



How will climate change affect vine behaviour in different soils?

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Various agricultural sectors are sensitive to projected climate change. In this sense, the strong link between climate and grapevine phenology and berry quality suggests a relevant impact. Within the concept of terroir, climate is a factor that influences ripening of a specific variety and resulting wine style. Furthermore, the effect of soil on grape potential is complex, because the soil acts on grapevine water and nutrient supply, and influences root zone temperature.

The aim of this work was to evaluate the effect of climate change (increased CO₂, higher temperature and lower relative humidity), soil texture and irrigation on the physiology, yield and berry quality of grapevine (*Vitis vinifera* L.) cv. Tempranillo.

A greenhouse experiment was carried out with potted, own-rooted fruit-bearing cuttings. Three factors were studied: a) climate change (700 $\mu\text{mol CO}_2 \text{ mol}^{-1}$ air, 28/18°C and 45/65% day/night relative humidity) vs. current conditions (375 $\mu\text{mol CO}_2 \text{ mol}^{-1}$ air, 24/14°C and 33/53% day/night relative humidity), b) soil texture (9, 18 and 36% soil clay content) and c) irrigation; well-irrigated (20-35% of soil water content) vs. water deficit (60% of the water applied to the irrigated plants). Berries were harvested at ripeness (21-23 °Brix).

Climate change shortened the time between veraison and full maturity up to 9 days and reduced the number of berries per bunch. Grapes grown under climate change conditions had higher pH and lower acidity (due to malic and tartaric acids), anthocyanins content and colour intensity. Water-deficit delayed ripening up to 10 days and reduced final leaf area and root weight. Berries from water stressed plants had an increased skin/pulp ratio and pH, and lower acidity (malic acid) and polyphenol content. Regarding soil texture, plants grown in the soil with lower clay content increased root fresh weight and had higher total anthocyanins content. There were no interactions between factors.

In conclusion, both climate change and water-deficit had a clear influence on the grape phenological development and composition, whilst soil affected root configuration and anthocyanins concentration. Effects of climate change and water availability on different soil conditions should be considered to take full advantage or mitigate the consequences of the future climate conditions.