TERROIR FACTORS CAUSING SENSORY AND CHEMICAL VARIATION IN RIESLING WINES

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Abstract

The term "terroir", originated in France, comprises the interaction of soil, climate, and topography with the vines of a specific variety and may be extended to the human impact due to the active choice of viticultural and oenological treatments. Although geological diversity has been described for many vineyard sites, there is only scarce scientific knowledge about how the specific soil or climatic conditions translate into specific sensory differences.

To investigate the sensory impact of terroir, a range of 25 highly diverse vineyard sites were selected in Germany. Riesling grapes were harvested from those sites during five consecutive vintages, which were either processed following a standardised winemaking protocol or according to customary winemaking in the respective wine estate. Eight to ten months after harvest, a descriptive analysis by 20 trained judges characterised the wines by one colour, 14 odor and five taste attributes.

According to sensory analysis, wine originating from different vineyard sites yielded a considerable variation, although they were in close proximity. For example, throughout five vintages wines made from Riesling grapes grown on a loamy loess soil with basalt stones were much more intense in its citrus, peach, mango and honey melon attributes than the wines produced from light colored sandstone, which was described as more sour with vegetative and mineral notes. Applying discriminant analysis, it was possible to group the five bedrock types according to their sensory properties, and identify their typical aroma attributes.

Combining sensory and site specific data, PLS analysis was able to explain 48% of the sensory variation by a combined soil/climate data set with first two dimensions. The highest coefficients of determination were obtained for the explanation of sourness-related attributes (R2 0.82 – 0.94), which correlated with precipitation during the ripening period and the gravel content of the soil. The odour of honeydew melon was related to the sum of growing degree days, calcium and clay content of the soil plant available water.

Extracted flavor compounds of the wines were also analysed by GC-MS and used to group different terroirs. Furthermore, concentration of flavor compounds could be linked as well with soil and climate data using PLS-regression as well as to link them with sensory perception.

Overall, this research could address specifically the impact of individual versus standardized winemaking, since wines were obtained from both sources, but from identical grape material. Throughout five vintages and 24 vineyard sites, customized winemaking was superior to distinguish the different terroirs to a greater extent than standardized winemaking.

Based on the analysis of up to 105 wine samples the impact of terroir could be demonstrated on a very robust data basis. Knowledge gained on how site-specific soil and climate parameters contribute to sensory differences in the wines will be an important contribution to communicating the concept of terroir to consumers."

Keywords: Terroir, wine, viticulture, Riesling, aroma compounds