



An Integrated Approach to Viticulture Zoning Using Hydrological Modelling and GIS Procedures

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In the present day agricultural scenario, viticulture zoning is becoming a very important issue for the development of a viticulture that could integrate farmers income, quality of the products and the sustainable development of the environment. In this work is presented a new alternative approach to viticulture zoning which integrates the traditional “terroir” scheme with a physically based hydrological model (a rate model) supported by a georeferenced database in a GIS application.

This works aims to emphasise the major importance of integrating soil hydrological behaviour in viticulture zoning; this importance is manly due to the well known influence of the plant water status over the grape quality (anthocyanins, phenols, actual taste, etc.).

The detailed knowledge of the soil hydrological behaviour, a reliable evaluation of both daily water balance and plant water stress requires indeed the use of physically based models for an accurate description of the soil-plant-atmosphere system.

The study has been conducted in a test area located in the central part of the Campania region: the Valle Telesina (BN). This area has a long tradition in the production of high quality wines (DOC and DOCG) and it has an extension of about 20.000 ha and it is characterized by a large soil and climate variability.

The approach has been applied in the following steps: (i) elaboration and spatial distribution of daily climatic data through a physical model and geostatistical analysis of the data set (for rain data); (ii) spatial elaboration and implementation of (a) Amerine e Winkler index and (b) potential incident solar radiation (DEM derived), (c) pre-existing soil information over the whole study area; (iii) implementation of a deterministic model (SWAP) for simulating water transport in the soil-plant-atmosphere system and for the production of thematic maps of water stress (model output) over different phenological phases; (iv) GIS elaboration of the viticulture integrated zoning using the processed information; (v) statistical evaluation of the performance of the adopted viticulture zoning using independent plant, grape and grape must data.

Keywords: viticulture zoning; SWAP; stress index