Seleção de propriedades agrícolas para avaliações de sustentabilidade

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Resumo: Tendo em vista a importância da agricultura familiar para a produção de alimentos e sua interação com a sustentabilidade, esta pesquisa se propôs a desenvolver uma metodologia para seleção de um grupo representativo de propriedades agrícolas familiares no Sul do Brasil para posterior avaliação de indicadores de sustentabilidade. A

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pesquisa foi conduzida em 101 propriedades nos estados da região Sul do Brasil. Uma avaliação prévia de indicadores conduzida através de um questionário aplicado aos agricultores se mostrou fundamental no processo de seleção utilizado. A partir dessas informações, foi possível estabelecer um ranqueamento das propriedades. Além disso, a análise estatística multivariada dos indicadores agrupou as propriedades similares, permitindo a seleção de propriedades com características distintas, de forma a representar adequadamente a diversidade do universo amostral. Por fim, a avaliação do perfil dos agricultores também auxiliou no processo, reduzindo as chances de seleção de agricultores com potencial de desistência ao longo do estudo, seja pela dificuldade de interação com as equipes de pesquisa ou pela falta de interesse na implantação de novas práticas de manejo voltadas ao incremento da sustentabilidade da propriedade.

Palavras-chave: Agricultura sustentável. Desenvolvimento sustentável. Agricultura familiar. Indicadores de sustentabilidade. Método de seleção.

Selection of family farmers for sustainability evaluation

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Abstract: In view of the importance of family farming for food production and its interaction with sustainability, this research proposed to develop a methodology for selecting a representative group of family farms in southern Brazil for further evaluation of sustainability indicators. The research was carried out on farms in the states of Rio Grande do Sul, Santa Catarina and Paraná. A previous evaluation of indicators conducted through a questionnaire applied to farmers proved to be fundamental in the selection process used. From this information, it was possible to establish a ranking of farm. In addition, a multivariate statistical analysis of the indicators, which groups similar farm, helped

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in the selection of farm with different characteristics. Finally, the assessment of the profile of farmers also helps in the process, as it reduces the chances of selecting farmers who may have the potential to drop out during the study, either due to the difficulty of interacting with the research teams or the lack of interest in implementing new management practices for increasing the farm sustainability.

Keywords: Sustainable agriculture. Sustainable development. Family farming. Sustainability indicators. Selection method.

Selección de propiedades agricolas para evaluacion de sostenibilidad

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Resumen: Conociendo la importancia de la agricultura familiar para la producción de alimentos y su interacción con la sustentabilidad, el objetivo de este trabajo fue desarrollar una metodología para seleccionar un grupo representativo de fincas familiares en el sur de Brasil para una detallada evaluación de los indicadores de sostenibilidad. El trabajo fue realizado en 101 propiedades en los estados de Rio Grande do Sul, Santa Catarina y Paraná. Una evaluación previa de indicadores realizada a través de un cuestionario aplicado a los agricultores resultó

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fundamental en el proceso de selección utilizado. A partir de esta información, fue posible establecer un ranking de propiedades. Además, un análisis estadístico multivariante de los indicadores, que agrupa propiedades similares, ayudó en la selección de propiedades con características diferentes. Finalmente, la evaluación del perfil de los agricultores también contribuye en el proceso, ya que reduce las posibilidades de seleccionar agricultores con los que es difícil hablar y que pueden tener el potencial de abandonar durante el estudio.

Palabras clave: Agricultura sostenible. Desenvolvimiento sustentable. Agricultura familiar. Indicadores de sostenibilidad. Método de selección.

1. Introduction

The 2017 Agricultural Census, a survey carried out on more than 5 million rural farms throughout Brazil, points out that 77% of agricultural establishments in the country were classified as family farming. In terms of area, family farming occupied 80.9 million hectares during the research period, which represents 23% of the total area of Brazilian agricultural establishments (Mapa, 2023).

Family farmers are those who practice activities in rural areas and who (Brasil, 2016): a) have up to four fiscal modules, with the fiscal module being a parameter for land classification of rural property in terms of size; b) predominantly use family labor; c) have a minimum percentage of family income from economic activities on their farm and; d) manages his establishment with his family.

Given the importance of family farming for food production (Vieira et al., 2015; Silva; Polli, 2020), and its interaction with agrobiodiversity (Figueredo et al., 2023), fauna, flora, and being the way of life of a significant part of the Brazilian population (Maciel; Troian, 2022), the sustainability of this type of establishment is a goal that must be pursued (Oliveira; Bertolini, 2022).

According to Gliessman (2000), agriculture becomes sustainable when: it causes the least harmful effects to the environment; uses water to support the water needs of the environment and people, and depends mainly on the internal resources of the agroecosystem, seeking the inclusion of nearby communities. In addition, it seeks to value and conserve biological diversity (Marchetti, 2020), to guarantee equal access to agricultural practices, knowledge, and technologies, thus allowing local control of agricultural resources (Gliessman, 2000). The concept of ‘agricultural sustainability’ is ambitious, as several factors influence its attainment and assessment (Rao et al., 2019). Efficiency in food production combined with reducing the environmental impacts of agricultural activities are current challenges for farmers and the scientific community (Calicioglu et al., 2019). In this sense, the assessment of the sustainability of production systems allows detection trends, strengths, or bottlenecks, which are important to assess the current conditions of the system and propose improvements (Bolívar, 2011), when necessary.

In this sense, a research project entitled Projeto Auera[3], which is a partnership between Embrapa Clima Temperado and Philip Morris Brasil proposes to develop a model for evaluating the sustainability of family farming in the south of Brazil. However, the development of a model that allows assessing the complex environmental, socioeconomic, and productive interactions of a rural property, through a diagnosis of its sustainability, involves a series of steps. The first of these steps, which directly involves the farms, is the selection of the sample set to be evaluated. That is the election of farms that represent the regional and local peculiarities of the region.

Sampling is fundamental in agricultural studies because, in general, it is not possible to access the entirety of a given population universe, due to obstacles such as logistics, time, human, and financial resources, among others. (Miura et al., 2022). Therefore, information is taken on a part of the whole, to identify and conclude plausible and important results about the totality under study (Schilling; Batista, 2008).

Thus, the objective of this research was to develop a sampling methodology for the selection of a representative group of farms for the evaluation of sustainability indicators of family farms in the southern region of Brazil.

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3 Projeto Auera – Desenvolvimento e avaliação de modelos de sustentabilidade de propriedades produtoras de tabaco no Sul do Brasil – EMBRAPA: Chamada 00/2020 / Projetos Cofinanciados 2020 – Nacional e Internacional, Projeto tipo II (Desenvolvimento e Validação).

2. Methodological procedures

The study was carried out on family farms in the southern states of Brazil: Rio Grande do Sul, Santa Catarina, and Paraná. The southern region of Brazil has three climate types according to the Köppen classification, Cfa, Cfb and Af. Cfa is predominant in the states of Rio Grande do Sul and Paraná, characterized as a subtropical climate, with an average temperature of the coldest month below 18ºC and an average temperature of the hottest month above 22ºC. The Af is the tropical type, with abundant rainfall and high relative humidity, being present only in part of the coast of Paraná and Santa Catarina. Cfb occupies a large part of the three states, being predominant in Santa Catarina, it is the temperate climate type itself, with an average temperature of the coldest month below 18ºC and an average temperature of the hottest month below 22ºC. The farms studied are located in regions with a Cfa or Cfb climate.

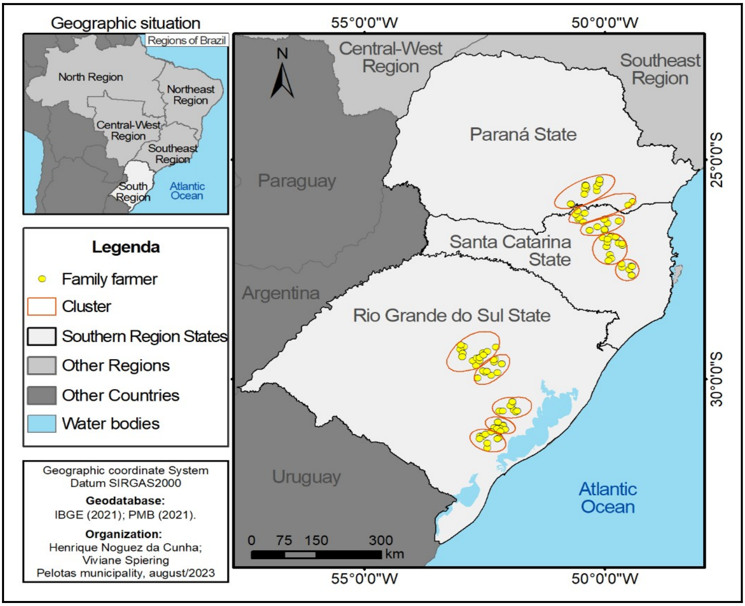
The sample population involved in the present study has a partnership with the company Philip Morris Brasil within the Integrated Tobacco Production System and, therefore has tobacco cultivation as a common characteristic. For personal data protection, the names of farmers were omitted throughout the study and a code was used as an identifier.

All farms fit the criteria indicated by the Ministry of Agriculture, Livestock and Food Supply (Portuguese acronym, MAPA) (Brasil, 2016) to characterize family farming establishments. According to a preliminary diagnosis obtained in this study, families consisted on average of three to four members and the predominant level of education was incomplete elementary school for older members, followed by complete or incomplete higher education for younger members. The average age of family members was 40 years old, with 67% being between 25 and 60 years old. Most farmers (84%) had their area with an average size of 21.9 ha. On the other hand, 16% have a leased area with an average size of 4.06 ha.

Tobacco production is a common feature of the evaluated farms, but the importance of this crop for the families is variable, being the main crop in some cases and others just another component of the production system. In general, production systems are quite diversified, mainly composed of crops such as maize, silage maize, sweet potatoes, cassava, beans, and potatoes, as well as fruit and vegetable crops for family consumption. Corn is the species most used in diversification, being present in more than 90% of the farms, therefore being an important source of direct income or ballast for animal production.

The farm selection process had two phases. First, the selection involved the analysis of a database with 5,283 farms distributed in the three states of southern Brazil, Rio Grande do Sul, Santa Catarina, and Paraná. The selection process was described and discussed by Miura et al. (2022), in which 101 farms were selected. However, due to the complexity and the large number of indicators for sustainability assessment, it was necessary for a second selection phase to further reduce the number of farms so that the sampling process was feasible, while still being representative and reliable. For that, the 101 farms were further organized into ten territorial units (clusters), according to the distance between them and the similarity of geographical aspects. This grouping was carried out to compose the representativeness of these environments based on field surveys and, in turn, facilitate the logistics in the diagnosis and intervention proposal stage (Figure 1).

Figure 1 – Distribution of ten clusters with family farms in southern Brazil. Source: IBGE (2021) and the research data



Source: Authors.

The second selection phase involved eliminatory and ranking criteria:

a) Farms without registration in the National Rural Environmental Registry System (Portuguese acronym, SICAR) – eliminatory criteria;
b) Farms that do not have ownership autonomy – eliminatory criteria;
c) Selection index, whose supporting data were obtained by a structured questionnaire applied to the family on the sustainability of the farm (Table 1) – ranking criteria;
d) Similarity analysis of the farm – criterion for choosing different properties (representativeness/range);
e) Definition of the profile of the farmer, whose evaluation was carried out by the professionals responsible for the

technical assistance of the farm (Supplementary material) – ranking criteria.

2.1 Selection Index and Related Indicators

A selection of substantial sustainability criteria with a transparent scientific diagnosis is required, to understand interconnected biophysical processes (Lairez et al., 2020). The selection index aimed to rank the farm according to the level of sustainability assessed by some indicators selected during interviews and the application of a questionnaire (Supplementary Material) to the families.

The evaluated indicators were (Table 1): a) registration of the farm in the SICAR; b) farming domain; c) time of partnership with the integrating company; d) type of soil tillage system; e) level of diversification of the production system; f) simplified environmental assessment; g) existence of family succession.

The indicators had scores with different weights, being categorized into three classes: first order, with eight weights; second order, with four weights; and third order, with two weights. The weights were attributed by a group of researchers with specialties related to each indicator, taking into account the importance of the indicator for the long-term sustainability of the farm and for the context of enabling the research of assessing sustainability on each farm. Finally, the selection index is the result of the sum of the scores of all indicators.

After excluding the farms that do not have a registration in SICAR and those whose farmers mostly lease land and/or do not have autonomy in managing the property, the indicators were weighted based on a scale of notes, generating an index, called “index of selection” (Table 1).

Table 1 – Weighting of indicators and formation of the selection index

Indicator		Score
Elimination step		
a) Farms that do not have registration in SICAR		Excluded from process
b) Farmers who are mostly tenants and/or do not have autonomy in managing the property		Excluded from process
Ranking step		
c) Registration in SICAR	i) Has registration in SICAR, but the farmer does not live in the registered area	4
	ii) Has registration in SICAR and the farmer resides in the registered area	8
d) Farming domain	i) Farmers who have their own land, but are also tenants of other farms	4
	ii) Farmers who own and work exclusively on their property	8
e) Time of partnership with the integrating company	i) Less than four years of partnership	-8
	ii) Four years of partnership	4
	iii) Five years of partnership	5
	iv) Six years of partnership	6
	v) Seven ears of partnership	7
	vi) Eight years of partnership	8
f) Soil management system	i) Conventional system	1
	ii) Minimum Cultivation	2
	iii) Direct Planting	4
g) Production system diversification[4]	i) Number of species 0 – 2	1
	ii) Number of species 3 – 4	2
	iii) Number of species 4 – 5	3
	iv) Number of species 5 – 6	4
h) Simplified environmental assessment[5]		0 - 4

4 The average number of species that characterizes the diversification of the production system of the farm was calculated through the average between the number of species of economic importance (tobacco, corn, soybean, beans, etc…), fruits, vegetables and animal production (poultry, pigs, beef cattle, dairy cattle, and fish).

5 Calculated according to Table 2. Conventional system: It consists of the operation carried out with plows or heavy classes, which aims to loosen

i) Family succession	i) No successors or there are successors with no interest in managing/working on the farming	0
	ii) There are successors with an interest in managing/working on the farming.	2
	Selection index	**Score sum**

Source: Authors.

Registration of the farm in the SICAR – SICAR is the system that allows the Rural Environmental Registration (Portuguese acronym, CAR) whose information is essential in the context of analyzing the sustainability of the farm. CAR makes it possible to assess compliance with the legal frameworks related to Permanent Preservation Areas (Portuguese acronym, APPs) and Legal Reserves (Portuguese acronym, RLs), in addition to identifying the presence of water bodies, fountains, areas of native forest, etc...). The score was based on the existence of the farming polygon in SICAR and whether or not the farmer resides on the property.

Farm domain – The farm domain refers to ownership of the land, that is, how much is owned by the farmer, leased, or in partnership with other farmers. In general, farmers with a higher proportion of their land have greater autonomy for decision-making in future intervention and monitoring actions. In this sense, the necessary adjustments to increase the level of sustainability of the property have a greater chance of success and continuity in situations where the farmer has greater autonomy from the rural property.

Time of partnership with the integrator company – In this

the soil, and is also used for the incorporation of correctives, fertilizers, vegetable residues, and efficient plants, or surface decompression. Minimum Cultivation: It consists of the implements passage, such as the scarifying plow or the light harrow, rotating to break only the dense surface layer and, in the case of the harrow, it controls small electric plants. Direct Planting: Complex processes, comprising soil mobilization only in the line or hole, permanent maintenance of soil cover, and species diversification, via crop rotation and/or intercropping.

case study, the evaluated farms are linked to an integrator company, which is willing to provide technical assistance and committed to the process of improving the property's sustainability indexes. In this way, the continuity of the research depends on the maintenance of the partnership between the company and the farmer, and therefore, that longer the partnership, the greater the weight of this indicator.

Soil preparation system – The soil preparation system was used as an indicator related to the adoption of soil and water conservation practices on the farm. The indicator was obtained through the sum of the values corresponding to each type of soil preparation, taking into account the weight/score attributed to each system according to the sustainability level characteristic of the systems. In case there are different soil preparation systems on the property, the weighted sum was performed based on the percentage of each system and the respective score.

Level of diversification of the production system – The diversification of the production system was used as a composite indicator of the property's agrobiodiversity, the family's food wealth, and the property's potential for environmental and economic sustainability. To represent the productive diversity of the farm, the following sub-indicators were used: a) number of plant species of economic importance (tobacco, corn, soybeans, beans, etc...); b) number of fruit species (orange, peach, apple, vine, etc...); c) number of vegetable species (lettuce, cabbage, beet, carrot, etc...); c) number of animal species (cattle, pigs, poultry, etc...). From the number of species in each segment, the average diversification of the production system was calculated. A score was assigned to the mean value obtained, as shown in Table 1.

Simplified environmental assessment – The simplified environmental assessment was used as a composite indicator related to the relative amount of native vegetation on the property, connection of forest fragments, presence of water springs and watercourses, and their permanent preservation areas. Each indicator was classified into three categorical levels: Low (score 0), Intermediate (score 0.5), and High (score 1.0) (Table 2). The values obtained for the farm were submitted to a score sum that could vary from 0 to 4.0.

Family succession – The existence of family succession was used as an indicator of the property's potential for continuity as a multiplier actor in the processes of promoting sustainability on the property itself and in the community.

Table 2 – Categorization and scoring of environmental parameters

Environmental parameter	Description	Nota
Native vegetation	Nonexistent	0
	Owns but is less than 20% of the property[6]	0,5
	Owns and is greater than 20% of the property	1,0
Fragment connection	Nonexistent	0
	Fragments with poor connections	0,5
	Good connected fragments	1,0
Fountain	Nonexistent	0
	Fountains with non-existent riparian forests or partial PPA2	0,5
	Fountains with riparian forest in total PPA	1,0
Watercourses	Nonexistent	0
	Watercourses with non-existent riparian forest or partial PPA	0,5
	Watercourses with riparian forest and total PPA	1,0

Source: Authors.

2.2 Statistical analysis to evaluate the similarity between the farms

Consisted of the joint analysis of the component indicators of the selection index to evaluate the similarity of the farms. This

6 Minimum required by the Brazilian environmental legislation in the sampled region (Brasil, 2012). 2 PPA – permanent preservation areas.

study aims to help in the selection of similar or different farms, depending on the objective of the research. Furthermore, if there is a need to replace a property, the analysis allows the selection of a new one with similar characteristics. Cluster Analysis is a multivariate statistical analysis technique that seeks to group similar objects according to the criteria given by the set of observed variables (Kubrusly, 2001). Clustering is a powerful learning tool for detecting structures in datasets (Adolfsson et al., 2019).

2.3 Farmers profile

As the farmers had technical assistance provided by the integrator company, the technicians responsible for assisting each farmer were invited to answer a questionnaire to create a profile of the farmer and his property. This assessment aimed to identify those farmers with the greatest potential to accept proposals to improve the sustainability of the property; with a greater chance of continuing the project; with a greater ability to propagate actions to improve the level of sustainability; and those located in regions with better logistics for the research team.

The questionnaire was composed of the following items: a) receptivity: willingness of the farmer to participate in the project; for changes in the technological standard, incorporation of new technologies and innovation in its processes; b) partnership history: history and perspective of keeping the partnership with the integrator company for the next five years; c) representativeness: the potential of the farmer and his property to be local and/or regional technological references, serving as a model to other farmers; d) relationship: empathy, ability to dialogue and to establish new friendships; e) logistics: road access conditions to the property; distance from the property to food and accommodation support structures. Each item was classified as Very low, Low, Medium, High, and Very high

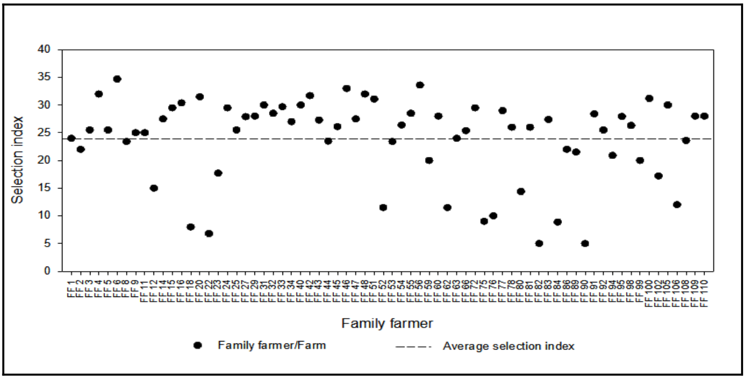
(Supplementary Material).

3. Results and discussions

From a total population of 101 farms 31 were excluded from the selection process, either because they did not have polygons in the SICAR or because farmers did not own the property and/or did not have autonomy over its management. The lack of registration in SICAR makes it impossible to carry out a series of assessments related to environmental legislation and the conservation of fauna and flora, which are essential for assessing sustainability. In the same sense, the farm whose farmers do not have the domain, as in the case of leasing, makes it difficult to intervene and monitor actions, especially those that require investments with a medium and long-term effect such as the implementation of flood control structures, recomposition of APPs, delimitation of RL, among others.

Thus, after excluding those farms that did not meet these criteria, the selection index was calculated for the 70 farms that remained (Figure 2).

Figure 2 – Selection index of farms that remained in the selection process after the elimination step



Source: Authors.

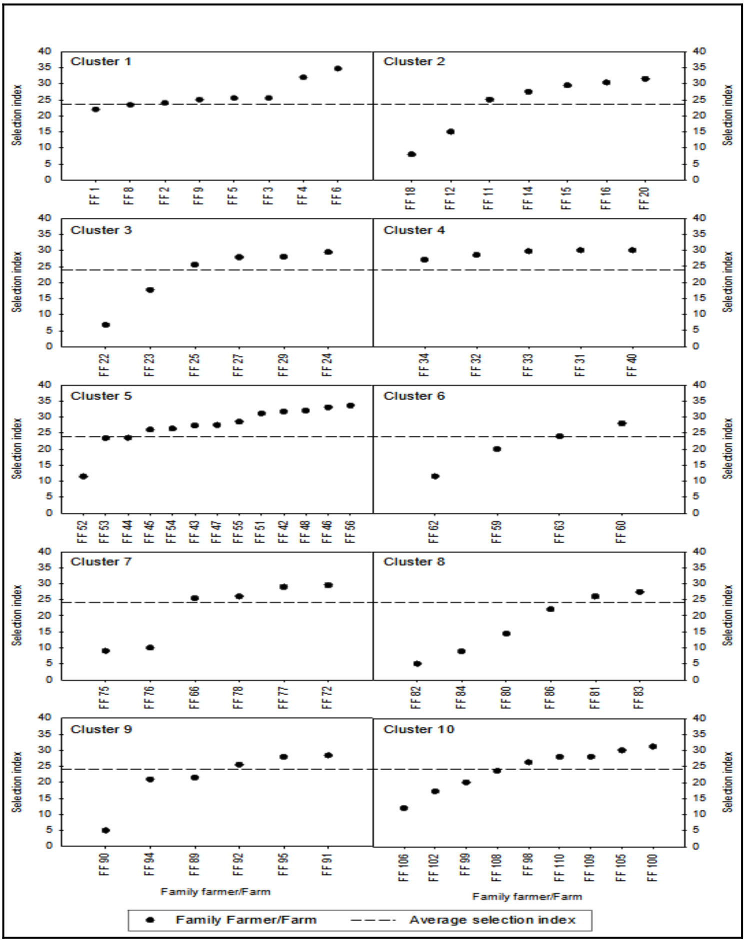
The selection index ranked the farms, within each Cluster, according to some sustainability indicators described in Table 1. This way, it was possible to identify farms with different levels of sustainability. According to Oliveira et al. (2008), it is essential for the development of an index that the data set covers an impact gradient including areas with little or minimal impact and highly degraded areas. Due to the environmental, social, and production system differences found in Southern Brazil, the analysis of the selection index was carried out within each Cluster (Figure 3) to maintain the representativeness of the different realities of the total set of farms.

To maintain variability in the sample set, farms with different selection indices were selected, using as a reference the general average of the 70 farms (average selection index = 24). For this purpose, farms with a selection index below and above the general average were selected (Figure 3). However, in Cluster 4, there were only above-average farms (Figure 3), meaning that the homogeneity of the farms is probably part of the social, environmental, and productive characteristics of the region or the Cluster. However, to make the selection of farms with different characteristics in each Cluster more reliable and robust, the data were submitted to Cluster Analysis (Figure 4). Cluster analysis is one of the most robust methods in terms of statistics and data modeling and clustering is a data analysis tool applied across diverse areas (Adolfsson et al., 2019).

From this, we sought to select properties with a selection index above and below the average (Figure 3) and that were in different similarity groups (Figure 4). Therefore, ensuring significant differences between the properties selected in each Cluster and, consequently, variability and representativeness.

The cluster analysis is also important when a sampling unit needs to be replaced, as it allows the researcher to identify the one with the characteristics closest to the one that needs to be replaced. This possibility is fundamental in medium and long-term studies that involve a dense survey of data and with a high monetary cost.

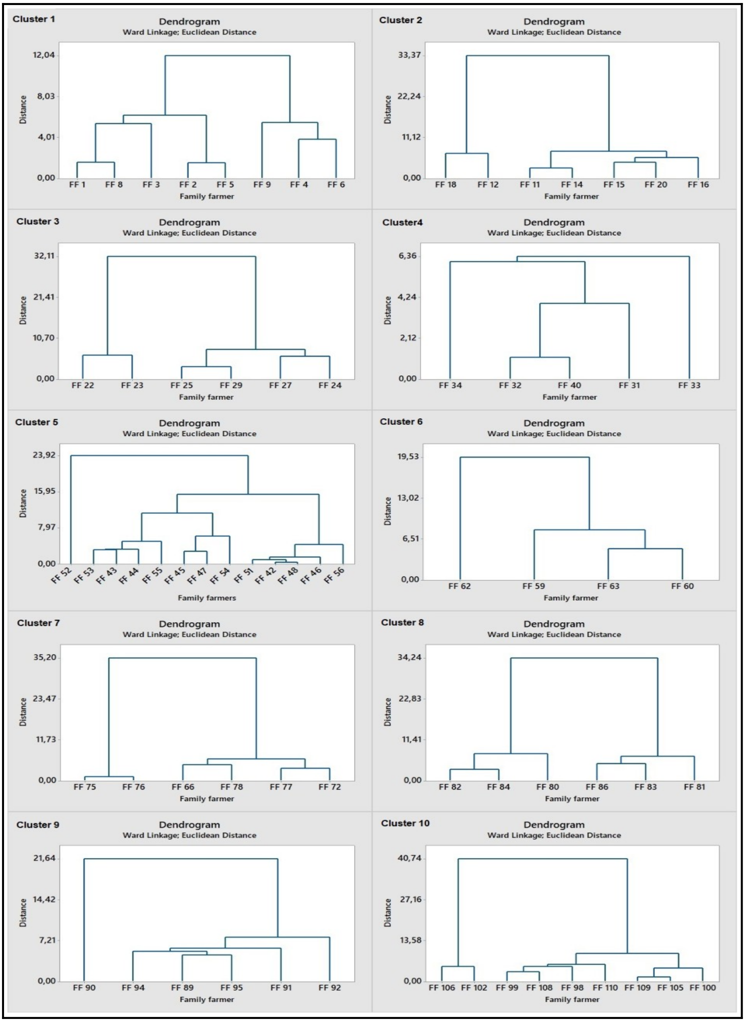
Figure 3 – Selection index of farms in each Cluster



Source: Authors.

The selection index and the Cluster Analysis provide elements that enable the selection of farmers/farms with different characteristics. Despite that, a final step in this selection process was necessary, in order to select within each grouping that farmer or farm whose research is more likely to be successful. In this sense, knowledge of the profile of the farmer is essential.

Figure 4 – Cluster Analysis of family farmer/farms



Source: Authors.

The farmers' profile assessment was carried out by the technicians who provide technical assistance on the farms, considering the following items: receptiveness, length of partnership, representativeness, relationship, and logistics. This assessment provided an overview of how the farmer and family would welcome a sustainability assessment, as this process would involve visits by a large number of people (multidisciplinary team), sampling of soil, water, plants, and images, as well as interviews for taking information about the management of the property. Finally, the logistical aspect was also considered, since it could hinder or limit the evaluations. From this, preference was given to farmers who were more receptive, easy to relate to, who had a history of maintaining the partnership, who were representative concerning other farmers in the region, and were located in a region with favorable logistics.

Taking into account the selection index, the similarity of the farms, and the evaluation of the farmers' profile, 19 properties were selected (Table 2). In general, for each cluster, two farms were selected, one with a selection index above and the other with a selection index below the average, except for Cluster 4. In this Cluster, only one farm with a selection index above the average was selected, as there were no properties below the average.

The efficiency and robustness of the proposed selection process were put to the test in the fieldwork, which is now in the final stage. There were no dropouts or any other setbacks that would indicate that the selected properties were not suitable. The success in the selection of properties was also confirmed by the evaluation of the professionals responsible for technical assistance, who indicated that the properties selected in each Cluster represent the characteristics of the sampling universe.

Table 3 – Characteristics of selected farmers

Family farmer/ Farm	Cluster	Selection index position	Receptivity	Partnership history	Representativeness	Relationship	Logistics
FF 1	Cluster 1	below average	High	Medium	High	High	Medium
FF 6	Cluster 1	above average	Medium	High	Medium	Medium	Medium
FF 12	Cluster 2	below average	Medium	Very high	Medium	High	Medium
FF 16	Cluster 2	above average	High	Medium	Medium	Very high	Low
FF 22	Cluster 3	below average	High	High	Very high	Very high	Very high
FF 27	Cluster 3	above average	High	High	Very high	Very high	High
FF 33	Cluster 4	above average	High	High	Medium	High	Medium
FF 52	Cluster 5	below average	Very low	Low	Very low	Medium	Medium
FF 42	Cluster 5	above average	Medium	Medium	Medium	Medium	Medium
FF 62	Cluster 6	below average	Low	Medium	Low	Medium	High
FF 60	Cluster 6	above average	Low	Medium	Low	Medium	High
FF 75	Cluster 7	below average	Medium	Low	Low	Medium	High
FF 72	Cluster 7	above average	High	Very low	Very low	Very high	Very high
FF 80	Cluster 8	below average	Very high	High	Very high	High	Medium
FF 83	Cluster 8	above average	High	High	High	High	Medium
FF 94	Cluster 9	below average	High	High	High	High	High
FF 91	Cluster 9	above average	Medium	High	High	High	High
FF 108	Cluster 10	below average	High	Medium	Low	High	High
FF 105	Cluster 10	above average	High	High	High	High	Medium

Source: Authors.

4. Final considerations

The world faces a challenge in meeting the growing demand for sustainable products, especially due to population pressure, scarcity of resources, ecosystem manipulation and climate change. Therefore, sustainable development in agriculture and rural areas must be an objective to be achieved.

The sustainability concept in rural areas is related to the quality of production, the maintenance, and improvement of productivity, the preservation of natural resources for future generations, the management and conservation of soil, water, and biodiversity, in addition to the quality of life of farmers and their families. To evaluate these issues, many methodologies are being developed and the selection of properties for the evaluation of these methodologies is the first step in the process. However, the selection of a sample made up of family farms is a complex process, which needs to consider productive, environmental, and socioeconomic aspects.

In this sense, the property family farming selection model proposed in the present research involved the evaluation of a series of indicators related to the sustainability of properties to form a selection index, which together with the similarity analysis, brought an idea of the level of sustainability and made it possible to select properties with specific characteristics, increasing the representativeness of the selected sample. Furthermore, knowledge of the farmer's profile contributed to the selection of farmers most interested in carrying out the work, an important aspect when it comes to sustainability studies, which are invariably medium and long-term and involve the movement of multidisciplinary teams in the property. It also allows the selection of farmers who are references among their peers and can disseminate technologies in their region of coverage.

The selection of a sample of 19 properties from a total population of 101, made it possible to develop a sustainability index for family farming in the three southern states of Brazil. The reduction in the number of properties allowed the concentration of resources on the evaluation of a large number of indicators that characterized the level of sustainability of these properties. Therefore, it is believed that the methodology presented can be used as a reference for other studies that need to reduce the number of properties to be evaluated in a large population.

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