



A multivariate approach for the study of the environmental drivers of wine production structure

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Vitivinicultural “terroir” is a concept referring to an area in which the collective knowledge of the interactions between environment and vitivinicultural practices develops, providing distinctive characteristics to the products. The effect of the environment components over the terroir has been already widely demonstrated. What it has not been studied yet is their possible effect on the structure of wine production. Therefore, the aim of this work was to find if environmental drivers influence the wine production structure.

This kind of investigation necessarily involves a change of scale towards wide territories. We used the Italian Denomination of Origin territories, which were grouped in Macro-areas (reference scale 1:500,000) with respect of geographic proximity, environmental features, viticultural affinity and tradition.

The characterization of the structure of the wine transformation industry was based on the official data reported in the wine production declarations related to the year 2008. Statistics were taken into account about general quantitative variables of wine farms, presence of associative forms, degree of vertical integration of wineries, quality orientation of wine producers, and acreage of vineyard. The environmental variables climate, soil, and vegetation vigour were selected for their direct influence on the vine growing. A second set of variables was chosen to express the effect of land morphology on viticultural management. The third one was intended to discover the possible relationships between viticultural structures and land quality, such as the indexes of sensitivity to desertification, the soil resistance to water erosion, and land vulnerability.

A PCA was carried out separately for the environmental and economic data to reduce the database dimensions. The new economic and environmental synthetic descriptors were involved in three multivariate analyses: i) the correlation between economic and environmental descriptors through the non-parametric Spearman test; ii) a cluster analysis to group the Macro-areas in few homogeneous economic structures; iii) a discriminant analysis of economic clusters and environmental factors, to highlight the environmental drivers of the different wine production structures.

The cluster analysis identified six systems of production and organization. Climatic, pedoclimatic, morphological mean conditions and morphological heterogeneity of Macro-areas had the most important discriminant power over the clusters.

The economic structures addressed to large-scale kind of production and those with a not clear orientation were located in low hills and plains with Mediterranean climatic conditions. Lands at higher elevation and rougher morphology correlated with high quality products and structures, either made of little independent farms or cooperatives, in the highest cold wet areas, or large independent farms, on medium hill.

In conclusion, for the first time it was proved that certain landscape characteristics have a significant influence over the typology of wine production structure. The result of this multivariate analyses suggest that pedo-climatic characteristics and landscape attributes care can have a strategic role on the wine industry.