

GIS VITICULTURAL MANAGEMENT FOR ZONING WINES' VARIETIES. TRACEABILITY AND QUALITY IMPROVEMENT POTENTIALS.

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The objective characterization of the viticultural "terroirs" is necessary in order to better understand the relationships between soils, plants and wine production quality. A research on the viticultural "terroirs" of "canton de Vaud" – Switzerland was decided to increase the competitiveness of vaudois wines on the international market.

Integrated geodatabase

As part of this project, a pedological and agronomical geodatabase was designed and realized. Its purpose is to offer a structure that can store and treat the pedological and agronomical data collected in the field. This tool allows to capture and analyse information in order to facilitate the characterization of viticultural soils and the exploitation of agronomical data. All the vineyard data can be summarized and interpreted with one database, coupled with a Geographic Information System (GIS).

The geodatabase is designed on the basis of a data survey and the analysis functions required. A model representing the reality was developed and the data was structured accordingly. The data were normalized to facilitate their capture and exploitation as well as the perpetuation of the database. It must be noted, that natural sciences phenomena are difficult to describe using strict rules because the field observations remain subjective.

The realized database works with Access and Mapinfo connected together. Interfaces are built up in order to offer a user-friendly environment. It's also possible to produce summarized notices aimed at wine growers.

Microclimate

The objective is to make microclimate zoning in order to better understand the correlations between the agronomical behaviour of the vineyard, the soils characterization and the microclimatic variables.

In climatic conditions of the "canton", the microclimate is defined by pluviometry and the thermal gradient. A microclimatic model integrating temperature, relief, illumination and pluviometry was built. The adopted approach uses a digital elevation model with a resolution of 25 meters, the DEM25 of the Federal Office of Topography (around 1/25'000 scale).

The thermal gradient is deduced from illumination, wind effect estimations and an empirical model of thermal altitudinal distribution. The illumination is calculated with a radiation model that integrates the effects of the surrounding relief (slope, aspect and casted shadow) and the sun height above the horizon during a specific period. The relief shape and the principal wind directions based on a regional cartography allowed to estimate the wind effect. The rainfall distribution is the result of a data regionalization coming from the Meteosuisse stations network (monthly rainfall values collected in the stations near or inside the vineyard during the last 30 years).

The microclimatic parameters are calculated for critical periods in the vineyard's vegetative cycle. The achieved results are adapted to measurement stations data. Finally, a comparison with the map of thermal levels of "canton de Vaud" and the results of ecophysiological study allow to adjust the microclimate model. The final microclimatic zoning is a weighting of the above mentioned variables. Its value is more qualitative than quantitative. It offers however a comparison basis between the different regions concerned by the study.

The coupling of the database with a geographic information system allows to put together pedological, agronomical and microclimatic data and analyse them to deduce "terroirs" unities.

Perspectives

The final part of the project will consist in making the results of the study available electronically. At first, an internet browsing solution has been chosen. A more interactive tool will then be developed as a popularization means to map wines' varieties repartition and help the professionals to monitor the vineyard.