

# Tropical Viticulture Diagnosis in the North and Northwest Fluminense

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## Abstract

Viticulture has proved to be an alternative for farmers in the northern and northwestern Rio de Janeiro State; however, the activity is still very recent and requires the development of agronomic and managerial techniques. Therefore, the objective of this work was to diagnose the production areas and the characteristics inherent to the inner and outer environment of this farming enterprise. It was observed that the grape-growing farms predominate in an average area of 1 hectare, with productivity between 20 and 25 t/ha, with offer in the harvest and in the off-season. The inner points are stronger than the weak ones, and can be adjusted with the joint execution of the viticulturists allied to the opportunities, such as agrotourism and the diversification of available cultivars that allow a greater offer of the product and minimize the inherent threats observed, such as climatic variations and the shortage of skilled labor. These identified points may indicate competitiveness strategies for the wine market in the studied regions.

**Keywords:** grape, productive chain, SOWT matrix, *Vitis labrusca*

## 1. Introduction

The wine sector is one of the most important for the Brazilian agricultural economy, as it provides livelihood for a number of small grape-growing farms. Although present in many States and regions, it is especially significant in Southern Brazil where a large part of the production is intended for agribusiness of juice and wine (Baldin et al., 2018). The southern region of Brazil stands out as the largest producer of grapes, for the production of wine, while in the Southeast and Northeast regions, the production of grapes for fresh consumption predominates (Mello, 2016).

Among the grape-producing states in the southeastern region, Rio de Janeiro has an area of 17 hectares (IBGE, 2018) ranking the 11th position among the grape-producing states in Brazil. Although it presents a very small production, it is observed the importance of this sector for the generation of income for small farmers in the north and northwestern Fluminense regions (Pommer et al., 2009).

The grape production in the State of Rio de Janeiro is much lower than that in areas in São Paulo State and with a smaller grape production area in the southeastern region. Nevertheless, it is likely that its grape is a factor that boosts local economies particularly because it is in expansion in the northern and northwestern Fluminense Region. It should be observed that the latter region is among the regions of Rio de Janeiro with the worst rates of economic development, with a poorly diversified agricultural sector.

The Fluminense viticulture is still an incipient activity. It has been disseminated through scientific research and by farmers who have been seeking for alternatives in this agricultural business. According to Pommer et al. (2009) the northern region of Rio de Janeiro has conditions to establish itself as a hub for table grapes in the State, with more than two harvests a year. It is possible to find information about the behavior of this crop in these regions in studies by Almeida et al. (2017), Silva et al. (2017), Deus et al. (2016), among others.

The viticulture chain is relevant due to the diversification of the local productive matrix, the added value, the generation of income and jobs as well as the increase in the Gross Domestic Product (GDP) of the municipalities

involved. Because those crops are at their beginning, a diagnosis of the inner and outer points can serve as a reference regarding the development of the Fluminense viticulture and a guide to agricultural policies. In addition, management tools can be used within rural properties as a strategy to increase productivity (Parré, Bankutti, & Zanmaria, 2011).

According to Lopes et al. (2018) these tools can optimize the activity as a whole, both in the administration and in the management of the rural property, resulting in increased profitability and return. The adequate management can provide winegrowers with improvements in their socioeconomic conditions, strategic decisions and advances in the productive activity.

In the agricultural sector, SWOT analysis is used to assess the strategic position of projects. In India, the tool was used to analyze the agricultural sector in terms of capacity to meet further food security requirements (Parveen & Nain, 2013). In relation to the Fluminense viticulture, which is still in recent development, it can be a tool for the analysis of the inner and outer environment that can characterize the development of the activity.

The knowledge of the inner and outer factors linked to the development of this activity in a sustainable way is relevant to make the productive units more competitive. Thus, the objective of this work was to analyze viticulture in the North and Northwest Fluminense Regions, identifying the strengths and weaknesses, the potential and threats that can influence their development.

## 2. Method

### 2.1 Study Area

The study area is located in the north and northwest Regions of the State of Rio de Janeiro (Figure 1). In the Northern Fluminense the following municipalities are found: Campos dos Goytacazes, Carapebus, Cardoso Moreira and São Fidelis. And the following municipalities are found in the northwest Region: Bom Jesus do Itabapoana, Cambuci, Italva, São José de Ubá and Varre Sai. These municipalities were selected taking into account the fact that they are the grape-producing municipalities in the regions, adding to the lack of economic information on production costs, the lack of data on the behavior of grape prices and analyzes of economic viability viticulture in development in these regions.

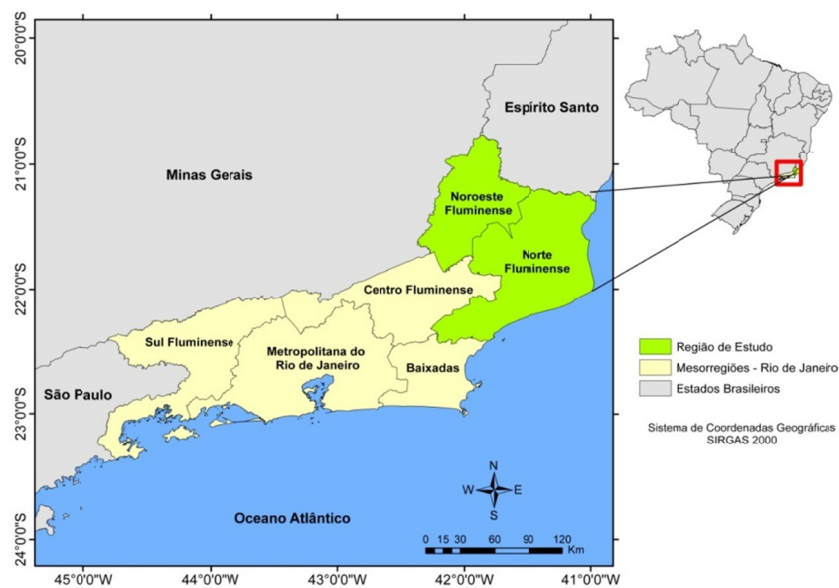


Figure 1. Characterization of grape production areas

### 2.2 Data Collection

Data were collected by means of semi-structured interviews, through field research, from April 2017 to May 2018. The interviews were conducted directly with all winegrowers in the regions, considering the total number of 16 producers, and grape cultivation area already implemented in the regions in this period. Firstly, through these interviews, the following data were collected: location of grape production areas, size of production areas and average productivity.

### 2.3 Data Analysis

Following data collection, an organizational assessment tool denominated SWOT Matrix was applied, in order to observe the following variables: Strengths, Weaknesses, Opportunities and Threats. This analysis was carried out on two levels: in the outer and inner environments. The inner environment examines the strengths and weaknesses that need to be monitored constantly and can be controlled. The external environment, in turn, comprises changes that occur outside the organization, but which can affect its performance, being characterized by threats and opportunities.

After analyzing the outer and inner environments, companies can decide which competitive strategies should be used to achieve their competitive objective. Competitive strategies could be used to “exploit opportunities in the company’s environment with the company’s strength and neutralize threats in the company’s environment, avoiding the company’s weaknesses”. This analysis can be the starting point in the identification and implementation of the most appropriate strategy for the wine business in the areas surveyed. Thus, this work allows the identification of a strategy that can explore the strengths of viticulture in Rio de Janeiro and eliminate or minimize, at least, weaknesses and the outer threats.

As a result, this matrix allows analyzing the strengths and weaknesses as perspectives that depend only on the viticulturist and on his or her productive system and the opportunities and threats, which, in turn, do not depend on the action of the producer and on the response of his or her productive systems, but on outer factors.

The results obtained from the interviews were organized into tables with data in relative frequency, as well as the studies by Biassio and Crespo Silva (2015); Sarmiento (2017); Nascimento Mendes, Dos Anjos, and Raphael (2018), and Schneider, Zilli, and Vieira (2017).

## 3. Results and Discussion

### 3.1 Characterization of the Grape Production Areas

The diagnosis carried out in the field allowed to identify nine producing municipalities, among them, the municipality of Bom Jesus do Itabapoana as the largest in production area (7 ha) in the Northwest Region and Cardoso Moreira in the North Region (4 ha), while São José de Ubá had the largest number of producers per municipality (Table 1). Also, the producing areas were distributed in the regions. Small and medium farmers predominate in both regions, with a strong presence of family labor. Similar data for viticulture were found in other regions by Anzanello (2012) in Rio Grande do Sul and Cappello, Spósito, and Osaki (2017) in the Northwest of São Paulo State.

Table 1. Grape production units and number of winegrowers in northern and northwestern Rio de Janeiro State

Municipalities	Area (ha)	(%)	*No.	(%)
Nothwest Region	11.5	67.65	11	68.75
Bom Jesus do Itabapoana	7	41.18	1	6.25
São José de Ubá	2	11.76	4	25
Varre Sai	1	5.88	3	18.75
Cambuci	1	5.88	2	12.5
Italva	0.5	2.94	1	6.25
North Region	5.5	32.35	5	31.25
Cardoso Moreira	4	23.53	1	6.25
São Fidélis	1	5.88	2	12.5
Campos dos Goytacazes	0.25	1.47	1	6.25
Carapebus	0.25	1.47	1	6.25
Total	17	100	16	100

Note. \*No.: Number of grapegrowers/municipalities.

In 88% of the farms, the grape cultivation occupies an area of less than 1 ha. This reduced size is due to the amount that was subsidized by the Frutificar Program, and the other producers that invested on their own since they consider the activity as a novelty in the regions. Similar data were observed by Cappello et al. (2017) and Duarte (2013). It should be observed that, in order to expand the areas, more capital and greater availability of labor and guarantees for placing the product on the market are needed.

Productivity per hectare is between 20 and 25 t/ha/year, for 10 respondents (62.5%). Different productivity may be achieved depending on the variety, driving system and technological level and year of production. In Rio Grande do Sul, Anzanello (2012) found that the average yield was 9.6 t/ha, and Cappello et al. (2017) in the State of São Paulo observed 14 t/ha in the harvest, and 10 t/ha in the off-season in the region of Campinas. The comparison between the average of these leading traditional grape regions in the country showed that the local edaphoclimatic conditions, as well as, the appropriate management for cultivation has provided a very attractive productivity.

### 3.2 Analysis of the SWOT (Strengths, Weaknesses, Opportunities, Threats) Matrix

The strengths and weaknesses are related to the capacity and influence of the factors that can contribute or harm the grape production systems found in the regions. While, the opportunities were defined as aspects that are important to encourage the productive areas until the flow of the production, and the threats were listed as aspects that represent risks to the maintenance of the production systems (Table 2).

Table 2. Factors that influence the competitiveness of grape production and trade in the North and Northwest Fluminense Regions

SWOT MATRIX	
INTERNAL ENVIRONMENT	
STRENGTHS:	WEAKNESSES:
1. Favorable edaphoclimatic conditions	1. Lack of producer's organization
2. More than one harvest per year	2. Little experience in viticulture
3. Proximity to consumers	3. Market shortages by producers
4. Trade in the property	4. Little administrative knowledge
5. Strengthening of the family workforce	
6. Agricultural diversification	
7. Possibility of local trade	
EXTERNAL ENVIRONMENT	
OPPORTUNITIES:	THREATS:
1. Fruiting Program	1. High investment cost
2. Agrotourism	2. Low water availability
3. Availability of variety diversity	3. Absence of agricultural policies
5. Research development	4. Shortage of skilled labor
6. Few intermediaries	5. Few courses and field days
7. Additional income source	

#### 3.2.1 Strengths

Among the strengths, the edaphoclimatic conditions of the regions promote the development of grape cultivation, such as solar radiation, temperature, relative humidity, precipitation and soil fertility. Associated with these conditions, management practices adapted to local conditions, such as scheduled pruning, use of irrigation and plant regulators, enable the grape producer to obtain more than one harvest throughout the year. In addition, the phenological cycle and thermal needs of the grapevine are similar to those found in the State of São Paulo.

The proximity of the farmers to the main consumer, in addition to providing a trade with other agricultural products within the properties, has strengthened viticulture in the regions. This trade on the property narrows the relationship between the producer and the consumer, and generally results in better prices for the producer, since the product does not pass through different agents in the chain up to retail. These data differ from the observations by Alves, Tonin, and Carrer (2013) in Paraná, where producers cannot classify the product and are unable to offer a large volume without the presence of an intermediary, with a trade that generally results in lower prices for the producers.

#### 3.2.2 Weaknesses

One weaknesses in the chain is the little experience in viticulture. As it is still an incipient activity, many producers do not know the behavior of the grapevine over the year, and throughout the development of the crop

they need to adapt the management combined to the local edaphoclimatic conditions, and identify the physiological and nutritional demand of this fruit.

Technical agents also point out the lack of organization of the farmers as a major weakness in almost every rural sector, and it is not characteristic only of grape producers. In particular, it can be considered that at the stage of viticulture development, the existence of associations and cooperatives would strengthen the chain and the development of culture in the regions. Most municipalities in Rio de Janeiro have family farming with low levels of modernization, in particular, the North and Northwest regions show family farming with relatively low rates of use of the technologies, considered in the analysis carried out by De Souza, Souza, and Ferreira Neto (2018). In view of this weakness, it is necessary to emphasize, the search for local organization can be an alternative for strengthening winegrowers, constituting an instrument for competitiveness. The formation of associations and cooperatives is an important tool for social, political and economic organization (Costa, Junior, Gomes, & Silva, 2015).

### 3.2.3 Opportunities

Agricultural policies can be arrangements of instruments that stimulate agricultural production. In this context, the Frutificar Program is an agricultural policy that developed the cultivation of grapes in the regions, since it encouraged and subsidized 62.5% of the interviewed wine growers. Costa, Tarsitano, and Conceição (2012) observed that the majority of winegrowers invested in the grape, through the National Program for Strengthening Family Agriculture (PRONAF) in the municipality of Jales (SP).

There is also a possibility of local vineyards to provide the “sale” of the tourist territory of the regions, also highlighting the sustainability of the regional grape. Agrotourism has been promoted by the consumption of grapes and by-products within the crop. Some producers report having received 30 people per month in the field in harvest months. Viticulture can even trigger a greater dissemination of tourism, not only by motivating wine tourism but also focusing on other attractions in the regions, as also reported by Sarmiento (2017).

The good performance of winegrowing in different regions of the country is linked to the great variability in the genetic material used. There are more than 120 cultivars of *Vitis vinifera* and more than 40 cultivars of American grapes, including *Vitis labrusca* varieties (Camargo, Tonietto, & Hoffmann, 2011). The diversity of cultivars is another promising variable that favors viticulture in Rio de Janeiro, considering that the different characteristics of cultivars can aid competitiveness in this productive sector. In the distribution of cultivated varieties there are nine varieties, among which stands out the cultivation of ‘Niagara Rosada’, followed by cultivars, BRS Vitória, BRS Isabel Precoce, BRS Isis, Bordô, and others in smaller areas. This diversity allows a greater variety in the offer of the grape, giving the producer and consumer more options in the wine market, such as seedless grapes, and grapes that can be used for the production of wines, juices and jams, increasing the farm’s gross revenue, corroborating with Mello (2017).

The insertion of grape cultivation not only diversifies agricultural production in the regions, as observed in some properties with only an economic activity as a source of income, such as dairy farming, tomato and coffee farming but also allows to balance the income when a product has a drop in its value. This diversification is of great importance in terms of social reproduction strategy, as it guarantees yields in seasonal periods of production, minimizing the risks of having a single activity.

The expansion of viticulture to vitiviniculture mainly in northwestern Rio de Janeiro is a factor that boosts the local economies, since it is a region that has the lowest economic development rates in the State. In addition to the opportunities, the agents reported the maintenance of rural people in the region since throughout the crop, there is a considerable demand for labor, similar to what is reported by Pommer et al. (2009), being an important ameliorator of social problems in these regions.

Among the nine institutions that support local agriculture, six had the knowledge of grape production, but they only assist in commercialization through the National School Food Program (PNAE). Although, for some producers, the price paid for this program has already been advantageous, they stressed that it has suffered a reduction and delay in the payment, corroborating with Agapto et al. (2012). It seems that some farmers have the potential to participate in this process; however, these factors may discourage them.

### 3.2.4 Threats

In contrast, it is known that agriculture is vulnerable to the effects that the climate changes has on hydrological balances and natural resources. The interference of water shortage in the pruning and harvest seasons, observed by some producers, affected the possibility of more than one harvest per year. Regardless of being natural or

anthropogenic, it is necessary to seek strategies mainly for small farmers as because of their dependence on agricultural production, will suffer the greatest impacts (Mertz et al., 2009; Deressa, Hassan, & Ringler, 2011).

The high investment value for the implementation is also a threat to the expansion of new vineyards. With the incentive of Frutificar (Agricultural development program of the State of Rio de Janeiro that aims to finance fruit-growing projects in the State), many producers had subsidies to start, the production; however, it is currently active only for maintenance. In addition to this failure in the operation of Frutificar, the lack of agricultural policies aimed at the development of viticulture in the regions is highlighted.

There is a lack of technical assistance for the management, the investment and the risk analysis in these regions. Thus, knowledge about administrative processes may provide advances in the production of the activity and added-value to the final product. There is also little skilled labor to guide them in cultivation techniques, such as pruning, phytosanitary management and harvesting, as found by Costa et al. (2012) in Jales, SP. Due to the high cost and the increasing difficulty in the availability of labor, winegrowers need to adjust themselves by intensifying the search for more productive cultivars and training systems for vines, as observed by Pedro Junior, Hernandez, and Moura (2018).

#### 4. Conclusion

The edaphoclimatic conditions and the possibility of more than one harvest are points that contribute to the diversification of the productive matrix, job creation and sustainable development in the regions. The Frutificar Program and the development of studies are the outer factors that promoted the performance of viticulture in Rio de Janeiro. This demonstrates that the strengths and opportunities of this activity indicate the great potential to establish competitive advantages for the regions.

There was a lack of specialized technical assistance, management training for local producers, and water issues, which need to be adjusted for the better performance of the grapevine and the continuity of the recent development of the activity in the regions.

There was a need for strategies for the production and organization of producers, in order to better explore the strengths and opportunities, and keep production the best as possible in the face of unfavorable conditions, both in terms of climate changes and the market.

Finally, the present study can support further works on the scenario of the development of viticulture in the regions of Rio de Janeiro, and to contribute to the exploration of the points of competitiveness presented in the study.

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## Appendix

### Data collection

	ha	N	%	t/ha
Grape production units				
Number of winegrowers				
Productivity				
Points	S	W	O	T
Favorable edaphoclimatic conditions				
More than one harvest per year				
Proximity to consumers				
Trade in the property				
Strengthening of the family workforce				
Agricultural diversification				
Possibility of local trade				
Lack of producer's organization				
Little experience in viticulture				
Market shortages by producers				
Little administrative knowledge				
Fruiting Program				
Agrotourism				
Availability of variety diversity				
Research development				
Few intermediaries				
Additional income source				
High investment cost				
Low water availability				
Absence of agricultural policies				
Shortage of skilled labor				
Few courses and field days				

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