Reconstitution of the flavor signature of Dornfelder red wine on the basis of the natural concentrations of its key aroma and taste compounds

Abstract:
By application of aroma extract dilution analysis (AEDA) on the volatile fraction isolated from a Dornfelder red wine, 31 odor-active compounds were identified by means of HRGC-MS and comparison with reference compounds. A total of 27 odorants, judged with high FD factors by means of AEDA, was quantitated by means of stable isotope dilution assays, and acetaldehyde was determined enzymatically. In addition, 36 taste-active compounds were analyzed by means of HPLC-UV, HPLC-MS/MS, and ion chromatography. The quantitative data obtained for the identified aroma and taste compounds enabled for the first time the reconstruction of the overall flavor of the red wine. Sensory evaluation of both the aroma and taste profiles of the authentic red wine and the recombinate revealed that Dornfelder red wine was closely mimicked. Moreover, it was demonstrated that the high molecular weight fraction of red wine is essential for its astringent taste impression. By comparison of the overall odor of the aroma recombinate in ethanol with that of the total flavor recombinate containing all tastants, it was shown for the first time that the nonvolatile tastants had a strong influence on the intensity of certain aroma qualities.