

The key role of vineyard parcel in modifying flavor compounds of Cabernet Sauvignon grapes

Haocheng Lu^{1,2}, Mengbo Tian^{1,2}, Ning Shi^{1,2}, Jun Wang^{1,2*}

¹ Center for Viticulture and Enology, College of Food Science and Nutritional Engineering, China Agricultural University, Beijing 100083, China

² Key Laboratory of Viticulture and Enology, Ministry of Agriculture and Rural Affairs, Beijing 100083, China

*Corresponding author: jun_wang@cau.edu.cn

Abstract (250 words)

To produce premium wines in a specific region is the goal of local oenologists. This study aimed to investigate the influence of soil properties on the flavoromics of Cabernet Sauvignon grapes to provide a better insight into single-vineyard wines. Six commercial Cabernet Sauvignon vineyards were selected in the Manas region to collect berries at three harvest ripeness in three seasons (2019–2021). The six vineyards had little difference in mesoclimate conditions while varying greatly in soil composition. Results showed that the harvest date of two adjacent vineyards (within 200 m) could vary up to two weeks. High vineyard pH (> 8.5) could accelerate grape ripening rate, increase grape anthocyanin and flavonol concentration while decreasing C6/C9-related aromas. Vineyards with moderate nutrition were beneficial for accumulating norisoprenoids in grapes. Differently expressed genes involved in the pathways of secondary metabolites were selected through transcriptome analysis, revealing the regulation of grape flavor compounds influenced by vineyard soil heterogeneity. This work provides molecular and chemical mechanisms underlying single-vineyard wines and a theoretical basis for targeted wine production.

Keywords: Single vineyard wine, soil, phenolics, aromas, transcriptome.