# PhD School on Agriculture, Environment and Bioenergy

(http://sites.unimi.it/dottorato_aab/)

***(XL cycle, 2024-27)***

## Project draft

**1.Field of interest**

*Indicare il settore scientifico disciplinare:*

*AGR03*

**2.Project title**

Study on acid potential of grapevine cultivars for sparkling wine bases and low-alchool wines.

**3.Tutor:**

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**co-tutor/s:**

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**4.Relevance of the topic and state of the art:**

Today the wine market is facing new challenges, strongly influenced by changing environmental conditions imposed by climate change. Both on a global scale and more specifically in the Italian context, the sparkling wine sector is constantly growing, requiring grapes with a high acidity level, concurrent with the requested sugar content, but this oenological result is frequently threatened by the global summer rise of temperature. On the other hand, the demand of low alcohol wines is increasing but new research is needed to identify the most suitable grapevine varieties for this new kind of product. In fact, in this case, the aim is to provide grapes able to properly ripe reaching a low sugar content and a low acidity level, together with an interesting aromatic profile.

The aim of this project is the identification of grapevine cultivars with an acid potential suitable for sparkling wine bases and low-alcohol wines, evaluating the ripening dynamics and the oenological results considering different management practices.

## 5.Layout of the project (draft)

### 5.1. Materials & Methods:

Based on literature review, different cultivars of grapevine will be identified considering their acid potential, targeting 1) sparkling wine bases and 2) low-alcohol wines.

Open field monitoring of the ripening dynamics will be performed in commercial vineyards for the selected grape varieties to assess for each cultivar 1) the potential level of acid synthesis, 2) the acid preservation during ripening, 3) the sugar/acid ratio, 4) the aromatic profile at ripening and 5) the stability of acid level in relation to environmental conditions.

A focus on the effects of management practices on the acid dynamic will be performed in controlled environment for Pinot blanc adult vines cultivated in vase and available in the facilities of DISAA.

The oenological potential be evaluated by means of chemical and sensorial analysis of the micro-wines obtained from the experimental fields for the most promising cultivars studied.

### 5.2. Schedule and major steps (3 years):

The project proposal will be scheduled across three experimental years. Literature review and experimental set up are planned for the first half of the 1st year, ending with the definition of candidate cultivars for the evaluation of acid potential for sparkling wine bases and low-alcohol wines and the identification of the open-field experimental plots.

Sugar/acidity dynamics will be analyzed during the grapevine reproductive cycle in the first, second and third year, while the controlled environment experiments will be performed in the second and third year.

Micro-vinification will be performed on the second and third yea, based on grapes harvested in the experimental plots. Chemical and sensorial analysis of wines will be performed to define the enological potential of the different cultivars, considering the specific needs of sparkling wine bases and low alcohol wines.

Data elaboration and statistical analysis will be performed each year of the project. Two scientific publications of results are expected in the end of the second and the third years, respectively.

The following Gantt chart summarizes the main steps of the Project.

| **Year of Project** | **1** | **2** | **3** |
|---|---|---|---|
| Literature review | **X** | | |
| Experimental setup | **X** | | |
| Identification of the candidate cultivars | **X** | | |
| Field evaluation of the ripening dynamics | **X** | **X** | **X** |
| Controlled environment evaluation of the ripening dynamics | | **X** | **X** |
| Evaluation of oenological potential | | **X** | **X** |
| Data Analysis | **X** | **X** | **X** |
| Scientific publications | | **X** | **X** |

**6. Available funds (to support research):**
Funding will be available to support the research, sourced from both specific grants focused on the project theme and from free funds.

**7. Co-Financing (to support the bourse):**
NO

**8. Literature:**
Alem, H., Torregrosa, L., Rigou, P., Schneider, R., & Ojeda, H. (2021). Effect of the plant sink/source balance on the metabolic content of the Vitis vinifera L. red grape. European Journal of Agronomy, 122. https://doi.org/10.1016/j.eja.2020.126168

Bellvert, J., Marsal, J., Mata, M., & Girona, J. (2016). Yield, must composition, and wine quality responses to preveraison water deficits in sparkling base wines of chardonnay. American Journal of Enology and Viticulture, 67(1), 1–12. https://doi.org/10.5344/ajev.2015.15039

Caccavello, G., Giaccone, M., Scognamiglio, P., Forlani, M., & Basile, B. (2017). Influence of intensity of post-veraison defoliation or shoot trimming on vine physiology, yield components, berry and wine composition in Aglianico grapevines. Australian Journal of Grape and Wine Research, 23(2), 226–239. https://doi.org/10.1111/ajgw.12263

Esteruelas, M., González-Royo, E., Kontoudakis, N., Orte, A., Cantos, A., Canals, J. M., & Zamora, F. (2015). Influence of grape maturity on the foaming properties of base wines and sparkling wines (Cava). Journal of the Science of Food and Agriculture, 95(10), 2071–2080. https://doi.org/10.1002/jsfa.6922

Ghiglieno, I., Carlin, S., Cola, G., Vrhovsek, U., Valenti, L., Garcia-Aloy, M., & Mattivi, F. (2023). Impact of meteorological conditions, canopy shading and leaf removal on yield, must quality, and norisoprenoid compounds content in Franciacorta sparkling wine. Frontiers in Plant Science, 14. https://doi.org/10.3389/fpls.2023.1125560

Liu, H. F., Wu, B. H., Fan, P. G., Li, S. H., & Li, L. S. (2006). Sugar and acid concentrations in 98 grape cultivars analyzed by principal component analysis. Journal of the Science of Food and Agriculture, 86(10), 1526–1536. https://doi.org/10.1002/jsfa.2541

Liu, P. H., Vrigneau, C., Salmon, T., Hoang, D. A., Boulet, J. C., Jégou, S., & Marchal, R. (2018). Influence of grape berry maturity on juice and base wine composition and foaming properties of sparkling wines from the champagne region. Molecules, 23(6). https://doi.org/10.3390/molecules23061372

Shiraishi, M., Fujishima, H., & Chijiwa, H. (2010). Evaluation of table grape genetic resources for sugar, organic acid, and amino acid composition of berries. In Euphytica (Vol. 174, Issue 1, pp. 1–13). https://doi.org/10.1007/s10681-009-0084-4