 007/99 and established the Technical Regulations for organic animal and plant production systems and the lists of substances and practices permitted for use in Organic Production Systems. Normative Instruction nº 64 was later replaced by Normative Instruction nº 46 of October 6th, 2011 (with the text later amended by Normative Instruction nº 17 of June 18th, 2014, and Normative Instruction nº 35 of September 8th, 2017). For 10 years, normative Instruction nº 46 was one of the main pieces of legislation on organic production in Brazil until the publication of Ordinance nº 52/2021 revoked Normative Instruction nº 46, which will be discussed later [20].

Three more Normative Instructions were published on May 28th, 2009:

> *NI nº 17, jointly issued by the Ministry of Agriculture, Livestock and Food Supply and the Ministry of the Environment (MMA), approves the technical standards for obtaining organic products from organic sustainable extractivists; NI nº 18, jointly issued by the Ministry of Health (MS) and the MAPA, sets out the technical regulations for processing, storing, and transporting organic products, as well as the products allowed for sanitizing facilities and equipment, the food additives and adjuvants allowed and the cleaning and disinfecting products that come into contact with organic food, and was later updated by NI nº 24 of June 1, 2011; and NI nº 19, which approves the organic quality control and information mechanisms and the official MAPA forms [21–23].*

NI nº 19 is truly relevant when it comes to the certification process. It established quality control and information mechanisms for organic production for legal entities and individuals, allowing for three forms of conformity assessment: certification by audit, the Social Control Organization (OCS), and the Participatory Guarantee System (SPG). Certification by audit is conducted by institutions under public or private law registered with MAPA, responsible for verifying the conformity of production processes based on organic production regulations.

Brazil has been an important driving force in the search for options for the auditing system, given that auditing is the costliest of the organic conformity assessment mechanisms and is far from

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the reality of the small producer. The other categories in the country resulted from pressure from social movements and producer associations, who opposed certification by auditing [24].

On the other categories of conformity assessment in Brazil:

> *The SPG is a participatory form of conformity assessment with the same recognition as an audit and comprises two groups: the members of the systems and the Participatory Conformity Assessment Bodies (OPACs). The OPAC is responsible for assuming the formal relationship with the MAPA, launching and updating the data of the production unit members of the SPG. The members of the systems can be made up of individuals and/or companies, which are divided into two categories: suppliers and collaborators. Suppliers comprise farming families, processors, distributors, marketers, transporters, and stores. The collaborators are consumers, technicians, public or private organizations, and NGO partners [24].*

The third form is the Social Control Organizations (OCS), which, unlike the SPG and the audit, does not offer producers the use of the SisOrg seal. As a result, producers participating in this modality must market their produce only through direct sales. Only family producers can participate in the OCS, which, like the SPG, is characterized by the Social Control and Solidarity Responsibility that the system provides. The OCS can be formed by a group, association, cooperative, or consortium of family producers, with or without legal personality, but the OCS must be registered with the MAPA [24].

Brazil was the first country to regulate the Participatory Guarantee System (SPG), serving as a world reference in this conformity assessment system [25]. In addition, NI nº 19 established guidelines for the National Register of Organic Producers (CNPO), the certificate of conformity, and defined the use of the SisOrg Seal (Brazilian Organic Conformity Assessment System) for certified products.

Also, in 2009, on July 23rd, Decree nº 6.913 was instituted, which deals with phytosanitary products approved for use in organic farming, and on November 5th, NI nº 50 was published, establishing the single official seal of the Brazilian Organic Conformity Assessment System (SisOrg), determining the requirements for its use on organic products NI nº 50 was later replaced by NI nº 18 of June 20th, 2014 [26,27].

Translation: "Produto orgânico": Organic Product; "Certificação por auditoria": Certification by Audit; "Sistema participativo": Participatory Guarantee System. Source: Adapted from [27].

Figure 1. Official seal of the Brazilian Organic Conformity Assessment System ("Selo SisOrg").

Seven others Normative Instructions were published in 2011. NI nº 1, of May 24th, 2011, jointly issued by SDA/SDC/ANVISA/IBAMA, establishes the procedures for registering phytosanitary products approved for use in organic farming; NI nº 23, of June 1st, 2011, which establishes the Technical Regulation for Organic Textile Products Derived from Cotton; Joint NI nº 24, of June 1st, 2011, which adds food additives and technology aids permitted in the processing of organic plant and animal products; NI nº 02, of June 2nd, 2011, jointly issued by SDA/SDC, which establishes the reference specifications for phytosanitary products approved for use in organic farming; Interministerial NI nº 28, of June 8th, 2011, which establishes Technical Standards for Organic Aquaculture Production Systems; NI nº 37, of August 2nd, 2011, which established the Technical

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Regulation for the production of Edible Mushrooms in Organic Production Systems; and NI nº 38 of August 2nd, 2011, which establishes the Technical Regulation for the Production of Seeds and Seedlings in Organic Production Systems [28–34].

In 2012, through Decree nº 7,794/2012, the federal government instituted the National Policy for Agroecology and Organic Production (PNAPO), aimed at allocating public funds to advance and foster agroecological transition and organic and ecologically based production [35].

The main instrument of the National Agroecology Policy (PNAPO) was the National Plan for Agroecology and Organic Production (PLANAPO), whose management bodies were the National Commission for Agroecology and Organic Production (CNAPO), made up of government representatives and civil society organizations, and the Interministerial Chamber for Agroecology and Organic Production (CIAPO), made up solely of government members to integrate and coordinate intra-governmental actions.

The first phase of PLANAPO, called "Brasil Agroecológico" (Agroecological Brazil), covered the period from 2013 to 2015 and represented a major step forward from the perspective of organizing actions in this area, promoting coordination between the public and private agents involved, expanding the intentions of government managers, which helped to incorporate the issue into methods for structuring and implementing public policies [36].

In 2015, given the provisions of Decree nº 7,794 of August 20th, 2012, Normative Instruction nº 13 of May 28th, 2015, was published, establishing the structure, composition, and duties of the Thematic Subcommittee on Organic Production, and the structure, composition and duties of the Organic Production Commissions in the Federation Units (CPOrg-UF), and the guidelines for drawing up their respective internal regulations [37].

In 2016, through the Interministerial Ordinance MDA/SEGOV/PR nº 1 of May 3rd, 2016, the second phase of PLANAPO (2016 - 2019) was launched, which followed the same basis of broad civil society participation as the first cycle. However, since 2016, the issue has been weakened, and a third cycle of the program has not followed. In addition to the regulations already mentioned, MAPA issued three important Technical Notes (TN), one in 2014 and two in 2018. The TN COAGRE (COAGRE = Agroecology coordination) nº 40, of August 6th, 2014, deals with provisional procedures for the registration and labeling of organic products; TN nº 1/2018, which provides for the use of various terms for the marketing of organic products; and TN nº 2/2018, which provides for the addition of water and salt in the formulations of organic products or products with organic ingredients [38–40].

4. Main points on ordinance nº 52/2021, the new guideline for organic production in Brazil

In 2021, MAPA published Ordinance nº 52 of March 15th, 2021. Ordinance 52 revoked Normative Instruction nº 46 of October 6th, 2011, establishing the new technical regulations for organic animal and plant production systems and the lists of permitted substances and practices [8].

The new Ordinance also revoked Normative Instructions nº 37 and nº 38 of August 2th, 2011, which now govern mushroom, organic seeds and seedlings production. Ordinance 52 was initially due to come into force on April 1st, 2021, but Circular Letter nº 2/2021 - MAPA set a deadline of March 15th, 2022, for producers to comply with the new regulations. It presents clearer language, meeting a demand from producers and technicians who were asking for a contemporary and easy to understand text. The new regulation also adds substances and practices to the "Positive Lists", expanding the technological options available to producers and the industry.

The update also includes new rules for the production of seedlings and seeds; mushroom production; animal production, with emphasis on animal welfare; plant production; and an increase in the characterization of the organic production unit; the inclusion or alteration of items to be included in the Organic Management Plan; greater rigidity concerning the source of contaminants, with emphasis on Genetically Modified Organisms (GMOs); inclusion of criteria for migratory beekeeping and meliponiculture; among others.

Among the new rules established by Ordinance nº 52, we can consider that the most impactful and with the greatest implications were those concerning using seeds and seedlings in plant

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production. Seedling and seed production are highly specialized and fundamental practices for obtaining good yields, for which many producers currently do not have sufficient and appropriate foundations or knowledge to promote the production of quality seeds and seedlings.

Even with the subsequent update by Ordinance nº 404 of February 22nd [41], which stipulated a deadline of five years for vegetable seedlings obtained from seeds to come from organic production systems, this reality still seems a long way off. There are very few organic seedling producers and to date no sign of the list of species with the availability of organic seeds and seedlings announced by MAPA. Figure 2 shows, utilizing an infographic, the main changes that Ordinance nº 52 of March 15, 2021, established.

Following the publication of Ordinance 52, two more Technical Notes (TN) were published rectifying some of the issues in Ordinance 52: Technical Note nº 1/2022 and Technical Note nº 2/2022, whose deal respectively with mushroom production and production in pots and elevated structures [42,43]. In addition to the Technical Notes, Ordinance nº 404 of February 22nd, 2022, was promulgated by the MAPA, amending Art. 103 § 2º of Ordinance 52, which deals with the use of organic seeds and seedlings.

It is important to note that not all organic production systems are covered by the Ordinance. For example, it does not deal with Aquaculture Production, Extractivism, and Processed Foods, for which the previous specific Normative Instructions continue to apply. Chart 1 shows the main organic production legislation in force in Brazil in 2023.

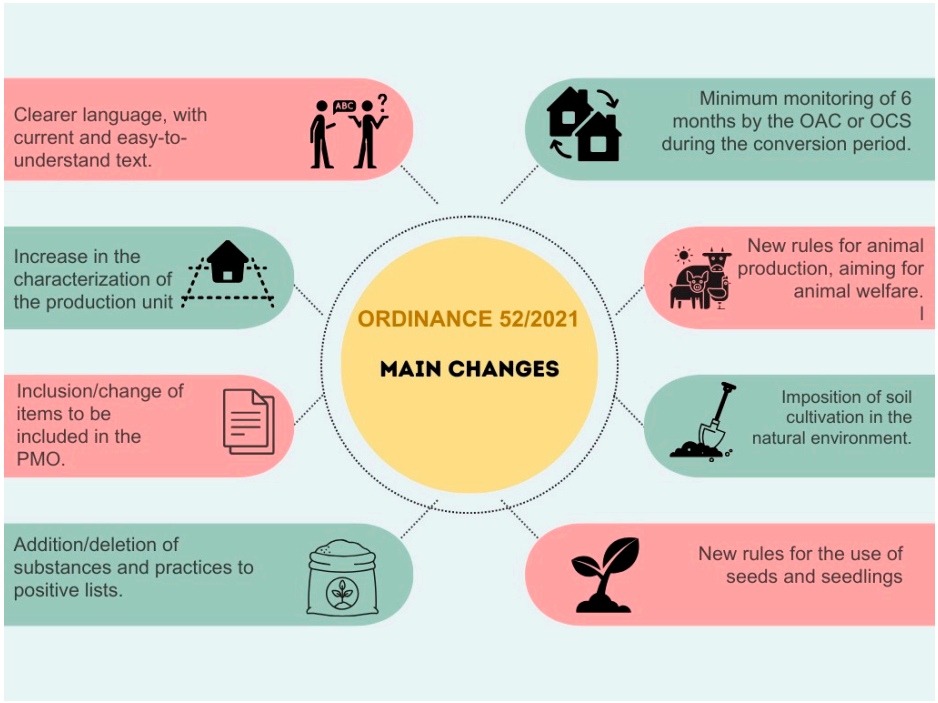

Figure 2. Main changes established by Ministry of Agriculture, Livestock and Food Supply (MAPA) Ordinance 52/2021. PMO: Organic handling plan; OCS: Social Control Organizations; OAC: Conformity Assessment Bodies.

Chart 1. Compilation of main organic production laws in force in Brazil in 2023.

Legislation	Legislative provision
Law nº 10,831, of December 23, 2003.	Provides for organic farming and other measures.
Decree 6,323 of December 27, 2007.	Regulates the Law nº 10,831 of 2003.

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Joint Normative Instruction nº 17, of May 28, 2009.	Approves the technical standards for obtaining organic products from organic, sustainable extractives.
Joint Normative Instruction nº 18, of May 28, 2009.	Approves the technical regulations for the processing, storing, and transporting organic products (amended by Interministerial Instruction nº 24/2011).
Normative Instruction nº 19 of May 28, 2009.	Approves organic quality control and information mechanisms.
Decree nº 6.913 of July 23, 2009.	Establishes differentiated registration for phytosanitary products approved for use in organic farming.
Normative Instruction nº 23, of June 1, 2011.	Establishes the Technical Regulation for Organic Textile Products Derived from Cotton.
Interministerial Normative Instruction nº 28, of June 8, 2011.	Establishes Technical Standards for Organic Aquaculture Production Systems.
Normative Instruction nº 18, of June 20, 2014.	Establishes the official seal of the Brazilian Organic Conformity Assessment System and sets out the requirements for its use.
Ordinance nº 52, of March 15, 2021.	Establishes the Technical Regulations for Organic Animal and Plant Production Systems and the lists of substances and practices permitted for use in Organic Production Systems.
Ordinance nº 404, of February 22, 2022.	Amends Art. 103 § 2º of Ordinance 52, which deals with using organic seeds and seedlings.

5. A case study for strawberry in organic system: how are the new rules affecting farmers?

Strawberry (*Fragaria* × *ananassa* Duch.) production is characterized by a wide range of cultivation systems (Figure 3) [44]. Farmers can choose to grow strawberry plants on soil, in hill system (Figure 3A) or out of the ground, with cultivation in substrate (Figure 3B–D).

Specifically, updating organic legislation is becoming a barrier to strawberry production outside of the ground in organic systems, making cultivation challenging and frequently impractical [45,46]. Discussion in farmer groups include nutrition, how to obtain organic seedlings, and the new regulations for cultivation out of the ground, in substrate.

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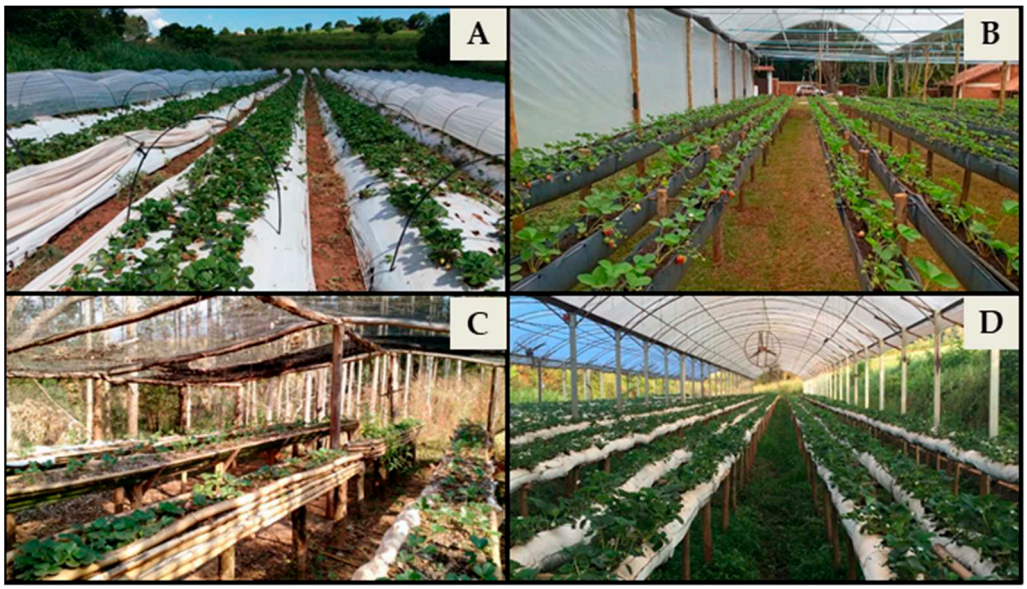

Figure 3. Strawberry cultivated in different systems. A) Strawberry cultivation in hill system. B) Strawberry cultivation in substrate, with plastic to support the substrate; C) Strawberry cultivation in substrate, with bamboo and plastic to support the substrate; D) Strawberry cultivation in substrate, with substrate in plastic grow bags.

The previous legislation did not provide guidelines for systems out of the ground, using substrate. However, farmers continued to cultivate with authorization from organizations that guarantee organic quality with a minimum of 30-50% of soil in the substrate composition, depending on the organization. The new regulations, however, still lack clarity and apply a subjective norm to this type of cultivation.

Ordinance nº 52's Article 97 mandates that soil must be used for plant production. However, Chapter II's second paragraph permits the use of pots in certain exceptional circumstances where cultivation in a natural setting is not feasible. In this way, cultivation out of the ground is addressed, where it is determined that the substrate used to replace the soil must have physical characteristics and chemical and biological properties similar to soil in natural conditions. This includes raised beds or structures of a similar nature, provided that the substrate is made exclusively from materials authorized in the technical regulations. This renders comprehension arbitrary.

It is important to note that subjective points in the legislation are required for applying the law correctly and fairly, adapting the legal system to specific reality from each farmer. Subjectivity is critical in order to avoid law for law's sake, which would complicate the process of ensuring organic quality even further. However, the current work raises the question of whether guidelines are required at some points to guide how the farmer and auditor should behave in order to ensure organic quality.

Another point that must be taken into account concerns on plant nutrition. As according to the fourth paragraph, article 97, of Ordinance nº 52, plant nutrition cannot be carried out exclusively through nutritional solutions, such as used in hydroponics and similar techniques. It is therefore necessary to add different fertilizers, permitted by ordinance when making the substrate and later, during the crop cycle, for fertilizers to be used in solid form.

According to Ordinance nº 52, the seedlings must be generated from organic systems. However, producers or companies producing organic strawberry seedlings are, to our knowledge, non-existent. Furthermore, most of the cultivars currently used are protected by patents, preventing farmers from producing their own seedlings. Another obstacle is that the seedlings have to go through a period of vernalization, which is the accumulation of hours of cold to induce plant stolon or flowering [47,48] and only large groups of seedling suppliers have adequate structure to prepare these seedlings. If the producer of organic seedlings needs to acquire vegetative propagation material from non-organic production systems, they must have ¾ of his production period under organic management so that

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the seedling produced can be considered organic. This makes the production of organic strawberries difficult, especially in strawberry production systems in soil beds in which plants are generally replaced annually.

6. General considerations, bottlenecks and suggestions

Brazilian legislation on organic farming stands out for having been built collectively between government and society, taking into account the social, environmental, and cultural differences of the different regions of Brazil, making them less exclusive.

Since the beginning of the regulation of organic farming in the country, through Normative Instruction nº 007 of May 17th, 1999, Brazilian legislation in the sector has undergone several modifications and updates, with five of the most relevant periods standing out (2003, 2007, 2009, 2011, and 2021). Although there are still sectors of organic farming that require regulation, today, we have comprehensive legislation that guarantees the organic quality of products in production and marketing.

However, we cannot ignore that the continual changes to the rules are an obstacle for professionals, students, and especially producers interested in the subject, who constantly need to keep up to date and often find it difficult to know what legislation is in force. That is why it is important to have materials that help those interested in the subject. This highlights the importance of this study.

For the scenario proposed by the Regulations to become feasible, government incentives and support for the development, research, and extension institutes are needed to boost the number of seedlings and producers and an adequate organic substrate. In addition, the development of work and studies to structure a scientific base, with minimum protocols for producing organic seedlings, considering the substrates used and the control of pests and diseases, to obtain better quality seedlings, which are still inferior to conventional ones.

As the regulation is being demanded, already certified producers will face difficulties, and a new obstacle will be formed to make it difficult for new producers to become organic producers. Caution is needed when determining an obligation on this scale.

Like other places in the world, such as the United States, the European Union, and Japan, where the mandatory use of organic seedlings and seeds did not come about by regulation but by adherence, the adoption of organic seeds and seedlings in Brazil should happen because of their benefits to the system as a whole, in an orderly and planned way, with the support of the government, and not just by legal injunction.

Even after the Regulation update, some difficulties are still being encountered. Some points in the legislation could be less subjective, i.e., more detailed, based on technical aspects so that quality assurance agents (auditors and inspectors) can have a solid basis in the legislation for their actions.

One example of subjectiveness is on Article 10, Chapter II of Ordinance 52, which states that farmers should mitigate the risks of contamination from neighboring areas. It is not detailed what is an efficient method to prevent these contaminations. This makes the auditor's or ethics committee's assessment subjective. In Brazil, the most common tactic used is the vegetative barrier. Depending on development of the plants, vegetation density, number of planted rows, windbreak porosity, and other factors, this method is considered as efficient in reduce the drift from one to other side of vegetative barrier up to 90% [49–51]. Figure 4 illustrates types of barriers that were used to mitigate contamination risks by different farmers. By common sense, Figure 4A would probably be considered as a failed vegetative barrier. However, what about Figure 4B–D? Would these examples be sufficient to mitigate the spray drift from neighboring areas? The plastic barrier shown in Figure 4C have little perforations on plastic. If neighboring farmer use synthetic insecticide, fungicide or herbicide, is that sufficient measure of spray drift mitigation? If neighboring farmer is also organic, the risk is reduced. On the other hand, high input synthetic crops as maize (*Zea mays* L.) or soybean (*Glycine max* (L.) Merrill) as a neighborhood is a higher factor of risk.

The vegetative barrier may be used for biodiversity and conservation biological control improvement [52–54]. Then, next organic legislation updates could encourage the use of vegetative

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barriers instead of non-natural barriers, which is usually used as an emergency tactic, but sometimes stays as the definitive tactic as a barrier. The first step for drift mitigation tactic with vegetative barrier guideline could be the definition of barrier porosity. This is the main factor related to the vegetative barrier that influences the reduction of wind speed and also the pesticide carrier [49]. Non-porous windbreak as the abovementioned plastic barriers may increase the wind turbulence, reducing drastically the protection against drift [49]. In addition, farmers (not only organic) awareness for the correct use of pesticides is needed. Factors that influence the pesticide spray drift are mode of application and formulation, droplet size, climatic conditions, and others [50]. These factors are crucial for neighboring farmer to avoid the use of pesticides in adverse conditions.

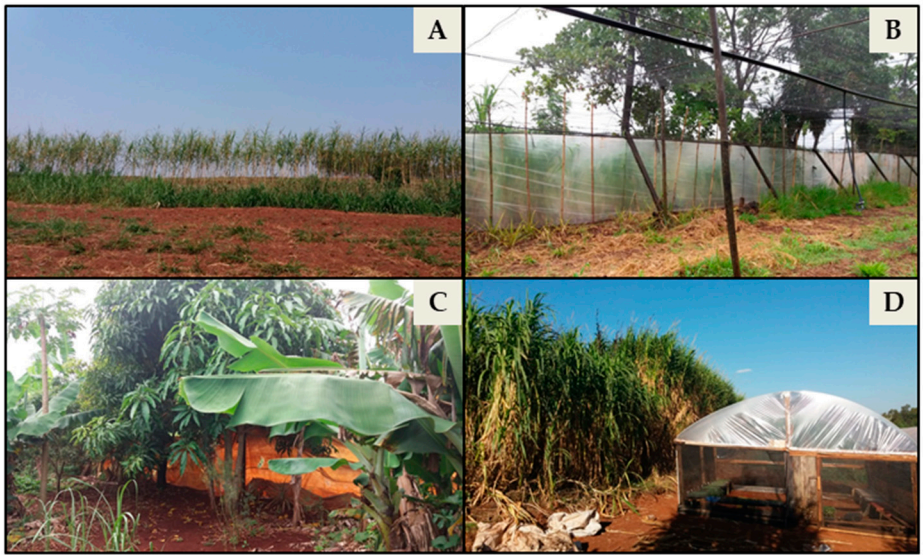

Figure 4. A) Vegetation barrier made up of Napier grass (*Pennisetum purpureum* Schum.) with insufficient measure of pesticide drift mitigation. B) Barrier with transparent plastic; C) Barrier with ripped plastic; D) Well-established vegetation barrier with Napier grass.

As discussed in the present work, the organic production legislation in Brazil is being continuous updating. Political policies should encourage/finance researches on the topics that should have still insufficient technical information as organic substrates, seedling productions, plant nutrition products, organic varieties that are adapted to the organic systems, etc. We understand that the process of research and construction of legislation is slow and should be implemented in a manner that farmers can adapt to legislation updates without loss the organic quality of the products guarantee.

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