

Climatic groups in Ibero-America viticulture compared to worldwide wine producer regions

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ABSTRACT

The wine production is an important activity in many Ibero-American countries. The wine producer regions of these countries configure a large use of different climate types and viticultural climates. In a vitivinicultural zoning project of CYTED (Ibero-American Program for Science, Technology and Development), a viticultural climatic characterization was done in this macro viticultural region. The project have assembled a climatic database that characterizes the viticultural regions, including relevant variables for viticulture: air temperature (mean, maximum, and minimum), precipitation, relative humidity, solar radiation, number of sunshine hours, wind speed, and evapotranspiration. Using indices of the Geoviticulture MCC System (HI, CI and DI), more than 70 viticultural regions in different countries (Argentina, Bolivia, Brazil, Chile, Cuba, Spain, Mexico, Peru, Portugal and Uruguay) were characterized according to its viticultural climatic. The results, which will be integrated to the worldwide database of the MCC System, showed that the Ibero-American viticulture is placed in a wide range of climatic groups of the wine producing regions around the world. This article presents the climatic groups found in Ibero-America, identifying also some new climatic groups not yet found in other regions of the world. This work also identifies some climatic groups not found in Ibero-America viticulture. The research has also highlighted viticultural areas characterized by climates with “intra-annual climatic variability”, with the potential to produce more than one growing cycle per year. The results allow to conclude that the

wide variability and climatic diversity present in Ibero-America may be one of the reasons to explain the diversity in terms of wine types, sensorial characteristics, typicity and uniqueness of wines produced on this macro-region.

Keywords: viticultural climate, MCC System, Ibero-American countries, climatic groups.

1 INTRODUCTION

The wine production is an important activity in many Ibero-American countries. The wine producer regions of these countries configure a large use of different climate types and viticultural climates. In a vitivinicultural zoning project of CYTED (Ibero-American Program for Science, Technology and Development), a viticultural climatic characterization was done in this macro viticultural region (1, 2), including a viticultural climatic characterization, done in this macro viticultural region.

The goal of this study was to characterize the viticultural climate and the climatic groups found in the wine producing regions in Ibero-American countries (a large grape-growing region) and also to compare these groups with the variability found in the viticulture worldwide.

2 MATERIAL AND METHODS

The Geoviticulture MCC System (3, 4) was used as the methodology to characterize the viticultural climate and the climatic groups of more than 70 viticultural regions in 10 Ibero-American countries: Argentina, Bolivia, Brazil, Chile, Cuba, Spain, Mexico, Peru, Portugal and Uruguay.

The CYTED project has assembled a climatic database to characterize the viticultural regions, including relevant variables for viticulture. The data base established regarding grape-growing regions

correspond to the inter-annual monthly means of climatic variables, as much as possible the normal climatic of the 1961–1990 series (minimum, maximum and mean air temperature; precipitation; relative air humidity; mean wind speed; solar radiation and/or sunshine hours; and Penman’s potential evapotranspiration) from standardized meteorological stations representing the climate of the grape-growing regions. For each region the three indices of the MCC System were calculated: Heliothermal index (HI), Cool night index (CI) and Dryness index (DI).

The results of Ibero-American regions were analyzed and characterized by Principal Component Analysis (PCA). Also, the climatic groups of the different viticultural regions of Ibero-American countries were displayed with the international database of viticultural climate available in Tonietto & Carbonneau (4) in order to characterize the placement of the Ibero-America viticulture in the world context.

3 RESULTS AND DISCUSSION

The viticultural climates found in the Ibero-American region are presented in the PCA of the Figure 1. The viticultural climate of the regions belongs to 31 climatic groups, according to MCC System. These results show the high variability in terms of climate existing in Ibero-America

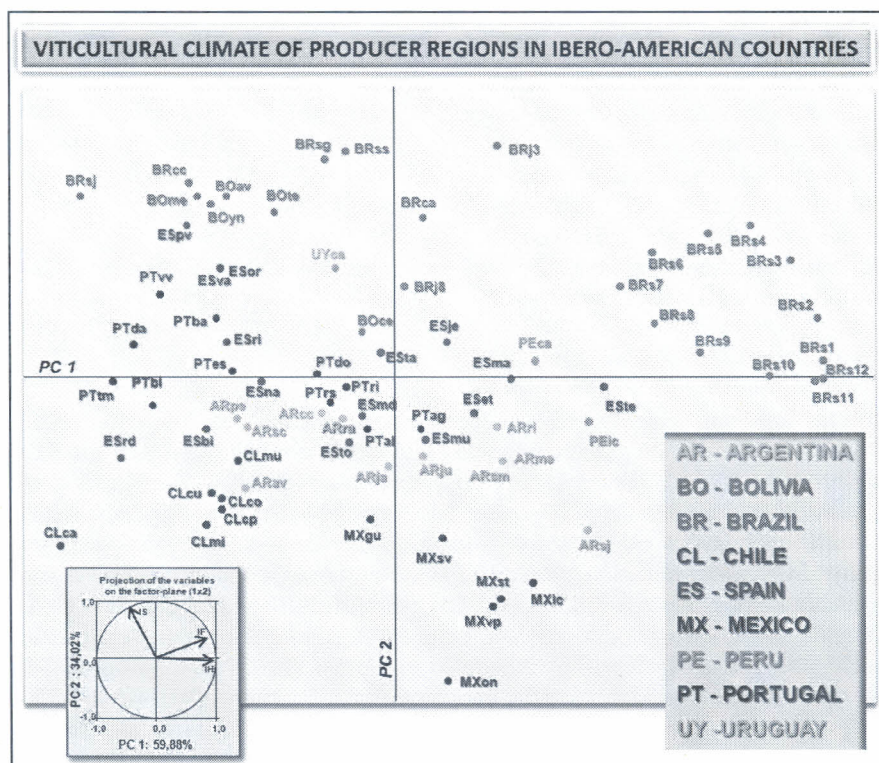


Figure 1. PCA showing the variability of the viticultural climate (HI, CI and DI indices of the MCC System) of the regions in 9 Ibero-American countries.

Considering the total variability in climate of worldwide viticultural regions described in previous works (4), the viticultural regions of each Ibero-American country have viticultural climates that cover complementary spaces, making possible a whole climate conditions for wine production. The results also shows viticultural regions characterized by tropical climates with intra-annual climatic variability: Vale do Submédio São Francisco region (BRs1 to BRs12) and João Pinheiro region (BRj3 and BRj8) (Figure 1), with the possibility to have more than one growing cycle per year. Cuba also has climates in evaluation for viticulture with intra-annual variability classified in the climatic groups IH+3 IF-2 IS-2 or IH-2 IF-1 IS-1.

The high diversity of the viticultural climate of the producers regions in Ibero-American countries is demonstrated in the PCA of Figure 2, which make possible to compare with the worldwide climatic

variability. We can observe that only climate class of IH Very cold is not identified, also with a little presence of IH Cold in Ibero-American countries (Table 1).

In terms of climatic groups the results showed that the Ibero-American viticulture is placed in a wide range of variability when compared to other wine producing regions variability around the world. Compared to the world database of the article Tonietto & Carbonneau (4), the Ibero-America viticulture is present in 31 of the 43 climatic groups identified in the world viticulture, many of them characterized, for instance, only in Ibero-America (Table 1).

The climatic variability found in the Ibero-America viticulture certainly is responsible for the numerous types and different qualities and originalities of the wines produced in Ibero-America, as demonstrated by Catania et al. (5) for Argentina.

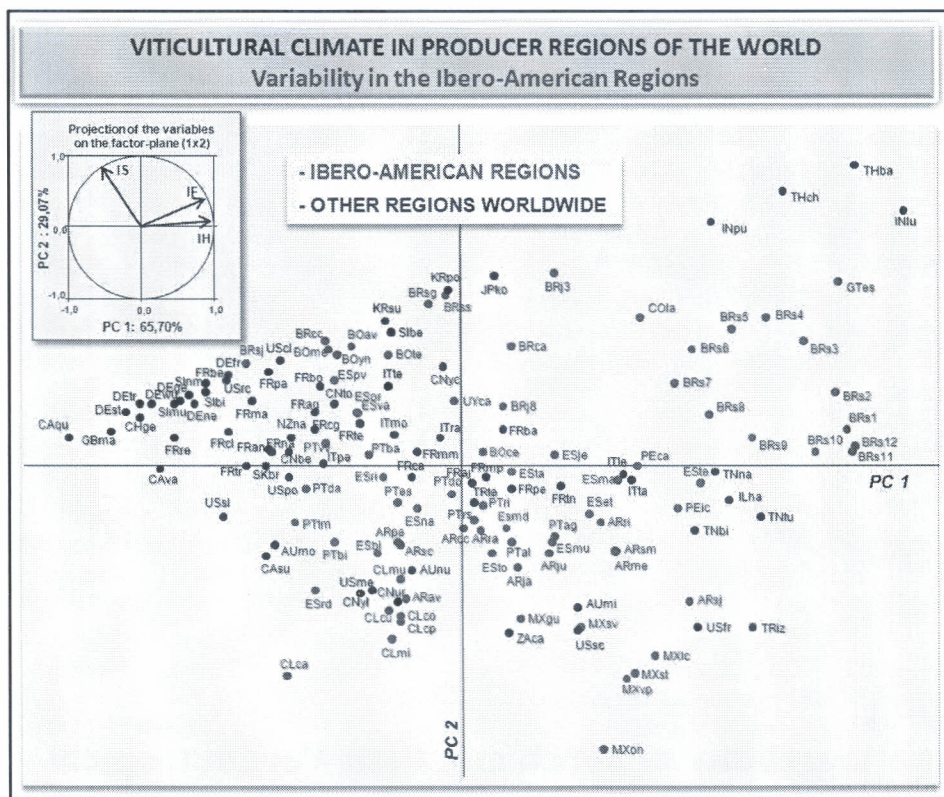


Figure 2. PCA showing the distribution of the viticultural climate (HI, CI and DI indices of the MCC System) of producer regions belonging to Ibero-American countries in relation to the context of other worldwide producer regions.

Indice de Sécheresse IS	Indice Héliothermique - IH																			
	IH -3			IH -2			IH -1			IH +1			IH +2			IH +3				
	Indice de Fraicheur des Nuits - IF																			
	IF +2	IF +1	IF -1	IF -2	IF +2	IF +1	IF -1	IF -2	IF +2	IF +1	IF -1	IF -2	IF +2	IF +1	IF -1	IF -2	IF +2	IF +1	IF -1	IF -2
IS -2	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA
IS -1	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA
IS +1	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA
IS +2	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA	USA

Table 1. Climatic groups (MCC System) of the Ibero-American regions (in yellow) integrated to the worldwide database regions (in red) of the MCC System (4).

4 CONCLUSIONS

The Ibero-American viticulture for wine production is representative of the most part of the macro climatic variability found in the world. The results allow to conclude that the wide variability and climatic diversity present in Ibero-America may be one of the reasons to explain the diversity in terms of wine types, sensorial characteristics, typicity and uniqueness of wines produced on this macro-region.

ACKNOWLEDGEMENTS

We thank to CYTED for this vitivinicultural zoning project of R&D; also to all participant research institutions in Ibero-American countries; to FINEP – Financiadora de Estudos e Projetos, for the support in the project APL Vinhos; to all institutions responsible to climatic database; to Mr. Alexandre Mussnich from Embrapa Grape and Wine for his help working in the climatic database.

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