Novel analytical approaches suitable for tracing the plant origin of commercial tannins.

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Tannins, as polyphenolic compounds, can stably bind proteins and other plant polymers such as polysaccharides. They can be produced by physical/chemical extraction from several plant tissues (e.g. wood, bark, roots, leaves, and fruit), and are generally grouped into hydrolysable tannins (gallo- and ellagi-tannins mainly extracted from gall, tara, oak, chestnut), and condensed tannins (proanthocyanidins from skin and seeds of grapes, tea, and quebracho). They are massively used in food preparation as flavourings and food ingredients; in winemaking they are admitted only as clarification agents for protein stabilization. Moreover, other positive effects are colour stabilization, mouth texturization, metal and thiolic off-flavour removal, and the inhibition activity of laccase in botrytized grapes. The availability of many possible plant sources leads to huge differences in the chemical profile of commercial tannins, and consequently in the oenological properties. These and the noteworthy differences in the commercial costs justify the interest on methods able to check their real botanic origin. The International Organization of Vine and Wine (OIV) proposes ultraviolet absorption measurements, phenolic contents, polyalcohol and monosaccharide profile to characterise the botanical origin of oenological tannins. This paper investigated the possibility of verifying the declared botanical origin of over 100 commercial tannins of 10 botanic origins on the base of a statistical modelisation of the analytical contents of sugars (by Ionic chromatography), simple phenols (UHPLC-coulometric detection), mineral profile (ICP-MS) and stable isotope ratio of C (IRMS). Forward stepwise discriminant analysis (FDA) provided good discrimination among 8 plant origins achieving 90% of correct re-classification using sugar profile, 98% of correct re-classification using simple phenols, and 100% of correct re-classification with the joint use of sugars and simple phenols. FDA obtained also good discrimination between the 8 most abundant groups, with 100% correct re-classification, using mineral elements and isotopes profiling. With a similar approach it was also possible to distinguish toasted and untoasted oak tannins, as well as tannins from grape skin and grape seeds. Our approaches showed better performances of correct re-classification compared to OIV method.

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