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New DIN-/CEN-HPLC method for the determination of the diterpene 16-O-methylcafestol

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Introduction

Coffea arabica and Coffea canephora have the greatest economic importance. Arabica coffee is grown in higher regions where the cherry grows and ripens slowly due to the low temperature. This affects the pleasant mild taste of the coffee beverage. In contrast, the robusta drink has an earthy dull note. On the world market, the arabica bean is therefore traded at significantly higher prices than the robusta bean. The evidence of adulteration was provided by the 16-O-methylcafestol (16-OMC) exclusively occurring in robusta coffee, a diterpene which is also stable under roasting conditions so that the compound is recognized worldwide as a marker substance for robusta.

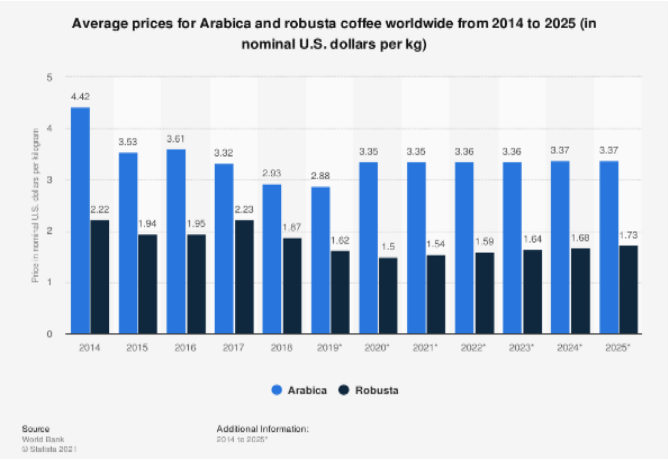

Figure 1: Coffee prices

Materials/Methods

In 2019, the CEN working group "Food Authenticity" decided to create CEN standards for the determination of 16-OMC in green and roasted coffee using both HPLC- and NMR-methods. The established but time- and solvent consuming DIN 10799 is to be replaced within this context. The new method developed in our working group allows the analysis of up to eight samples per day with reduced solvent requirements. The method will be validated in an international round robin test in April/May 2021 under the leadership of the Federal Ministry for Consumer Protection and Food Safety (BVL).

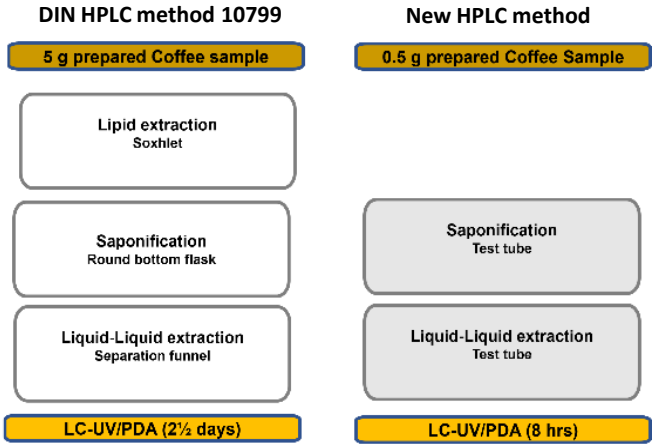

Figure 2: Comparison old versus new method

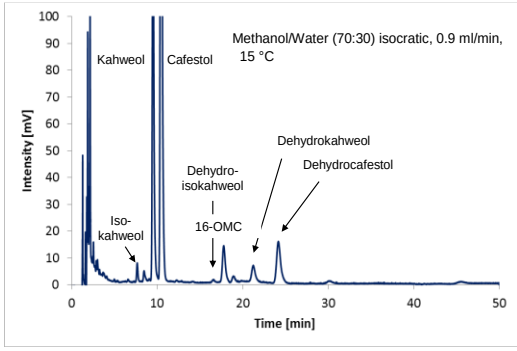

Figure 3: LC-Chromatogram

Results/Discussion

16 European laboratories from industry and state food control, mostly from Germany, Italy and France, will take part in the HPLC round robin test. The laboratories each have to analyze seven ground roast coffee samples in the concentration range between approx. 20 mg / kg and 2.000 mg / kg of 16-OMC. According to the specifications of the company QuoData (Berlin / Dresden), the samples are to be processed on one day in double determination and on another day in single determination. In addition, two green coffees with whole beans and one roasted coffee with whole beans are to be examined. Ten calibration solutions had to be prepared from a 16-OMC stock solution sent with the samples. In addition to the 16-OMC, the contents of cafestol, kahweol, dehydrocafestol and 16-O-methylkahweol must be determined. The cafestol / dehdrocafestol ratio indicates whether a coffee was roasted gently or strongly. After the evaluation of the round robin test data (HPLC and NMR) by QuoData, hopefully two CEN methods for the determination of 16-OMC can be established. It should also be pointed out that the NMR method has proven to be unsuitable for green coffee in preliminary tests and that NMR cannot distinguish between 16-OMC and 16-O-methylkahweol.

Conclusion/Perspectives

The internationally recognized CEN methods form basis for a similar assessment by all institutions dealing with the authenticity of coffee and coffee products and also protect consumers from being misled and deceived.

References

[1] Speer K, Tewis R, Montag A (1991), 16-O-Methylcafestol: a quality indicator for coffee. *Proc.14th ASIC Coll.*, ASIC, Paris, 237-244.

[2] Speer K, Kölling-Speer I (2006), The lipid fraction of the coffee bean. Braz. J. Plant. Physiol.,18, 201-216.