Sensorische Optimierung von Pflanzenproteinen aus Ölsaaten und Leguminosen

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Due to their functional and nutritional properties, proteins are important ingredients in the food and beverage industry. The global demand for sustainable, nutritional and functional plant-derived food proteins has increased over the last years. Next to the most common plant protein, soy, which contains sufficient quantities of the essential amino acids, other vegetable proteins from e. g. pea or rapeseed are known and seems to be promising protein sources for the future. Although these proteins offer an alternative to vegans, and people who live in regions where animal proteins sources are scare, their bitter and astringent off-taste is often the reason for consumer complaints and, therefore, is causing a major problem for plant protein processors and user. Although, the leguminous like off-flavor of protein products, especially of soy, has been analyzed for many years, no attention was directed towards the bitter/astringent off-taste of plant derived proteins.

By means of activity-guided fractionation using taste dilution analysis, LC-MS/MS, LC-TOF-MS and 1D/2D-NMR spectroscopy, kaempferol 3-O-(2‘’‘-O-sinapoyl-β-sophoroside), was found for the first time as the key molecule contributing to the intense bitter off-taste of rapeseed protein isolates with a human recognition taste threshold of 3.4 µmol/L. In contrast, fatty acid degradation products, such as trihydroxy fatty acids were identified as key bitter tastants in pea protein isolates.

Determination of human taste recognition thresholds of the highly purified compounds, quantitation by means of LC-MS/MS, followed by calculation of dose-over-threshold factors (DoT) allowed to judge the individual components on the basis of their taste impact. Final data confirmation by means of taste re-engineering and omission experiments, for the first time, revealed the chemical code of key molecules creating the typical off-taste profile of pea and rapeseed proteins.

These results now can be taken to effectively navigate breeding plans or technological processes and to improve application studies toward the production of preferentially pleasant and least bitter/ astringent tasting plant derived protein isolates.