PRELIMINARY RESULTS OF TEMPERATURE VARIABILITY IN A WINE REGION OF URUGUAY

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Introduction

Climate conditions of coastal wine regions vary according to the distance to the sea, playing an important role in grapevine behavior as well as in the composition of grape berry and wine. Increasing knowledge of temperature spatial variability in southern Uruguay provides information that will help in strategies to adapt grapevine to climate change. The aim of this work was to study temperature spatial variability in relation to the optimum thermal conditions for grapevine physiology.

Data and methods

Site: Southern Uruguay (Montevideo and Canelones Departments) (Figure 1).

- Ten plots were monitored in five commercial vineyards with different soil diversity, topography and distance to the sea (La plata River).

Climate: Data were obtained from ten "TinyTag Talk 2" temperature sensors in the vineyards.

- Temperature data measured during the 2012 and 2013 grapevine growing seasons was analyzed to assess spatial variability and its impacts on grapevine development.
- Bio-climatic indices were calculated from 1st September to 28th February. Thermal amplitude, number of days with maximum temperature above 35°C and number of hours above 35ºC were calculated at a finer temporal scale to assess spatial variability during summer (1st January to 15th march) i.e. the ripening period of grapes.

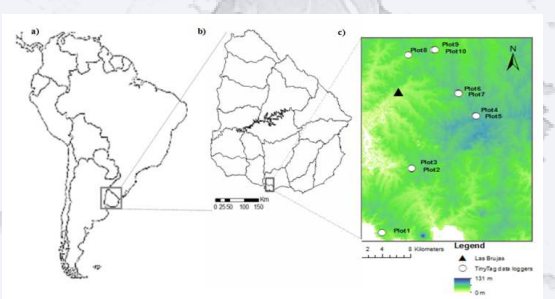

Figure 1. a) South-America. b) Location of the studied area in Southern Uruguay. c) Location of the network of TinyTag data loggers (O) in Montevideo and Canelones wine regions and the weather station of INIA Las Brujas (▲) (Map source: ArcGIS)

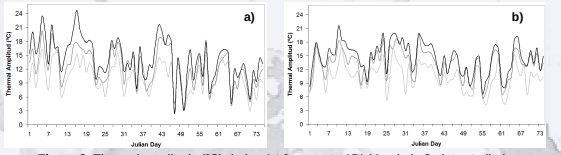

Figure 2. Thermal amplitude (ºC) during 1st January to 15th March in 3 plots studied. (·) Plot1, (·) Plot6 and (-) Plot9 in 2012 (a) and 2013 (b).

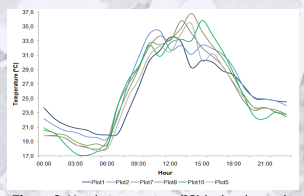

Figure 3. Hourly temperature (ºC) in the vineyards (Plots 1, 2, 5, 7, 8 and 10) on 14th February, 2012.

Results

Spatial variability of temperature

- Plots near the river (Plot1, 2 and 3) did not vary much in terms of bioclimatic indices, while inland plots displayed greater variability (Plot4 to 10).
- Mean daily thermal amplitude for summer 2012 was 4°C greater at Plot9 situated at 32 km inland than at Plot1 the closest plot to the Río de la Plata (14.3ºC ± 4.1 and 10.1ºC ± 3.3 respectively) (Figure 2). **Spatial distribution of temperatures across the wine region were similar in the both seasons.**

Spatial variability of temperature at fine scale

- Hourly temperature during the hottest day of summer 2012 showed a sudden decrease of temperature at plots 1 and 6 at 12:00LT suggesting the occurrence of local air circulation such a breeze from the Río de la Plata (Figure 3).
- Wind data from an automatic weather station situated in the proximity of the vineyards were analyzed to confirm it. The increase in wind velocity was associated with a change in direction describing the wind flow from the river acting as a sea breeze over the wine region. **During this hot day, the sea breeze arrival resulted in a cooling of 1.2°C at vineyards close to the river up to 0.8°C at 25 km inland.**

Conclusions

- Results showed significant differences in temperature, highlighting the moderating effect of the Río de la Plata estuary on temperature.
- The increasing knowledge of temperature spatial variability and its impact on grapevine behavior contributes to improving canopy management during the growing season and thus berry composition and wine quality.

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WCRP Conference
17th-21th March 2014 - Montevideo, URUGUAY