

## **Life ADICLIM meeting for winegrowers in the Saint-Emilion – Pomerol pilot site (November 12, 2018)**

### *General organization of the event*

On November 12, 2018 a meeting on the Life ADVICLIM project has been scheduled in the Saint-Emilion – Pomerol pilot site. The main objective was to inform the wine growers of the area about the progress of the Life ADVICLIM project. The meeting was organized in the “Lycée Agricole de Libourne – Montagne”. This community college is located inside the pilot site and trains future wine professionals (enologists, viticulturists and wine trade managers). They own the largest amphitheater in the area (200 places) and appropriate facilities for meetings, including sound and video equipment, a sound engineer and the possibility to organize lunch and wine tastings. The meeting was a great success. It was planned to launch the invitations in three time series: first to the winegrowers and consultants of the pilot site area as well as a selected group of scientists and students, second to winegrowers from surrounding appellations and third to other winegrowers of the Bordeaux area. It turned out that after the first round of invitations, the number of registrations corresponded roughly to the capacity of the amphitheater. Because there is no bigger venue in the area it was decided not to launch the second and third round of invitations. Instead, it is planned to organize meetings for winegrowers in surrounding appellation early 2019. Contacts have already been established with the association of winegrowers of the Fronsac appellations (which are located West of the pilot site) and later contacts will be taken with the growers association of the Côtes de Castillon appellation (East of the Pilot site). Finally 186 people attended the meeting, including 61 % winegrowers, 12 % consultants, 16 % scientists and 5 % students. The meeting was organized over the whole day, starting with a welcome coffee. Lunch was offered to the participants in the form of a cocktail, allowing winegrowers to network and exchange with the scientists working on the Life ADVICLIM project. During the lunch break, a winetasting was offered and included a flight with 3 wines from the same producer (château Franc Le Maine, Saint-Emilion Grand Cru) over three vintages: 2012, 2013 and 2014. Climate information on these vintages was provided, allowing delegates to relate the taste of the wine to the climatic conditions of the vintage. Other wines were presented to show the impact of the spatial temperature variability over the area on wine sensory attributes. All the wines were offered by the growers. A detailed printout of the program was provided, including a description of the Life ADVICLIM project. Furthermore two full text papers related to the presentations and a flyer presenting the major effects of climate change on viticulture and wine quality were distributed to the participants as take-home information. A journalist of a local newspaper (*Le Résistant*) was invited and covered the event with a very detailed paper. 12 oral presentations were scheduled, ranging from 10 to 40 minutes depending on the topic. Substantial time was allocated after each presentation to answer questions from the audience. The abundance of questions allowed highly interesting interactions between the presenting scientists and the local winegrowers.

## Introduction of the meeting

The meeting was introduced by Cornelis van Leeuwen and Hervé Quénol (project leader of Life ADVICLIM). Cornelis van Leeuwen explained the local motivations of the program. These include obtaining a better understanding of local climatic variability and its impact on viticultural practices and wine typicity. They also involve projections of climate change scenarios at local scale and assessments of how these changes will affect viticulture locally and how growers can adapt to changing climatic conditions. The important role of climate on grape composition was shown in comparison with other factors like soil and cultivar (Figure 1). Figures are taken from the presentations which were projected in the local language (French).

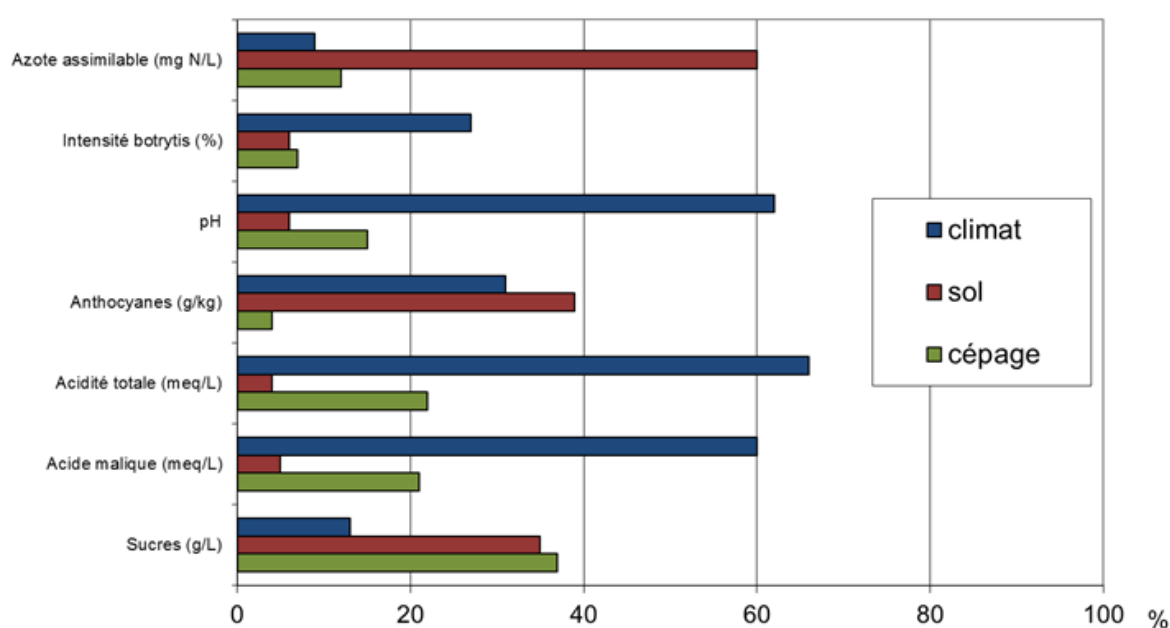


Figure 1 – Comparison of the relative contribution of climate (*climat*), soil (*sol*) and cultivar (*cépage*) on yeast available nitrogen in grape juice at ripeness, botrytis, pH, anthocyanins, total acidity, malic acid and grape sugar.

Hervé Quénol was in New Zealand at the time of the meeting. He presented the Life ADVICLIM project by video conference from New Zealand. The connection was fine and he insisted on the European dimension of the project.

## Results from the study of local climate variability in the Saint-Emilion – Pomerol pilot site

Laure de Rességuier and Théo Petitjean did a highly in-depth presentation on the experimental set-up of the measurement of the temperature at fine scale and presented local temperature variability inside the pilot site. Temperature maps are created by spatial modeling of data acquired by 90 temperature loggers and data from a local digital elevation models (DEM). Among the most striking results, year-to-year temperature variability is influenced by

maximum temperature rather than minimum temperature (Figure 2) while spatial temperature variability is more influenced by minimum temperature (Figure 3).

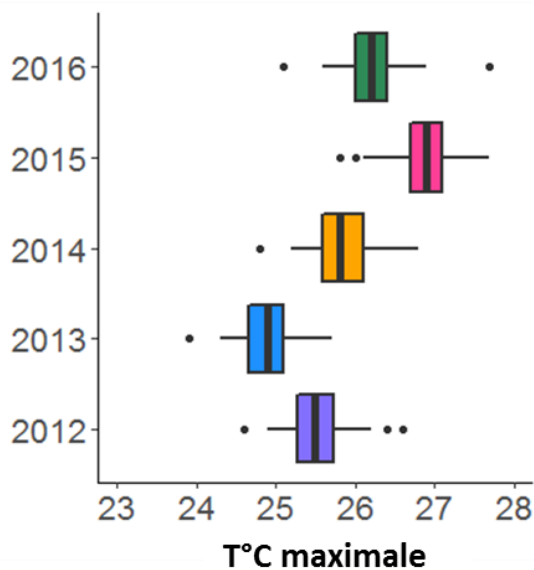


Figure 2 – Year-to-year variability of maximum temperatures. Error bars represent spatial variability.

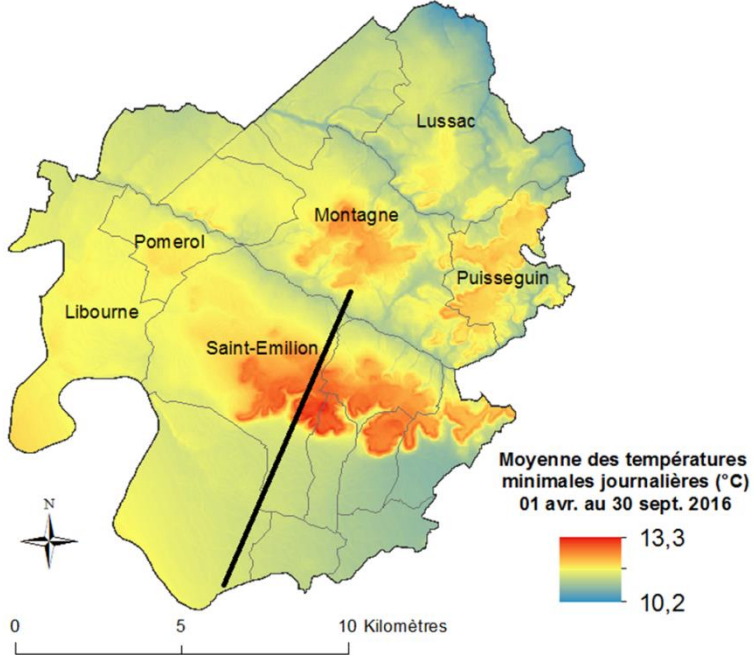


Figure 3 – Spatial variability of minimum temperatures over the Saint-Emilion – Pomerol pilot site (means from 1 April – 30 September 2016).

Spatial temperature variability varies according to weather conditions, in particular for minimum temperatures. Minimum temperatures vary with altitude and according to a gradient

South-West / North-East (Figure 3). By coupling spatial temperature variability to a grapevine phenology model developed in the project, major phenology stages like veraison can be mapped (figure 4).

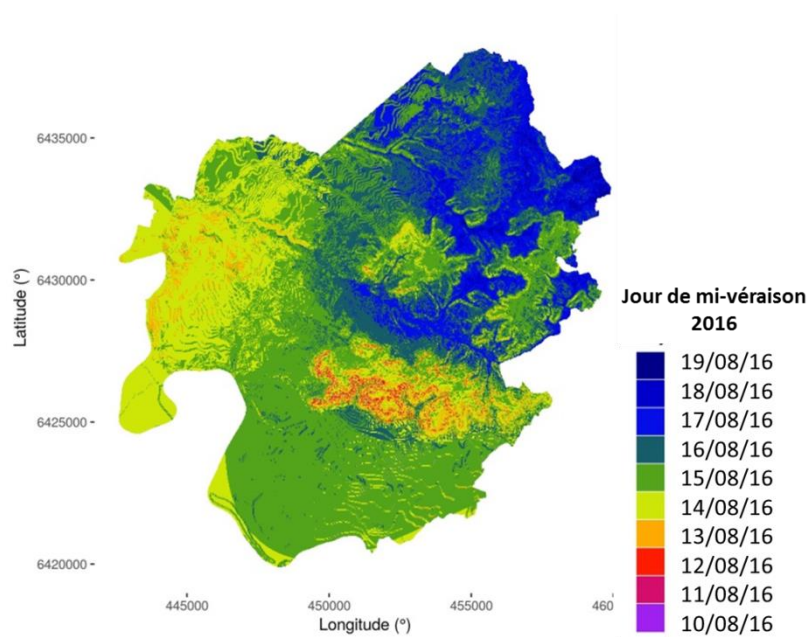


Figure 4 – Modelled veraison dates over the Saint-Emilion – Pomerol pilot site (2016).

Finally, Laure de Rességuier and Théo Petitjean showed how the climate influences grape composition. Grape sugar / acid ratio (i.e. the level of ripeness of the grape berries) increase with minimum and maximum temperatures, as well as with the level of water deficit, which was assessed in the study by  $\delta^{13}\text{C}$  measurements (van Leeuwen et al., 2009).

#### *Climate change projections at local scale*

Renan Le Roux has completed his PhD partially funded by the Life ADVICLIM project. He presented the results of his PhD, showing climate change projections at local scale. It was very interesting for the local growers to see how climate change will affect temperatures in their own vineyard plots. Laurence David presented during the lunch break a “story map”, which is an interactive activity where growers can zoom-in on their own estate and see the effects of the projections for their own vineyard.

#### *Simulations of the impact of climate change on vine development and grape production strategies*

This topic was presented by Mathias Rouan, who is working with Cyril Tissot. The multi agent approach models in a first step how climate change impacts on vine phenology. Accordingly, vineyard management practices and plant material will have to be changed in order to adapt to new climatic situations. In the multi agent models these modifications are

projected, allowing to study the impact of climate change on viticultural practices, productions costs and CO<sub>2</sub> output.

### *Vidac climate platform*

The company Ecoclimasol is involved in the Life ADVICLIM project to set-up a platform where the climate data registered by the sensors is made available to the growers. This platform is called Vidac and was presented by Julie Caubel.

### *Viticultural practices and greenhouse gaz emissions*

Emilie Adoir from IFV (Institut Français de la Vigne et du Vin) presented a study which she has carried out with Théo Petitjean, where greenhouse gaz emissions were quantified on 15 vineyard blocks in the pilot site. CO<sub>2</sub> output can vary as much as two-fold, depending on vineyard management strategies. This work also allows quantifying which practices do have major contribution to greenhouse gas emissions.

### *Adaptations to climate change*

Adaptations to climate change are a major issue for wine growers. This topic was presented by Cornelis van Leeuwen. He showed that growers need to adapt their plant material and management strategies to higher temperatures and increased drought. Genetic variability in plant material is a major resource for adaptation. The planting of later ripening varieties is an adaptation to increased temperatures. Veraison (the onset of grape ripening) can vary as much as 25 days depending on the variety (Figure 5) and ripeness even more so. High quality wine production can be maintained in the Saint-Emilion – Pomerol pilot site by limiting the acreage of the early ripening Merlot variety and increasing plantations of the later ripening Cabernet franc and Cabernet-Sauvignon varieties. By 2050 even Cabernet franc and Cabernet-Sauvignon may reach ripeness too early to ensure high quality wine production. Hence, in the second part of the XXI<sup>st</sup> century the introduction of very late ripening, non-local varieties, should be considered.

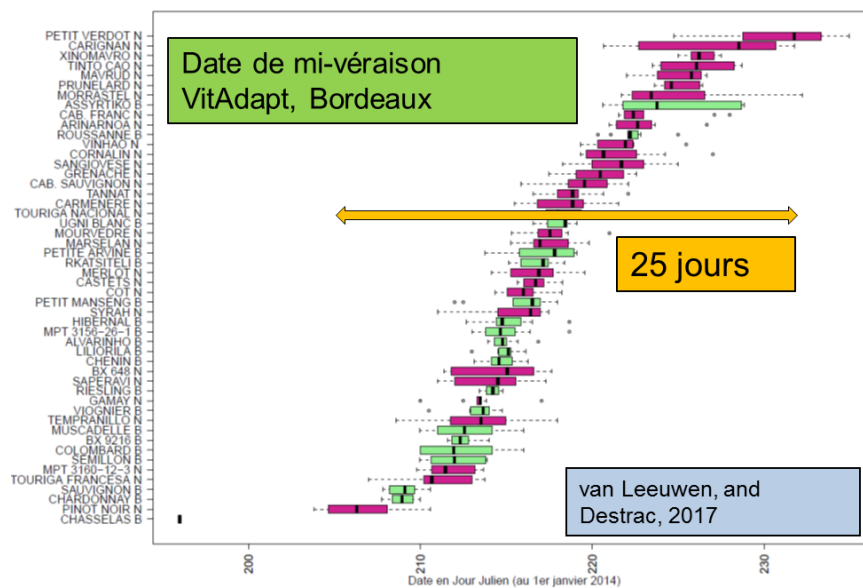


Figure 5 – Veraison dates (Day of the Year) for 52 varieties in 2014 in the VitAdapt experiment in the Bordeaux area.

Cornelis van Leeuwen showed that plant material (rootstocks and cultivars) can also be an adapted response to increased drought. The advantage of this type of adaptation is that it does not have a negative impact on the environment (in particular in comparison with the implementation of irrigation) and that it is neutral in terms of production costs.

#### *Projects related of the Life ADVICLIM project*

The Life ADVICLIM project has created real local dynamics and generated several research projects which are related to ADVICLIM, but which rely on different funding sources. Three of these projects were presented during the meeting.

Nathalie Ollat presented the AVVENIR project. This project is funded by the Bordeaux Wine Council (CIVB). It runs from 2018 to 2020 and aims at completing the results obtained in the frame of the Life ADVICLIM project. In the Saint-Emilion – Pomerol pilot site it will be investigated how temperature influences wine composition and sensory attributes of wine. The methodology developed in the Life ADVICLIM project to map temperatures at local scale will be tested over the whole Bordeaux area (120 000 hectares of vines). For this objective, the methodology will be adapted, decreasing the number of temperature sensors and implementing Infra-Red temperature measurements obtained through remote sensing.

Inside the Saint-Emilion – Pomerol pilot site, a collaboration was established with the Group of Defence Against Harmfull Organisms (GDON). Séverine Mary and Antoine Very presented how the spatial variability of temperatures over the pilot site can be used to model the development of grape moth (*Lobesia botrana*). This project was funded by winegrowers

associations and implemented in collaboration with Vitinnov. Vitinnov is a spin-off start-up from Bordeaux' Vine and Wine Sciences Institute (ISVV).

A collaboration has been established between the Life ADVICLIM project and the cooperative of the Irouleguy appellation, located at the foothills of the Pyrenées at 250 km from the Saint-Emilion – Pomerol pilot site. This cooperative vinifies grapes produced on 50 % of the total area in this appellation. With the methodology developed in the Life ADVICLIM temperatures were mapped over this area (Figure 6) and the effect on vine phenology was measured. Severine Mary (from Vitinnov) and Christophe Larrouquis (from the Irouléguy cooperative) showed that in this mountainous area, temperatures (and vine phenology) are highly related to altitude. Spatial variability of temperatures is more related to maximum temperatures than to minimum temperatures.

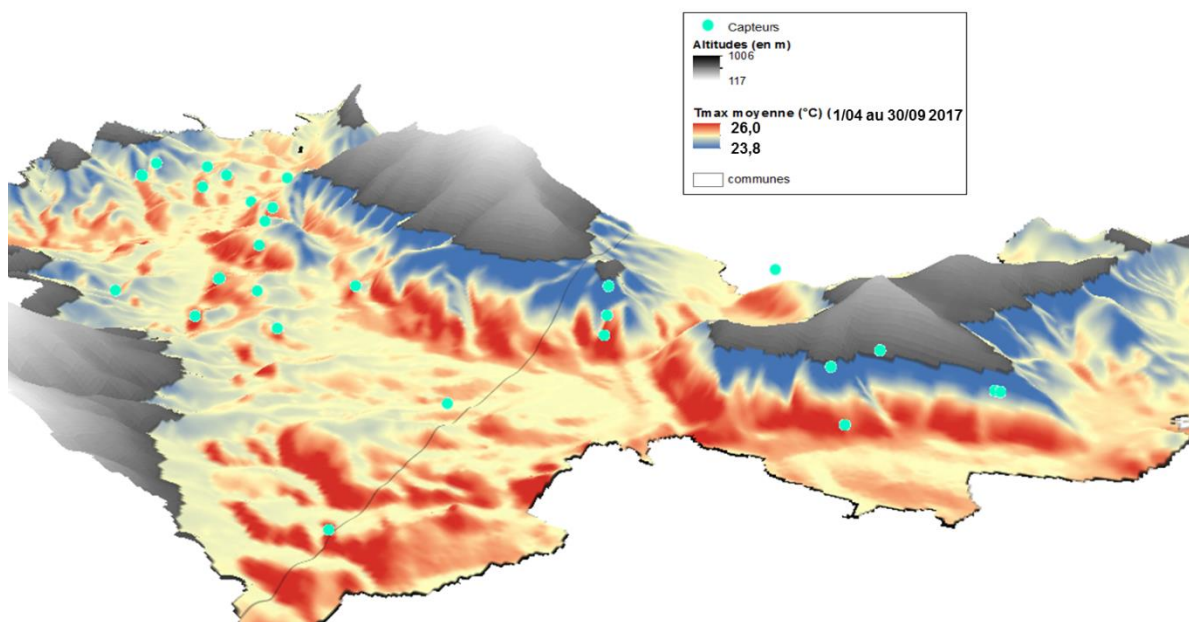


Figure 6 – Temperature variability in the Irouléguy appellation (maximum temperatures from April 1 to September 30, 2017).

This project was funded by the regional government and the winegrowers from the Irouleguy cooperative.

#### *Feedback on the meeting*

The Life ADVICLIM meeting in the Saint-Emilion – Pomerol pilot site was much acclaimed by the local winegrowers. Over the days following the meeting we received many encouraging messages. Interactions between winegrowers, scientists and students were appreciated. The event was covered by a long article in the local newspaper (*Le Résistant*). The PowerPoints of the presentations have been put online on the ADVICLIM website. This type of event will be reproduced on other pilot sites of the Life ADVICLIM project.

## References

VAN LEEUWEN C. and DESTRAC A., 2017. Modified grape composition under climate change conditions requires adaptations in the vineyard. *OENO One*, **51**, n°2, 147-154.

VAN LEEUWEN C., TRÉGOAT O., CHONÉ X., BOIS B., PERNET D. and GAUDILLÈRE J.-P., 2009. Vine water status is a key factor in grape ripening and vintage quality for red Bordeaux wine. How can it be assessed for vineyard management purposes? *J. Int. Sci. Vigne Vin*, **43**, n°3, 121-134.