

SCIENCE

Natural terroir units, Siena province, Tuscany

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This work aimed at setting up a multivariate and geostatistical methodology to map viticultural terroirs at the province scale (1:125,000). The methodology is based upon the creation of a GIS storing all the viticultural and oenological legacy data of experimental vineyards (1989–2009), long-term climate data, digital elevation model, soils (land systems) and legacy data of soil profiles.

Environmental parameters related to viticulture, selected by an explorative PCA, were: elevation, mean annual temperature, mean soil temperature, annual precipitation, clay, sand and gravel content of soils, soil water availability, redoximorphic features and rooting depth.

The variables interpolated using geostatistical methods, were used for a *k*-means clustering aimed to map the Natural Terroir Units (NTU). Vineyards of the province of Siena was subdivided into 9 NTU.

Both the historical DOCG (Chianti Classico, Brunello di Montalcino and Nobile di Montepulciano) and other DOCs were characterized by three or four NTU, whereas the wider Chianti and Chianti Colli senesi DOCG was mainly constituted by seven NTU.

Keywords: GIS; Geostatistics; soils; Sangiovese; wine

1. Introduction

The terroir concept possesses many definitions, all based on the interaction between soil, geology, climate, agro-ecosystems landscape, historical and sociological aspects (Carbonneau, 2002; Deloire, Vaudour, Carey, Bonnardot, & Van Leeuwen, 2005; Vaudour, 2003). Terroir can be loosely defined as 'taste of territory,' embodying certain characteristic qualities, which are the sum of the effects that the territory has on the final product. Man has geared agricultural husbandry and processing technologies to the particular natural environmental conditions to maximize the quality of food and confer it peculiarity and exclusivity (Costantini & Bucelli, 2008). This concept has been applied as the *Geographical Typical Indication* and the *Protected Appellations of Origin* (D.O.P. in Europe) for many agricultural products, or '*Appellation d'Origine Contrôlée*' (AOC, France), '*Denominación de Origen*' (DO, Spain) and '*Denominazione di Origine*

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