



DEVELOPMENT OF THE GEOGRAPHICAL INDICATION VALE DO SÃO FRANCISCO FOR TROPICAL WINES IN BRAZIL

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Abstract

Aim: Geographical Indications-GI are commonly used to protect territorial products around the world, such as cheese and wine. This qualification is useful because it improves the producer's organization, protects and valorizes the distinct origin and quality of the product, increases recognition and notoriety, and adds value for products. Tropical wines are mainly produced in Brazil, India, Thailand, Myanmar and Venezuela. In the 1980's, Brazil started to produce tropical wines in the São Francisco Valley, where vines are pruned twice per year and grapes are harvested twice a year, due to the natural conditions - high annual average temperature, solar radiation, water availability for irrigation, and vineyard management, using phytohormones. According to the plot scheduling, wineries can prune and harvest every day throughout the year. In this study, a Research, Development and Innovation (RD&I) project was developed between 2013 and 2018. The objective was to produce a dossier that describes the climate and soil conditions, landscape, topography, agronomical and viticultural parameters, as well as the enological protocols used by all wineries, in Vale do São Francisco, a region producing tropical wines. The dossier will be submitted in 2020 by Vinhovaf, an Association of the wineries, to recognize Vale do São Francisco as a Geographical indication (GI) for tropical wines. This GI will include white, red, and also sparkling wines made from traditional varieties of *Vitis vinifera* L. to the region.

Methods and Results: The geographical area delimited by the GI, includes eight cities presenting similar climate conditions (33,000 km² of total area). A characterization of the soils in the GI area, as well as the trellis systems of the vineyards, the rootstocks and varieties adapted and authorized, and the enological protocols adopted for winemaking was made. Grape composition and the physicochemical and sensorial parameters of the wines were also characterized.

Conclusions: A dossier has been developed with all the information needed to submit a request for Vale do São Francisco, located in northeastern Brazil to become a GI for still and sparkling tropical wines.

Significance and Impact of the Study: It will be the first GI for tropical wines in the world, using a similar structural model adopted by the European Union. It is expected that this will bring benefits to the wineries, as well as for all producers in general and for the working population involved in the grape and wine production chain in the region. The GI will improve the wine quality, recognition, reputation, valuation and promotion of all products, as it was observed for all GI obtained in the south of Brazil since 2002. Hence, the regional wine sector will improve its competitiveness, enotourism and attraction of new investments in the region.

Keywords: *Vitis vinifera* L, grape, wine, quality, typicality

Introduction

Wines are produced in very different climates and soils around the world, with specific grapevine management strategies and winemaking practices (Matthews, 2016). Traditional vitiviniculture has been practiced for many centuries (also referred to as “Old World”) and where the main wine producers are located in Europe, such as France, Germany, Greece, Italy, Portugal and Spain. In the same way, some countries have improved their wine production in the last few decades, even centuries ago, and are playing a very important role in the wine market worldwide. These are known as “New World”, such as Argentina, Australia, Brazil, Chile, China, New Zealand, South Africa, and United States (OIV, 2019). All of these traditional countries from “Old” and “New” Worlds are producing wines in the north hemisphere (between 30-50° north latitude) and south hemisphere (between 22-50° south latitude), where vines are pruned and grapes are harvested just once per year, in temperate and other climates. In the northern hemisphere, vines are pruned in January-February and grapes are harvested between August to October, depending on the variety (early, intermediate or late). In the southern hemisphere, vines are pruned in August-September and grapes are harvested between January to March, also depending on the variety. Conversely, in tropical climates grapevines respond differently, such as in Brazil.

Brazil is the only country in the world that has three different kinds of viticulture, according to climatic conditions and vine managements (Pereira, 2020). The first one is the traditional viticulture, started more than one century ago, where wines are produced in the south and south-east regions, in temperate and sub-tropical climates. In these conditions, vines are also pruned in August-September, similar to the other countries in the southern hemisphere, and grapes are harvested between January and March, also depending on the variety. The second one is located in the São Francisco Valley, in northeastern Brazil, in a tropical semi-arid climate, where so called “tropical wines” are being produced since 1980 (Tonietto and Pereira, 2011). In this region, vines are pruned and grapes are harvested twice a year (Pereira *et al.*, 2011; Tonietto and Pereira, 2012). Adopting the scheduling of different plots and vineyards, with natural conditions, such as high temperatures (annual average of 26.5°C), solar radiation (more than 3,000 MJ m⁻² year⁻¹), water availability for irrigation, and use of phytochemicals and other vine managements, it is possible to prune vines and harvest grapes every day of the year (Tonietto *et al.*, 2014; Pereira *et al.*, 2018). The wine quality and typicality varies according to the harvest date, mainly due to intra-annual climate variability, resulting in different wines (Pereira *et al.*, 2016). Finally, in Brazil there is a new third winegrowing zone, started in 2004 (the first commercial wines were sold in 2010) in southeastern Brazil (Minas Gerais state). Wineries prune vines twice a year, and harvest grapes just once per year (in the winter, between June and August, when temperatures range from 6-10°C in early morning, to 22-26°C in the afternoon), producing the so called “winter wines”. They choose grape harvests in the winter, because the summers are very wet, with less disease leading to higher quality grapes. In these conditions, vine management also requires the use of phytochemicals to allow two vegetative cycles, one for formation (just one bud per spur) and the second one for production (two buds per spur). The main regions producing the winter wines are the south-east (Minas Gerais, São Paulo, Rio de Janeiro and Espírito Santo states), center-west (Goiás, Mato Grosso and Federal District), and north-east (Bahia state) of the country. In all of these regions, the vineyards are located between 600-1200 m above sea level, in sub-tropical and tropical at elevation climates (Pereira, 2020).

In the São Francisco Valley, there are approximately 500 ha of vineyards of *Vitis vinifera* L. varieties being used to produce around 8 million litres of wines per year. Another 13,000 ha of *Vitis vinifera* L. are planted for table grapes, and 700 ha of *Vitis labrusca* for grape juices (whole, concentrated and reconstituted). From the 500 ha, around 380 hectares are planted in Pernambuco state, and 120 ha in Bahia state. Sparkling wines are responsible for around 65% of the total production, followed by red wines at 34% and white wines at 1% of total production (Pereira *et al.*, 2018). Vineyards are trained to either pergola or cordons with vertical shoot positioning (VSP), depending on the objective of the production. For sparkling, and still young red and white wines, pergola systems are used, while for aged red wines the vineyards are in VSP.

Geographical Indications for wines are traditionally used in many countries, and have been developed in Brazil since 1998. They started in the south region, where seven GI (seven Geographical Indications of origin and one Appellation of Origin) were already recognized by the National Institute of Industrial Property (INPI), and producers are controlling wine production and identifying these wines with specific labeling (Tonietto and Falcade, 2018). We present the main natural factors, such as climate and soil conditions, landscape, topography, as well as the agronomical and viticultural parameters, such as yield, rootstocks and varieties allowed, and the enological protocols used by all wineries, to produce tropical wines in Brazil.

Material and Methods

The project was developed between 2013 and 2018, financed by the National Council of Scientific and Technological Development (CNPq) and Brazilian Agricultural Research Corporation (Embrapa), with participation of Public Universities as partners (UCS and UFRPE). All seven wineries participated as partners and were represented by the Association of all wineries, named VINHOVASF.

The activities carried out included the delimitation of the geographical area of the GI, the characterization of its climate and soils, the trellis systems of the vineyards used by all wineries, the rootstocks and varieties authorized, as well as the enological protocols adopted for winemaking. Grape composition at harvest, the physicochemical and sensorial parameters of experimental and commercial wines were also documented. New wine styles were trialed, as alternatives to be made by wineries in the future. The wine stability was determined two years after bottling to better understand the evolution of chemical and sensorial attributes. A dossier was created with all this information to describe the main technical specifications of the GI.

Results and Discussion

The delimited geographical area of the GI Vale do São Francisco is shown in Figure 1, officially named as RIDE (Integrated Area of Development) of the pole Petrolina-Juazeiro. The total area is 33,453 km², which includes eight municipalities, four in Pernambuco state (Petrolina, Lagoa Grande, Santa Maria da Boa Vista and Orocó), and four in Bahia state (Juazeiro, Casa Nova, Sobradinho and Curaçá). The wine production area is in the same location as table grapes and grape juice production, with a total production of 14,200 ha.

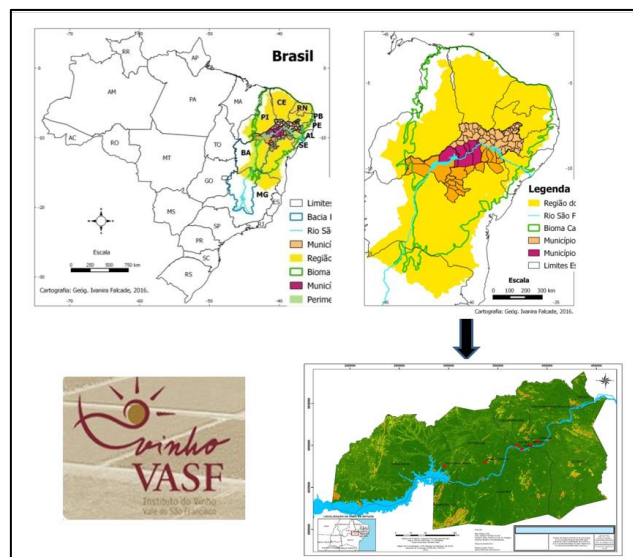


Figure 1: The images show the Brazilian map (at the top, on the left), the semi-arid region of Brazil (in yellow), with the GI Vale do São Francisco in the middle (in purple at the top, on the right). At the bottom, the label of the winery Association (VINHOVASF, on the bottom, on the left), and the Integrated Area of Development (RIDE) Petrolina-Juazeiro (in green on the bottom, on the right).

The climate in the area is described as tropical semi-arid (BSwh) by the Köppen classification and the majority of the soils are podzols and also eutrophic argisol/ typical plintustalf (soil taxonomy alfisol). All vineyards are planted on a flat landscape, and trellis systems were described in all vineyards (Pereira *et al.* 2016; 2018).

The varieties authorized for use (still red and white, sparkling wine, sweet muscat, brut and demi-sec, white and rosé) include the red Alicante Bouschet, Aragonês, Barbera, Cabernet Sauvignon, Egidola, Grenache, Malbec, Merlot, Ruby Cabernet, Tannat, Tempranillo, Touriga Nacional, Petit Verdot, and Syrah; and the white Arinto, Chardonnay, Chenin Blanc, Fernão Pires, Moscato Canelli, Moscato Itália, Sauvignon Blanc, Verdejo, and Viognier. All the commercial rootstocks were chosen based on the wine style and soil. The most commonly used are IAC 766 (*Riparia do Traviú x Vitis Caribaea*), IAC 313 (*Vitis riparia x Vitis rupestris x Vitis cinerea*), IAC 572 [101-14 MGT (*Vitis Riparia x Vitis rupestris*) x *Vitis caribaea*], and Paulsen 1103. The yield authorized varies according to the trellis system and wines. For red wines, wineries can harvest up to a maximum of 10 T of grapes per hectare

per season, totaling 30 T/ha/year in VSP, and a maximum of 15 T/ha/season, totalizing 30 T/ha/year in pergola. For white and rosé wines, a maximum of 15 T/ha/season or 30 T/ha/year in VSP, and a maximum of 20 T/ha/season or 40 T/ha/year in pergola. For sparkling wines, a maximum of 15 T/ha/season or 30 T/ha/year in VSP, and a maximum of 25 T/ha/season or 50 T/ha/year in pergola. For sweet Muscat wines, a maximum of 40 T/ha/season or 80 T/ha/year in pergola system.

The commercial wines allowed to use the label with the GI can be either varietals or blends made from all varieties authorized. The grapes must be 100% produced and wines made in the geographical area. Varietal wines must have at least 85% of the grape variety. The enological parameters used depend on the kind of wine, but all protocols were described and can be used, following the international rules of OIV. The wines tasted and approved by an independent panel, with qualities and typicalities, will be authorized to use the label of the GI Vale do São Francisco.

In this way, the description of natural factors, as well as vine managements, and enological protocols of tropical wines has been recognized by several awards, competitions and publications, between 1986 and 2018. This activity has a socioeconomic importance to the region and to the country (Tonietto and Falcade, 2018; Pereira *et al.* 2018). It is expected that the request to the GI Vale do São Francisco will be sent by the producers association (VINHOVASF) to be registered in 2020 in the INPI, and recognized by the end of 2021.

Conclusions

A dossier with all information needed to request the GI Vale do São Francisco was created. This GI will be the first for tropical wines in the world, using a similar structural model adopted by the European Union. The GI will improve wine quality, recognition, reputation, valuation and promotion of all products, as it was observed for all GI obtained in the south of Brazil. Therefore, the regional wine sector should have an improved competitiveness, and attraction of new investments, possibly with new wineries established in the region.

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