



Stilbenes: Quantitative extraction from grape skins, contribution of grape solids to wine and variation during wine maturation

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Abstract

With the objective of studying the relationship between stilbenic composition in grape skins and that in corresponding red wine, we have firstly optimized a method for quantitative extraction and purification of stilbenes from grape skins, used for posterior HPLC analysis. Stilbene levels in grape skins of three *Vitis vinifera* varieties (Castelão, Syrah and Tinta Roriz) and in their corresponding wines made by traditional winemaking technologies were analyzed. Stilbene composition in grape skin varied considerably, depending on the grapevine variety. The contents of *trans*-resveratrol in grape skins of the three varieties were not significantly different. However, their contents of *trans*-piceid on dry skin were very significantly different (67.24, 10.43 and 11.57 mg kg⁻¹, respectively). Moreover, *cis*-piceid, which was absent in Syrah and Tinta Roriz grape skins, was detected in Castelão grape skin with an important amount (58.9 mg kg⁻¹ on dry skin). The high concentrations of stilbenes were found in stem tissue (cv. Castelão): 145.52 mg kg⁻¹ of *trans*-resveratrol, 61.43 mg kg⁻¹ of *trans*-piceid and 143.85 mg kg⁻¹ of *cis*-piceid (on dry stem), while only *trans*-resveratrol was quantified in the grape seeds with a low concentration (6.8 mg kg⁻¹ on dry seed). Simulated maceration of each solid part of grapes using model wine solution indicated that both stem and seed have little contribution of stilbenes to wines while skins are the major source of these compounds in wine. On the other hand, *cis*-piceid was not detected in the corresponding wines made by these grapevine varieties, but its isomer *trans*-piceid was detected in an important concentration, suggesting that *cis*-piceid, once extracted, isomerized to its *trans*-form. The evolution of these compounds during the elaboration of wines (from the end of alcoholic fermentation until second racking, i.e., just before bottling) showed that in general, *trans*-resveratrol concentration decreases gradually, *trans*-piceid kept constant, while *cis*-resveratrol increases slightly. The important finding of this work is that there was a significant correlation between the concentration of total piceid in grape skins and that in the respective wine. On the contrary, no such relationship was found for resveratrol.

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