

## Soave beyond the zonation

## Soave au-delà du zonage

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**Abstract:** In a previous zoning program (1998-2002), climatic and pedological factors were able to distinguish 14 terroir within the Soave DOC area where wine characteristics are well recognizable. Nevertheless, in the past vinegrowers identified several vineyards where a better quality of the grapes and wines could be obtained. So, « beyond the zonation » will aim to suggest a new methodology to characterise the Cru, starting with 15 vineyards that were selected in the Soave Classico DOC area. In the year 2005, a meteorological station was positioned in each vineyard and temperature data were collected; because of the limited area of investigation, only 3 rain sensors were set up. Root distribution along the profile was ascertained and soil water availability was investigated by using a TDR equipment. From véraison to harvest grape samples were randomly collected and analysed for sugars (Brix), titratable acidity, pH and (only at harvest) for aroma compounds. In order to have a better understand of the influence of Cru on grape quality, wine was made keeping separated the grapes collected from each vineyard. Processing the temperature data, a first discrimination could be made between the two coldest (with the highest thermal range) Monte Carbonare and Frosca zones and the hottest Castelcerino, Costalta, Costeggiola and Pressoni. As a rule of thumb, the higher the temperatures, the greater the sugar level. On the other hand, titratable acidity and pH did not display such a variability. The aroma analysis supported the difference between Cru in terms of climate and pedology, being the coldest much richer in monoterpenoids (accounting for rose and acacia flower notes) and the hottest with a greater amount of norisoprenoids (accounting for mature and tropical notes). The wines, when drinkable, will confirm the chemical data results.

**Key words:** Garganega, cru, aroma compounds, root distribution

### Introduction

As well known, zoning studies aim to discover how the natural and the related human factor results in wine quality. Within the « whole » Soave DOC area, a geographical description of climate (min and max temperature, rainfall, thermal range) and pedology (texture, soil depth, water holding capacity) was made during a previous 4-year-zoning investigation (1998-2002), and 14 sub-zones were identified. For each area, the link between the above-mentioned natural element and the vine performances (yield, grape sugar content, aroma compound, wine quality) was studied. This first experience drew a picture of the different characteristics of the Soave territory improving the knowledge about the relationship grapevine-growing area (i.e. a grape aromatic map of the whole Soave area based on wine descriptors). For each area, some technical suggestions were given, in order to improve vine management taking care of water supply, crop load and harvest time (Calò *et al.*, 2002).

Based on this first result, a second study-step was than started, with the aim to explain the celebrity of some of the ancient cru. For long time (X<sup>th</sup> century) the Soave area has been well known for its wines, and together with history, some places (or even vineyards) became famous for wine quality. Nowadays, the cru prestige is still the same, and the wine price confirm this renown.

« Soave Beyond the zoning » would like to answer a few questions concerning 15 cru, and relative to land morphology, microclimate, soil properties, spring precocity, water balance and root distribution, together with an historical research about the place name.

### Climate

Climate conditions between budburst and harvest are able to influence grape composition and quality mainly through the temperature and rainfall values. Thus, annual and local climate, take part of a complex system where all the factors should be investigated (Van Leeuwen *et al.*, 2004). In Soave area, soil morphology are

extremely variable and consequently temperature change between vineyards. Using the data recorded in five different cru, fig.1 show the highest temperature values registered in Costeggiola and the lowest one in Monte Carbonare. In our first annual experience, the relation between grape composition (sugar content, acidity, malic and tartaric acid) and temperature (data not reported) were significant only for total acidity, malic and tartaric acid, other factors (yield per vine, water status) could have effected sugar level. As reported below, immediate was the link microclimate/grape aroma compound.

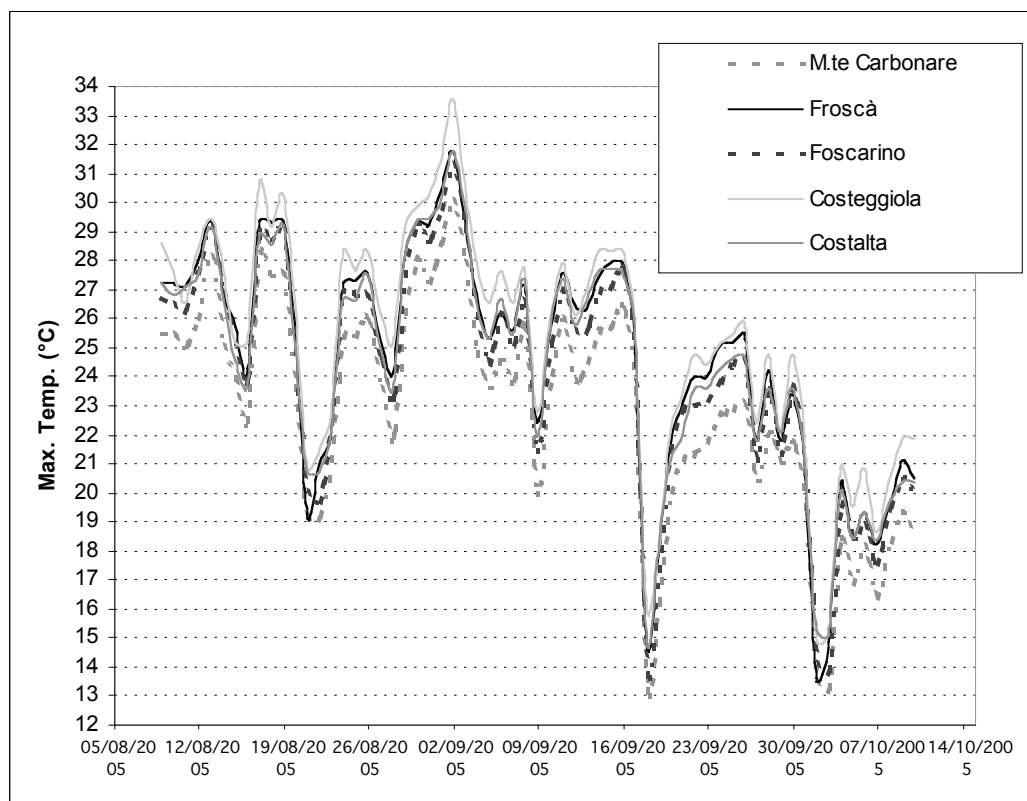


Figure 1 - Local maximum temperature in some different Soave zones

### Microclimate and aroma compound

Grape aroma composition has been known to be related with temperatures (min. temp. and max temp.) that are particularly variable within a hilly environment. Thus, a climate characterisation of the place needs in order to well-understand why grape quality changes. From the previous zoning program, a closed link between aroma compounds and climate was found (fig. 2). Methyl-salicylate is of utmost importance in determining the Garganega floral and balsamic (chestnut honey-like) aroma: the higher the temperatures, the higher the concentration (fig. 3). The role of high temperatures (both min. and max. temp.) on the occurrence of methyl-salicylate was confirmed also in this second zoning program (fig. 4; in this case there are only 9 available meteorological station). Since wine aroma is a blend of several hundred compounds, it is difficult to link a precise role for each compound; anyway, climate significantly affects the aroma occurrence in grapes and the sensory properties of the relative wines.

At now-time study-schedule, the characterisation of the climatic variability among places (cru) will be ready soon, and the quick vine metabolic adaptation will be related.

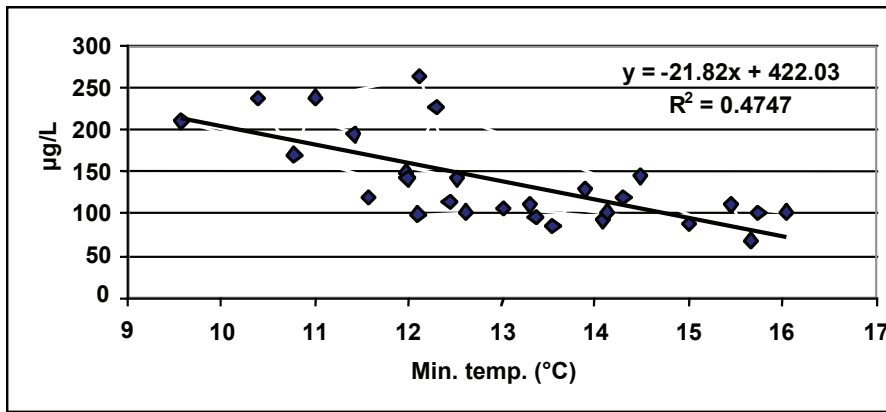


Figure 2 - Regression between the minimum temperatures of September and monoterpane concentration in musts

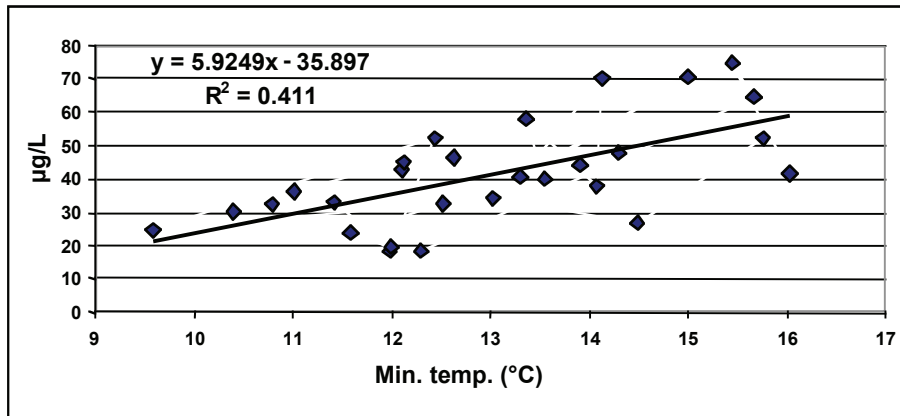


Figure 3 - Regression between the minimum temperatures (average 01 Sep – 10 Oct) and methyl salicylate concentration in musts

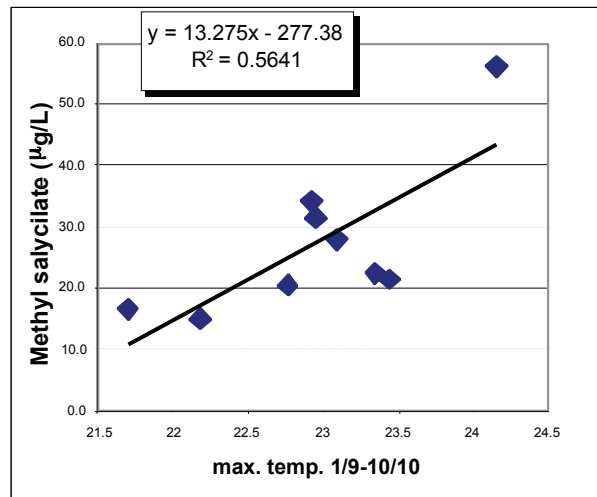
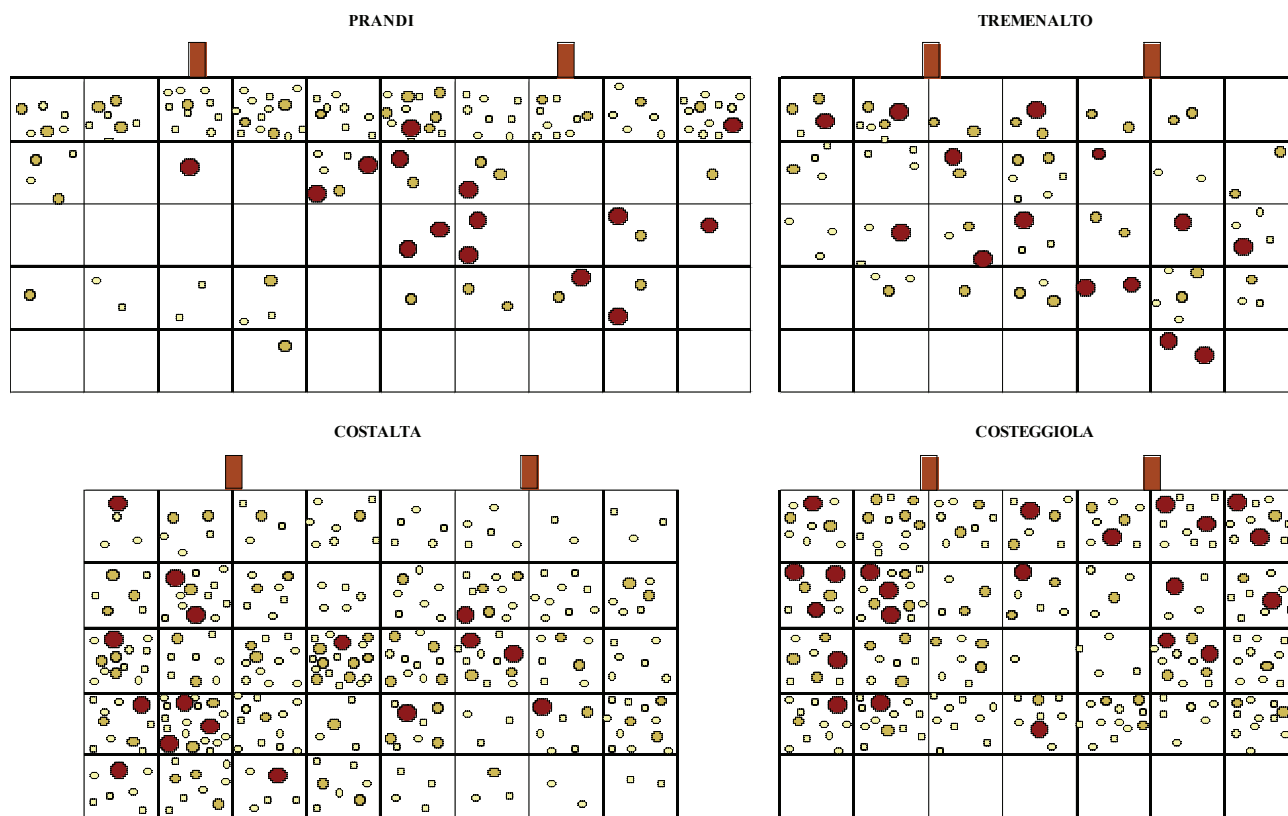


Figure 4 - Regression between the maximum temperatures (average 01 Sep – 10 Oct) and methyl salicylate concentration

### Roots distribution

There is a tight linkage between root functionality and grapevine productive behaviour (Davies *et al.*, 1991, Morlat *et al.*, 1993, Comas *et al.*, 2000). Thus, root distribution and deep could be significant in changing grape quality and wine organoleptic properties. Soil influence root development because of AWC (available water content) and air pores presence. Moreover, roots could explore deep horizons improving the absorption of macro- and micro-nutrients from the soil. Root development limitations are linked to the occurrence of impenetrable hard-rock layers, asphyxiated layers, clays or calcareous layers at different depths. Thus, root distribution analysis among « cru » makes clear the differences between soils. In the cru Prandi, the large part of the roots distributed within 0,20-m-depth being only large roots at below (fig. 5). In this soil, a

surface basaltic coarse layer prevented roots to go deep further. An opposite behaviour was found in the cru Costalta where a deep soil without any physical-chemical limitation promoted roots to homogeneously develop. Same development was shown for the cru Costeggiola, but the occurrence of a 0,80-m-depth calcareous layer limited root development at below. Root distribution above 0,80-m-depth was quite homogenous. By comparing the cru Costalta and Costeggiola, the latter is 20%-limited in root exploration. Different situation for the cru Tremenalto where a deep soil without any physical-chemical limit is characterised by a clay texture; in this soil plants developed a homogeneous-poor root system but not much deep, probably because of the excessive anoxia that normally occurs in the deeper layers.



**Figure 5 - Root distribution in four cru of Soave 0,70 m far from the rows.**

Counting was performed for two neighbouring grapevines till 1,00-m-depth, within 0,20 x 0,20-m square sub-units.

Roots were classified in three dimensional classes (< 1 mm, 1-3 mm, > 3 mm)

## Soil moisture

Among factors affecting grape quality, soil water availability role should not be forget. Because of the soil texture and depth differences among cru, soil moisture at harvest time resulted variable between areas (fig. 6). As a direct consequence the sensory evaluation of wines made in each areas will be different. Soil moisture data confirmed the extremely high variability linked with soil characteristics (rainfall was found to be almost the same among places). At now-time wines are still to be tasted (too early), but a close relationship between soil moisture and wine description will be expected.

Water availability can significantly influence the root development; by observing fig. 5 and 6, root abundance resulted in Costeggiola and Costalta where soil moisture was low, while root scarcity was discovered in Tremenalto where soil moisture was high. Thus the higher the soil moisture, the lower the root abundance.

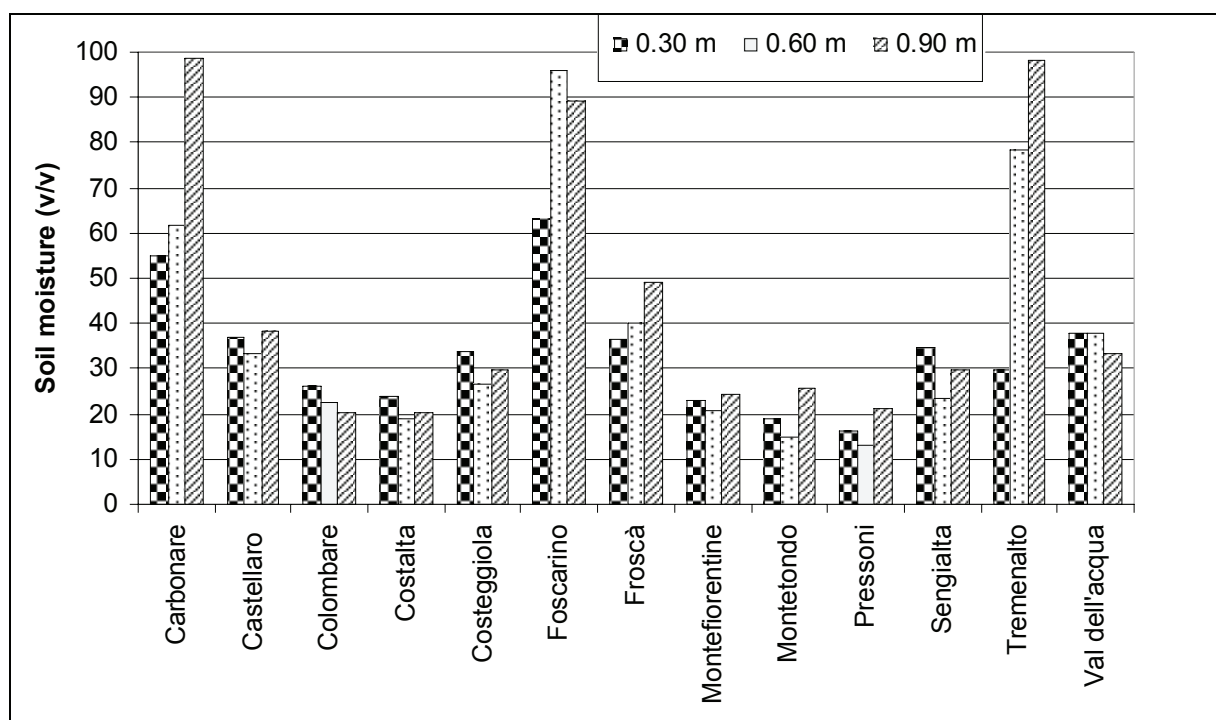


Figure 6 - Soil moisture at 0,30-m-, 0,60-m- and 0,90-m-depth for all of the investigated Soave cru at harvest time

## Conclusions

The terroir concept is characterized by the combination soil-climate-variety-vine grower (Deloire *et al.*, 2002), the main difficult is to study at the same time the effects of all these parameters. Our approach try to value, for Garganega variety, the element that built the wine characteristics starting from the soil (texture, depth, water status) and climate (temp. and rainfall) factors. First data (year 2005) confirm the tight relationship grape composition / terroir and the significant fingerprint that the single vineyard could give to own wine. The particular conformation of the micro-area (cru), seems to be very important to assign the microclimatic proprieties (like thermal range night/day) and the goal will be to discover the whole complexity of the vineyard and its wine.

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