Title: Suitability Assessment of Wine Grape Cultivation Regions Under Global Warming Conditions
Starting date: December 2024-March 2025
Duration: 6 months
Salary: Standard salary provided by the Implanteus project
Site: Beijing, China
Institute and Department: Institute of Botany, Chinese Academy of Sciences, Grape quality regulation lab.

Background

Global warming is having profound impacts on agricultural systems, including viticulture. Changes in temperature, precipitation patterns, and extreme weather events can alter the suitability of current wine grape cultivation regions. Understanding how these changes will affect the suitability of different regions for growing specific grape varieties is crucial for the sustainability of the wine industry. This study aims to assess the future suitability of wine grape cultivation regions under projected global warming scenarios, providing valuable insights for vineyard management and adaptation strategies.

Objectives

1. To analyze historical climate data and project future climate scenarios for key wine grape cultivation regions.
2. To evaluate the current and future suitability of these regions for growing specific wine grape varieties using climatic indices and suitability models.
3. To identify potential new regions that may become suitable for wine grape cultivation due to climate change.
4. To develop adaptation strategies for vineyards to mitigate the negative impacts of global warming.

Methods

1. Climate Data Analysis: Historical climate data for key wine grape cultivation regions will be collected and analyzed. Future climate scenarios will be projected using climate models (e.g., CMIP6) under different Representative Concentration Pathways (RCPs).
2. Suitability Modeling: Climatic indices relevant to wine grape cultivation, such as Growing Degree Days (GDD), Winkler Index, and Huglin Index, will be calculated. A suitability model will be developed using Geographic Information System (GIS) tools to map the current and future suitability of different regions for specific grape varieties.
3. New Region Identification: Potential new regions that may become suitable for wine grape cultivation due to climate change will be identified using the suitability model. These regions will be evaluated based on soil type, topography, and other agronomic factors.
4. Adaptation Strategies: Based on the results of the suitability assessment, adaptation strategies will be developed. These strategies may include changes in planting dates, selection of heat-tolerant grape varieties, irrigation management, and canopy management techniques.

Pre-requirements:

All master students major in plant science or related domains are welcomed. We look for a motivated candidate, with open personality, independent thinking and good skills of communication and writing. Skills in coding (e.g. with R) will be appreciated.

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The lab: The hosting lab is led by Prof. Zhanwu Dai, who has obtained his PhD diploma from Avignon University and then worked as a scientist (CR1) at INRAE for 9 years. With in total of 13 years of experience, Prof. Dai is internationally very well known for his work on grape quality regulation research with multidisciplinary approaches, including modeling, transcriptomes, metabolomes, epigenomes, as well as phenomes. The lab is conducting world-leading projects around grape quality at different levels and have extensive international collaborations with researchers from France, Spain, Italy, Germany, South African, Belgium, Australian, New Zealand, and USA. A list of Prof. Dai's publication could be found: https://www.researchgate.net/profile/Zhanwu-Dai/research