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A concept for the viticulture of ‘tropical wines’

Jorge TONIETTO^{1*}, Giuliano Elias PEREIRA²

^{1*} *Embrapa – National Center of Research in Grape and Wine, 95700-000 Bento Gonçalves-RS, Brazil, Telephone 55-54-3455.8000, Fax 55-54-3451.2792, E-mail: tonietto@cnpuv.embrapa.br*

² *Embrapa – National Center of Research in Grape and Wine / Research Center of the Tropical Semiarid Region, 56302-970 Petrolina-PE, Brazil, E-mail: gpereira@cpatsa.embrapa.br*

ABSTRACT

At worldwide level, the classical viticulture produces wines in almost all places in different climate types, where it is possible to obtain only one harvest per year. In these conditions, bud burst in vines occurs as a result of temperature raising at the end of the winter–beginning of spring. With the development of the vegetative cycle, grapes arrive to maturity/harvest period at the end of the summer–beginning of the fall season. After the fall of the leaves, vines undergo a dormant period with a vegetative repose (condition found also in some intertropical producer regions). A lot of grapes are produced for a long-time in the intertropical zone, but only a little part is used to winemaking. Considered a challenge in the past, to produce quality wines in the tropics became reality. The present industry of fine wines began about 30 years ago. Today, there are many commercial wineries in several countries in Occident and Orient in the tropical zone of the globe, like in Brazil, India, Thailand and Venezuela, producing some million liters of fine wines per year - called “tropical wines”. This article analysis these climates, in relation to the particular viticulture adapted and developed, where it is possible to have more than one cycle per year, with one or more harvests per year. Based on the particularities of this viticulture, a characterization is proposed for the viticulture of “tropical wines”. Some examples showing different tropical climates are presented.

Keywords: *Vitis vinifera, terroir, tropical climate, grape production, wines.*

1 INTRODUCTION

There are a lot of viticulture between the Tropic of Capricorn and the Tropic of Cancer, in the intertropical zone. The most part of the viticulture is for table grape production. However, there is also an increasing area of vineyards for winemaking, to produce quality wines. The present industry of fine wine production began about 30 years ago. Today, there are many commercial wineries in several countries in Occident and Orient in the tropical zone of the globe, like in Brazil, India, Thailand and Venezuela, producing some million liters of fine wines per year - called “tropical wines” (1, 2, 3, 4, 5, 6, 7, 8).

The objective of this article is to characterize and to define the viticulture concerned by the “tropical wines”.

2 MATERIAL AND METHODS

The article use elements of the “Geoviticulture Multicriteria Climatic Classification System” (9), in particular the concept of “viticulural climate with intra-annual variability” to characterize the viticulture for tropical wine production (10). The two main

climatic conditions used in the tropical viticulture are presented, using examples of climatic regions: a) double pruning and single harvesting system on the driest period of the year; b) more than one cycle per year with one or more harvests per year programmed by the wineries. Thermal-hydro characteristics of the regions over the year are presented.

3 RESULTS AND DISCUSSION

At worldwide level, the classical viticulture produces wines in almost all places in different climate types (according Péguy - Temperate: oceanic, warm oceanic, transition temperate, continental, cold continental; Mediterranean; Subtropical: subtropical, continental subtropical; Semi-Arid; Arid; Hyperarid), where it is possible to obtain only one harvest per year. In these conditions, bud burst in vines occurs as a result of temperature raising at the end of the winter–beginning of spring. With the development of the vegetative cycle, grapes arrive to maturity/harvest period at the end of the summer–beginning of the fall season. With the fall of the leaves vines undergo a dormant period with a vegetative repose. In the Figure 1 (d, e, f) we

observe the annual thermal evolution of the climate, in three viticultural regions with different thermal availability expressed by the monthly mean temperatures, for one vegetative cycle per year, with a subsequent dormant period.

Some other climates present a thermal regime during the year that allows the vine growing continuously, having successive and shorter vegetative cycles.

Irrigation and adapted varieties for this viticulture production system are necessary. As observed in Figure 1 (a, b, c), in the tropical climate we can find a big range of temperatures over the year (three patterns presented). Air temperatures during the year define the potential of the regions to have one or more than one vegetative cycle of grapevine per year.

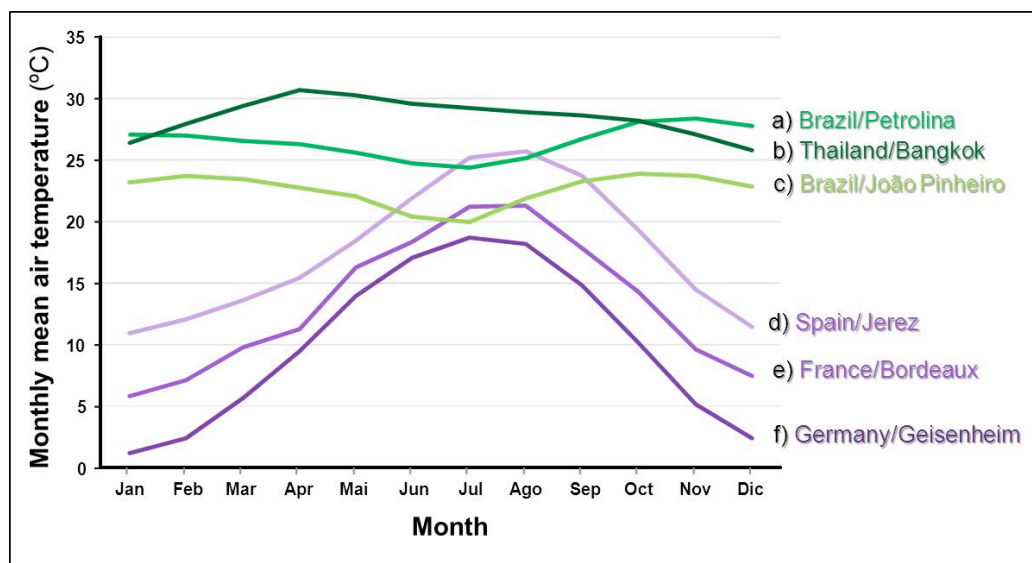


Figure 1. Monthly mean air temperature of some different wine regions worldwide for more than on cycle per year (a, b, c) or only one cycle per year (d, e, f).

In this thermal condition, two main situations, concerning viticultural cycles, are observed in the tropical vineyard of the world:

a) Double pruning and single harvesting system on the driest period of the year (Figure 1 - b and c; Figure 2 – a and c): this system is used to produce wines in regions alternating, during the year, a period very wet (monsoon climate in Asia, for example) with another dry. In this case, grapes are harvested only once a year in the dry period. This is the case of producer regions in Minas Gerais state (11) or São Paulo state in Brazil (12) or in some hot tropical conditions in India (13) or in Thailand.

b) More than one cycle per year with one or more harvest per year programmed by the wineries (Figure 1 – a; Figure 2 – b): this system is used to produce wines

in regions alternating, during the year, a not so wet period with another dry (tropical semi-arid climate in Brazil, in the example). With this climate it is possible to distribute the harvests of grapes throughout the year. It's possible to have even 5 cycles in two years, depending on the genetic and cycle duration of each grape variety. Normally, producers avoid producing with harvest in the rainy months. To obtain grapes with better enological quality, producers choose the best climatic conditions over the year to harvest grapes for winemaking process. Camargo (14) explains how to program viticultural cycles along the year to produce grapes with better quality in the case of the São Francisco Valley region in Brazil, considering cycle duration of different varieties.

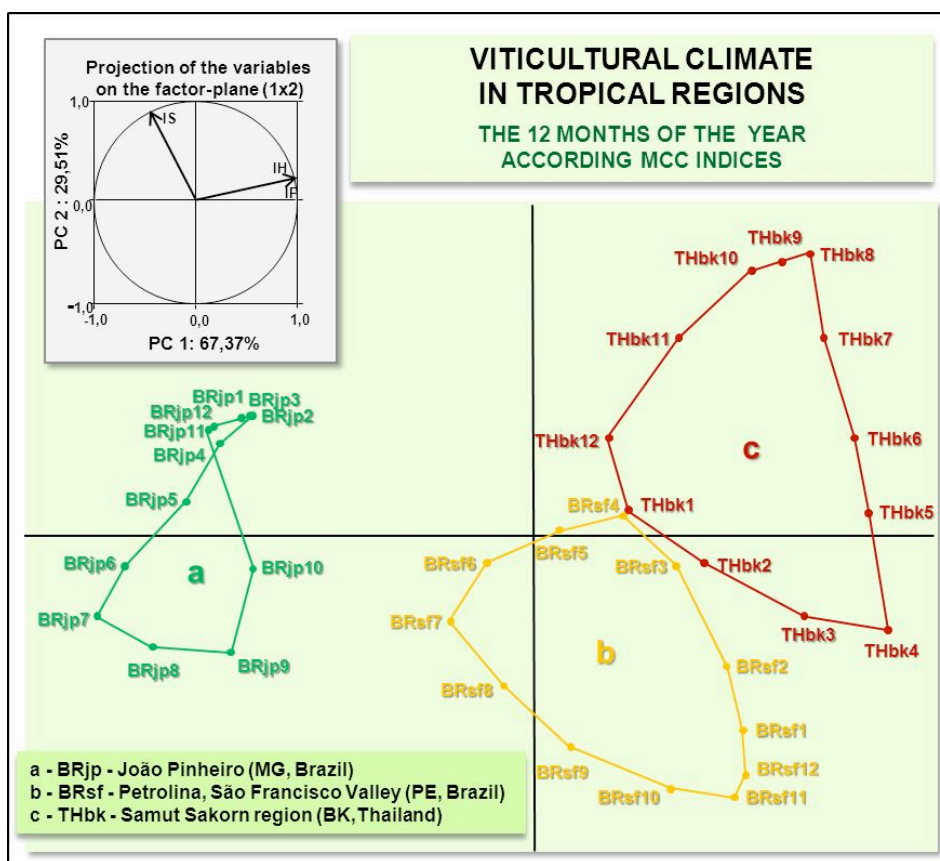


Figure 2. PCA of the viticultural climate according MCC System showing three different conditions of tropical vitiviniculture in the world: a) Southeast of Brazil; b) Northeast of Brazil; and c) South of Thailand (Source of the climatic database: 11, 15).

Figure 2 shows different viticultural climate all over the year in production regions of tropical wines: case “a” (IH with viticulture climate class *Warm*) and case “c” (IH class *Very warm*) - the viticulture have a double pruning and single harvesting system on the driest period of the year; in case “b” (IH class *Very warm*), viticulture have more than one cycle per year with one or more harvests per year programmed by the wineries. Others examples are given for Vietnam regions by Bois & Pérard (17).

The possibility to have more than one cycle per year, classify these regions in the “viticultural climate with intra-annual variability”. It corresponds to the regions where, under natural climate conditions, “viticultural climate class” (concept of the MCC System) changes according to the period of the year in which grapes can be produced (9). To exemplify, MCC System characterize three different climate groups in the São Francisco River Valley vineyard, Northeast of Brazil, located at 09° S, in a tropical semi-arid region (Figure 2 – b). We can even say that in this viticultural region, the same vineyard has three different “climatic terroirs” along the year. This condition allows to produce wines with different typicity according to the viticultural climate of the cycle, specially the climatic conditions during the grape maturation/harvest period (16).

The particularities of the viticultural production with more than one cycle per year are the reason to propose the exclusive use of this kind of viticulture to

characterize “tropical wines”. In this understanding, the fact of producing grapes in the intertropical zone for winemaking process is not sufficient to characterize the concept of “tropical wines”, considering that we can have, in this zone, climatic conditions typical of classical viticulture - with only one cycle per year, as in Tarija Central Valley, in Bolivia, to exemplify.

4 CONCLUSIONS

The article characterize « Tropical wines » as the wines elaborated with grapes produced in vineyards placed in regions with viticultural climate with intra-annual variability, allowing to have more than one vegetative cycle and one or more harvests per year.

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**L'effet du climat viticole sur la typicité des vins blancs :
caractérisation au niveau des régions viticoles ibéro-américaines**
*The effect of viticultural climate on white wine typicity:
A Characterization on Ibero-American Grape-Growing Regions*

**Jorge TONIETTO^{1,*}, Vicente SOTES RUIZ², Mauro Celso ZANUS¹, Carlo MONTES³,
Ernesto Martín ULIARTE⁴, Luis ANTELO BRUNO⁵, Pedro CLIMACO⁶, Álvaro PEÑA⁷,
Celito Crivellaro GUERRA¹, Carlos D. CATANIA⁴, Erich Julio KOHLBERG⁸,
Giuliano Elias PEREIRA¹, Jorge M. RICARDO-DA-SILVA⁹, Jordi VIDAL RAGOUT¹⁰,
Luis VIDA NAVARRO¹⁰, Olga LAUREANO⁹, Rogério de CASTRO⁹, Raúl F. DEL MONTE⁴,
Silvia Avagnina de DEL MONTE⁴, Vicente GOMEZ-MIGUEL², Alain CARBONNEAU¹¹**

¹ EMBRAPA Uva e Vinho, Rua Livramento, 515 - 95700-000 - Bento Gonçalves, Brazil, tonietto@cnpv.embrapa.br;

² UPM - Universidad Politécnica de Madrid, Spain;

³ CEAZA - Centro de Estudios Avanzados en Zonas Áridas, Chile;

⁴ INTA - EEA Mendoza, Argentina;

⁵ PFCUVS-FAUTAPO, Desarrollo de Mercados, Bolivia;

⁶ Instituto Nacional de Recursos Biológicos, I.P., INIA - Dois Portos, Portugal;

⁷ Universidad de Chile;

⁸ Expert Oenologue, Bolivia;

⁹ ISA-UTL - Instituto Superior de Agronomia, Portugal;

¹⁰ Expert Oenologue, Spain;

¹¹ AGRO Montpellier, France.

ABSTRACT

There are many studies in the world that characterize the effect of the climate on grape composition and wine characteristics and typicity concerning different viticultural regions. However, the same is not true concerning studies in a worldwide scale to characterize this effect considering different climate types. This study is part of a CYTED (Ibero-American Program for Science, Technology and Development) project in vitivinicultural zoning. The objective was to characterize the effect of the viticultural climate on white wine typicity on the macro Ibero-American viticultural region. The methodology used 46 grape-growing regions in 6 Ibero-American countries: Argentina, Bolivia, Brazil, Chile, Portugal and Spain. The viticultural climate of each region was characterized by the 3 viticultural climate index of the Geoviticulture MCC System (1): HI (Heliothermal index), CI (Cool night index) and DI (Dryness index). The main sensory characteristics observed frequently in representative white wines produced with grapes of each of these 46 grape-growing regions were described by enologists in the respective countries, using the methodology of Zanus & Tonietto (2). The sensory description concerned the intensity of perception of Color (Cou), Aroma - Intensity (Ar), Aroma - Ripe Fruit (Ar-Fm), Body - Palate Concentration (Con), Alcohol (Al) and Acidity (Ac). The Persistence in Mouth (Per) was also evaluated. The data were submitted to a correlation analysis of the variables and to a Principal