



## Root-soil relationships and terroir

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Soil features, along with climate, are among the most important determinants of a successful grape production in a certain area. Most of the studies, so far, investigated the above-ground vine response to different edaphic and climate conditions, but it is clearly not sufficient to explain the vine's whole behaviour. In fact, roots represent an important part of the terroir system (soil-plant-atmosphere-man), and their study can provide better comprehension of vine responses to different environments. The root density and distribution, the ability of deep-rooting and regenerating new roots are good indicators of root well-being, and represent the basis for an efficient physiological activity of the root system. Root deepening and distribution are strongly dependent and sensitive on soil type and soil properties, while root density is affected mostly by canopy size, rootstock and water availability. According to root well-being, soil management strategies should alleviate soil impediments, improving aeration and microbial activity. Moreover, agronomic practices can impact root system performance and influence the above-ground growth. It is well known, for example, that the root system size is largely diminished by high planting densities. Close vine spacings stimulate a more effective utilization of the available soil, water and nutrients, but if the competition for available soil becomes too high, it can repress vine growth, and compromise vineyard longevity, productivity and reaction to growing season weather. Development of resilient rootstocks, more efficient in terms of water and nutrient uptake and capable of dealing with climate and soil extremes (drought, high salinity) are primary goals for future research. The use of these rootstocks will benefit a more sustainable use of the soil resources and the preservation and valorisation of the terroir.