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Coffee sensory properties: a complementary data fusion to simulate odor&taste integration by instrumental approach. Possibilities and limits

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Text

This work deals with the study of a flavoromics approach to describe and predict coffee sensory quality and its potential and limits in routine control.
The cup tasting is nowadays the most important criteria to define the coffee quality, although i) it is time-consuming requiring panel training and alignment, and ii) it cannot be easily implemented at-line for an immediate feedback and/or a critical objective evaluation. Flavoromics is an “-omic” and “-holistic” approach focused on low molecular mass compounds (volatile and non-volatile) linking them to a sensorial perception through chemometric approaches[1-2]. Coffee cupping considers both aroma and taste and its evaluation considers several attributes at the same time[3-4]: the definition of the flavor quality therefore requires two complementary analytical techniques.
Chemical data of the investigated coffee samples (n=150) was obtained by analyzing both volatile and non-volatile fraction by HS-SPME-GC-MS and HPLC-UV/DAD. Sensory data were collected by an expert panel in a monadic way through a quantitative descriptive analysis. Multiple Factorial Analysis (MFA) was used to correlate the pool of observations (volatiles, non-volatiles, and sensory scores). PLS-DA was applied to select informative compounds from each analytical approach and PLS regression was used to correlate chemical and sensory data in prediction.
When focusing on bitter note, the sensory prediction models relative to targeted aroma and taste fingerprints displays good results in determining the sensory scores (Q^2 in prediction is 0.98 *vs* 0.95 with a prediction error of 0.6230 *vs* 1.0501 respectively for aroma and taste). However, coffee cupping is a multimodal perception involving different attributes at the same time[3-4] that can therefore be better represented by adopting an aroma and taste data fusion. This approach results in bitter scores prediction values of Q^2 0.89 with an error of 1.4007. A comparison of the Q model parameter with the other sensory notes highlights a different contribution of this taste fraction in their description since it has more impact in describing Acid, Bitter, Woody notes than Flowery and Fruity.

References

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