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/i** settore/i scientifico disciplinari:*

AGR03

2.Project title

Evaluation of the vineyard agronomic management to counteract climate change, considering different training systems

3.Tutor:

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co-tutor/s:

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

Viticultural productions are strongly affected by extreme environmental conditions that are currently exacerbated, as the result of climatic change. More in detail, the generalized increase of temperature determines an early start of the vegetative season, that often move ripening to a hotter period of the year, leading to higher thermal stress. This is amplified by the higher frequency of heat waves that characterizes the current climatic phase. Furthermore, the rise of temperature drives the increase of evapotranspiration demand, with the consequent exacerbation of drought conditions. Those negative events affect the physiology of the plant and the ripening dynamics, affecting the quality and quantity of production.

In this context, it is fundamental to define the best management practices to adapt the viticultural productions to the current and future climatic context, pursuing the objective of quality and sustainability and considering the specific oenological targets.

Alternative training systems are an interesting strategy to adapt to the new environmental conditions, because they affect the microclimate of vines (different light interception and, consequently, different shading effect and evapotranspiration level) and the physiology of the plant (different vigor and leaf area to yield ratio).

The aim of this project is to evaluate how different training system and short-term adaptation practices affect the quality and the quantity of grapevine production and to define the best combination for the specific vinicultural contexts analyzed.

5.Layout of the project (draft)

5.1. Materials & Methods:

The study will be performed in environments characterized by the adoption of different cultivars with distinct oenological goals. For each study area the main training system adopted will be compared with alternative ones.

The first step of the project will be the identification of two viticultural area of interest, the identification of vineyard with different training system to compare the most common training system of each area with alternative ones characterized by potential adaptation features (e.g. different leaf area to yield ratio, different cluster shading potential) and the definition of the experimental set up.

Concurrently, based on literature review, the most relevant short-term adaptation strategies will be defined for each site to be applied and tested along the project duration.

For the three years of the project, in each environment, the micrometeorological characterization of each training systems will be performed to assess the difference among the systems, with reference to solar radiation interception, shading effect on cluster temperature and relative humidity level in the inner canopy area.

Gas exchanges, photosynthesis and stomatal conductance will be monitored for each plot to assess the effect of training systems and management practices on the vine physiology.

Ripening dynamics and final production characterization at harvest will be performed for each experimental plot.

The oenological potential be evaluated by means of chemical and sensorial analysis of the micro-wines obtained from the experimental field plots.

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 two viticultural areas and the choice of the short-term adaptation strategies to be evaluated.

Field activity will be carried out during the three years of the project, monitoring the micrometeorology of each training system and the vine vegetative and reproductive development, dynamics of ripening, production quantity and quality for each experimental plot.

Micro-vinification will be performed on grapes harvested in the experimental plots. Chemical and sensorial analysis will be performed to assess the effect of training systems and management practices on the final product.

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

Year of Project	**1**	**2**	**3**
Literature review	**X**		
Definition of experimental areas	**X**		
Identification of the short-term adaptation practices	**X**		
Definition of the experimental set up	**X**		
Open field monitoring	**X**	**X**	**X**
Evaluation of oenological potential	**X**	**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:

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