PERCEPTION OF FAMILY FARMERS REGARDING FAMILY FORESTRY PRODUCTION

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Resumo

Percepção dos produtores familiares acerca da produção florestal familiar. Os plantios florestais na agricultura familiar cumprem um papel importante frente à necessidade energética das propriedades rurais. Nesse sentido, o objetivo deste trabalho foi analisar as características referentes à percepção de produtores rurais quanto à produção florestal familiar. Para isso, a coleta dos dados consistiu em entrevistas com 434 produtores rurais entre os anos de 2013 e 2014. Essas entrevistas foram baseadas em tópicos que transparecem a percepção dos produtores quanto à produção florestal familiar e, em sua grande maioria, os produtores cultivam florestas há mais de uma década. Ficou evidente que há pouca influência de agentes públicos em treinamentos para capacitação dos produtores para a produção florestal familiar. A definição da espécie e espaçamento é baseada no conhecimento empírico, e as propriedades rurais apresentam profunda relação com a produção florestal, mas os produtores apresentam carência em relação às técnicas de condução desses plantios florestais.

Palavras-chave: lenha, plantios florestais, silvicultura.

Abstract

Forest plantations in family farming play an important role in meeting the energy needs of rural properties. In this context, the objective of this study was to analyze the characteristics related to the perception of rural producers regarding family forestry production. Data collection consisted of interviews with 434 rural producers between 2013 and 2014. These interviews were based on topics that reflect the producers' perception of family forestry production, and the vast majority have been cultivating forests for more than a decade. It became evident that there is little influence from public agents in training and capacity-building for family forestry production. The choice of species and spacing is based on empirical knowledge, and rural properties have a deep connection with forestry production. However, producers lack knowledge regarding the management techniques of these forest plantations.

Keywords: firewood, forest plantations, silviculture.

INTRODUCTION

The concept of family farming encompasses a heterogeneous social group that, in general terms, is characterized by the integration of production unit, land, and family. This mode of production involves the practice of various agricultural, forestry, aquaculture, or extractive activities on rural properties with an area smaller than four fiscal modules, and predominantly family labor (BRASIL, 2006). In Brazil, according to the 2017 Agricultural Census, more than 76% of the 5,073,324 existing agricultural establishments are classified as belonging to this group (DEL GROSSI, 2019). It is through production systems that these key players are generated, resulting in important food and non-food goods in Brazilian agribusiness (BELISÁRIO AND CÂNDIDO, 2013).

In recent decades, in certain regions of Brazil, the adoption of forestry and agroforestry practices has been growing among farmers. This shift has provided, among other benefits, the utilization of areas unsuitable for the cultivation of traditional crops due to limiting factors such as slope or soil fertility. Thus, the introduction of silvicultural activities has become a viable alternative for diversifying production, improving environmental conditions, and increasing income from small rural properties.

Forest plantations play an important role in meeting energy demands for drying agricultural products and contribute to the preservation of native forest remnants on rural properties. Despite the significance of the forestry component on small rural properties, there remains a lack of clarity about the real needs of these systems, as well

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as the perceptions of rural producers regarding wood production. Unlike the practices of large companies, silviculture carried out by family farmers lacks sufficient studies and technological support.

An interesting way to conduct a diagnosis in rural areas is through participatory methodologies that allow capturing the views or perceptions of certain actors regarding a given reality. Thus, understanding the perception of family farmers regarding forestry production can be important for public or private agents to develop strategies that encourage family forestry production and contribute to sustainable rural development. In light of the above, the objective of this research was to analyze the perception of rural producers regarding family forestry production.

MATERIAL AND METHODS

Work Area

The study was conducted in the three southern states of Brazil (Paraná, Santa Catarina, and Rio Grande do Sul). The scope of this study included regions with a strong association between forestry production and family farming. In this context, the decision was made to analyze the forestry profile of farmers involved in the Virginia tobacco production chain, as the main source of fuel for curing barns (drying units) used for tobacco leaf drying comes from eucalyptus forests (firewood). The regions studied were grouped based on their physiographic characteristics (Figure 1).
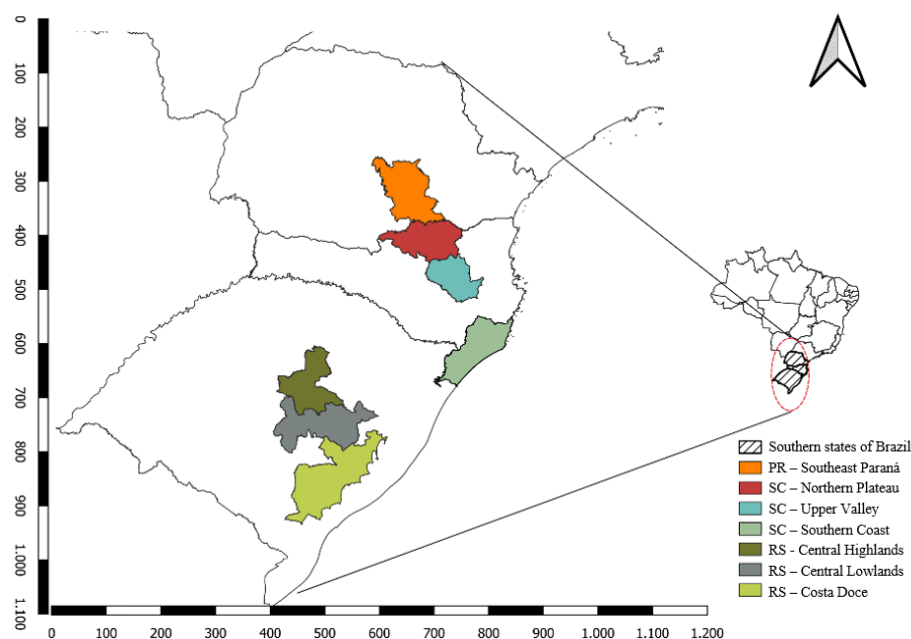

Figure 1. Geographic location of the regions included in the study.
Figura 1. Localização geográfica das regiões que compõem o estudo.

Data Collection and Analysis

The data collection consisted of applying a semi-structured questionnaire to 434 rural producers between 2013 and 2014. The interview covered a range of indicators to capture how forestry production is perceived by family farmers involved in the Virginia tobacco value chain. The topics addressed were: the length of time the family has worked with planted forests (forestry tradition); the criteria for determining spacing and the forest species used; participation in forestry-related training; the source of financial resources for forest planting (own funds, company, or financing); the percentage of family properties that sell wood; farmers' interest in expanding their forested area; the implementation of silvicultural practices, such as ant control, fertilization, weed control, and replanting; the criteria for determining initial planting density; and the survival rate.

The collected data were compiled and organized into a general matrix, which allowed for descriptive analysis and the application of multivariate statistical methods, as well as cluster analysis. For the descriptive analysis, the data were summarized using the average values of the analyzed variables, presented in tables and graphs, utilizing Microsoft Excel® spreadsheets. For the multivariate analysis, the Dendrogram function from the Multivariate Analysis package (AZEVEDO, 2021) in R software version 3.3.0 (R CORE TEAM, 2016) was used.

This procedure was conducted using indicators collected during the interviews to infer how forestry production is perceived by farmers (participation in training, forest profitability, interest in expanding forested areas, ant control practices, fertilization, weed control, and replanting). Initially, dissimilarity was calculated, followed by the application of Ward's method to calculate the smallest increase in intra-group variance and

generate clusters, or dendrograms. To ensure the appropriate choice of clustering method, the cophenetic correlation coefficient was calculated, as proposed by Sokal and Rohlf (1962).

RESULTS

Considering the physiographic regions studied, it was observed that the vast majority of families have a close relationship with forestry production, as silvicultural practices have been present for more than 10 years in these areas, leading to a strong forestry tradition in the southern region (Table 1).

Table 1. Classes of periods during which producers cultivate forests.
Tabela 1. Classes de períodos em que os produtores cultivam florestas.

Regions	< 5 (%)	5 -10 (%)	10-15 (%)	15 – 20 (%)	> 20 (%)
PR – Southeast Paraná	6,3	38,8	21,3	13,8	20
SC – Northern Plateau	8,7	45,7	17,4	8,7	19,6
SC – Upper Valley	8,1	37,8	27	10,8	16,2
SC – Southern Coast	5,6	16,7	19,4	5,6	52,8
RS - Central Highlands	6	31,3	19,3	12	31,3
RS – Central Lowlands	18,6	20,9	18,6	7	34,9
RS – Costa Doce	5,4	24,3	8,1	10,8	51,4

Regarding the choice of forest species (Figure 2), the main reasons reported by producers are related to the growth and suitability of the species for firewood and logs for use in improvements on rural properties. As for the factors influencing the determination of spacing, more than 60% of producers claim that it is done arbitrarily or randomly.
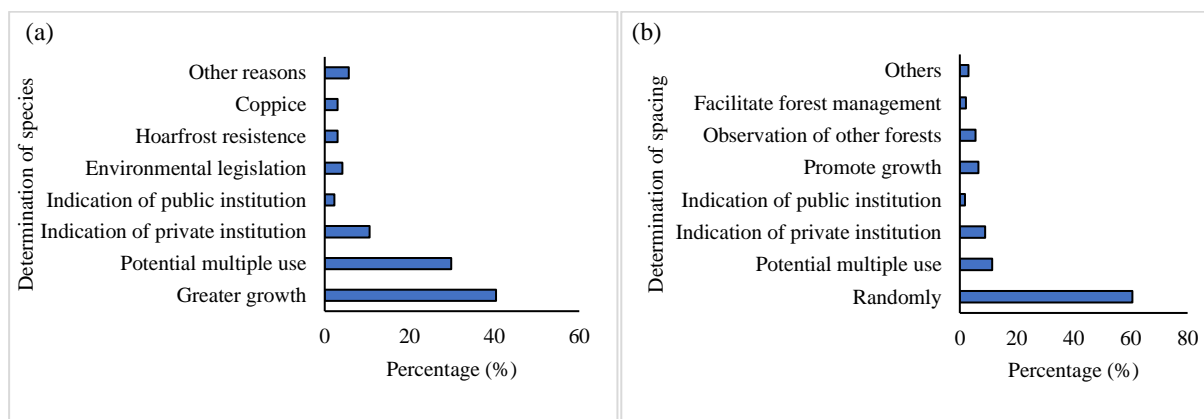

Figure 2. Criteria for defining the species (a) and spacing (b) for forest plantations.
Figura 2. Critérios para definição da espécie (a) e espaçamentos (b) para os plantios florestais.

Due to this evidence, most producers unfortunately carry out forest plantations without technical criteria, usually by empirically adjusting the number of seedlings purchased for the reserved area.

The real reasons that lead producers to establish forests are related to the demand for wood on their properties (70.6%), as well as financial return (32.6%) and the use of idle areas (9.7%). A total of 81.1% of producers responded that, in their view, planting forests is profitable. Regarding the financial resources used for forest establishment, most producers used their own resources and almost did not access credit lines for financing, such as PRONAF Forest (Table 2).

Table 2. 2a) Sources of financial resources used by producers for forest establishment. 2b) Indicators associated with how forestry production is perceived within family farming in the studied physiographic regions.

Tabela 2. 2a) Fontes de recursos financeiros utilizados pelos produtores para implantação das florestas; 2b) Indicadores associados à forma que a produção florestal é percebida no âmbito da agricultura familiar nas regiões fisiográficas estudadas.

2a			
Region	Source of resources		
	Own (%)	Company (%)	Financing (%)
PR – Southeast Paraná	57,7	42,3	0
SC – Northern Plateau	93,5	6,5	0
SC – Upper Valley	94,4	5,6	0
SC – Southern Coast	87,1	6,5	6,5
RS - Central Highlands	61,6	34,2	4,1
RS – Central Lowlands	67,5	32,5	0
RS – Costa Doce	55,9	44,1	0

2b							
Region	Part. in training. (%)[1]	Cons. forest prof. (%)[2]	Sell Wood (%)[3]	Int. in exp. forest area (%)[4]	Ant control (%)[5]	Fertilization. (%)[6]	Weed Control. (%)[7]	Perform replating. (%)[8]
PR – Southeast Paraná	22,9	82,9	11,3	64,3	93,6	68,6	63,8	36,3
SC – Northern Plateau	28,3	88,9	17,4	67,4	92,7	80,5	58,5	29,3
SC – Upper Valley	51,4	91,9	17,1	68,6	95,7	74,5	61,7	42,9
SC – Southern Coast	20,4	88,9	25,8	39,1	92,6	63	66,7	42,9
RS - Central Highlands	21,9	92,5	15	74,2	95,4	56,5	50,6	23,1
RS – Central Lowlands	18,8	87	6,5	60	98,6	67,6	70,4	21,7
RS – Costa Doce	11,6	83,7	8,8	61,1	87,8	32,7	18,4	10,2

[1]Participation in training; [2]Consider forests profitable; [3]Sell wood; [4]Interested in expanding forest area; [5]Perform ant control; [6]Perform fertilization; [7]Perform weed control; [8]Perform replanting.

By submitting the data to multivariate analysis, a hierarchical clustering resulted in two well-defined groups, with the first formed by the region RS – Costa Doce and the second by the other regions (Figure 3). The estimated value of the cophenetic correlation was 0.92 (p=0.001).
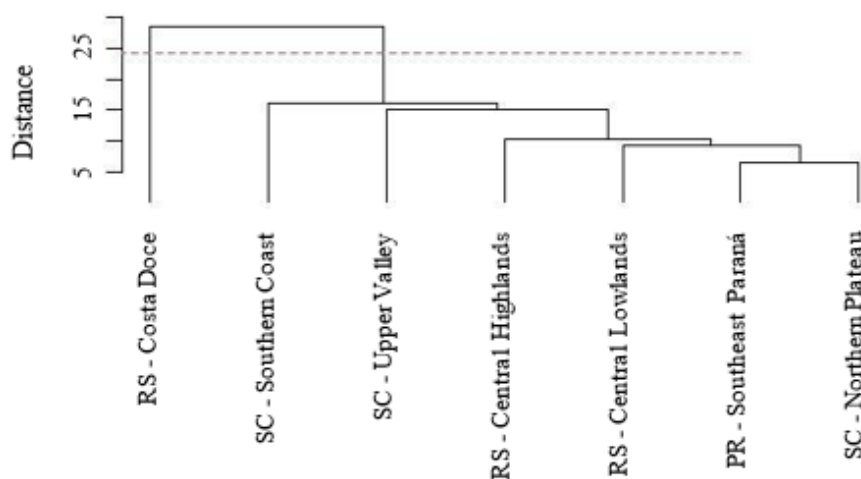

Figure 3. Dendrogram of hierarchical clustering through multivariate analysis of the physiographic regions studied in the southern region of Brazil.

Figura 3. Dendrograma de agrupamento hierárquico através da análise multivariada das regiões fisiográficas estudadas da região Sul do Brasil.

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Engenharia Florestal

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DISCUSSION

The forestry tradition is strongly related to the fact that the regions studied are part of the Virginia tobacco value chain, as Farias *et al*. (2017), Dessbessel *et al*. (2017), and Pasa *et al*. (2021) highlighted the close relationship between forestry production and the demand for firewood to supply drying barns for tobacco leaf curing in these regions of southern Brazil.

This relationship between family farming and forestry production can be observed in various value chains, as biomass from fast-growing forests serves multiple purposes on small and medium-sized rural properties. Similarly, Reinato *et al*. (2002) highlighted the importance of this component for coffee-producing farms in Minas Gerais. In southern Brazil, firewood from eucalyptus forests is used as fuel for grain drying (GREFF, 2015). Rios *et al*. (2016) emphasized the use of wood for grain drying in the municipality of Palotina during the 2013-2014 period, where seven out of eight companies interviewed used this material as the main fuel for grain drying. Resende *et al*. (2021) evaluated the quality of corn grains subjected to drying in a direct combustion furnace (both manually and automatically), using wood chips or firewood, and found that the mass quality of one thousand grains was not affected by the drying process.

Despite the clear importance of maintaining fast-growing forests for the target audience under analysis, it is noteworthy that public sector extension agents contributed little to forest establishment. Instead, private companies were the external actors that most influenced this process, though they did not provide adequate technical guidance regarding silviculture. As a result, farmers' responses concerning species selection and spacing criteria reflect the lack of skilled technical assistance to effectively promote forest production technology. Rochadelli *et al*. (2008) also observed that companies were the primary providers of technical assistance to family forest producers in the Paraná Plateau region.

This result may indicate that, for this target audience, public extension agents are not effectively impacting the silvicultural practices being employed. This factor certainly affects the quality of silviculture practiced by tobacco producers. One of the consequences could be the arbitrary determination of spacing, which results in the over-densification of plantations (SIMIONI *et al*., 2018). Given the economic importance of this value chain, it would be beneficial to strengthen forest extension services to encourage the adoption of more precise silvicultural techniques by producers. This would, in turn, lead to higher-quality family forestry production, potentially enabling farmers to meet the demands of higher-value markets, such as logs and posts, thereby creating opportunities for income diversification.

The obtained cophenetic correlation value indicates that the clustering method was satisfactory, showing that the average Euclidean distance was sufficient to summarize the dataset's information. According to Rohlf (1970), coefficient values higher than 0.7 are considered adequate. The result suggests that the lower percentage of producers participating in forestry planting training reflects in the reduced adoption of silvicultural management practices (replanting, fertilization, weed control, and ant control), as the RS - Costa Doce region was separated from the other regions. Considering these factors alone, it can be inferred that this region is a priority for implementing action plans to improve silvicultural techniques for family forestry production.

Regardless of the result obtained through the clustering analysis, the diagnosed reality suggests that producers have limited knowledge and technology regarding forestry production. Therefore, with training programs on forestry practices, forestry production will improve in both quality and quantity, making the activity more economically viable (MENDES *et al*., 2011). The information gathered in this research is important for guiding public or private programs aimed at structuring the training and capacity-building of small producers in family forestry production.

CONCLUSIONS

- Rural properties have a deep connection with forestry production; however, it is evident that there are gaps in the techniques for establishing and maintaining forest plantations.
- Firewood from family forestry production is the main fuel material used to supply curing units in the Virginia tobacco curing process.
- Finally, there is little influence from public agents regarding forest extension through training aimed at improving the capacity of producers in family forestry production.

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