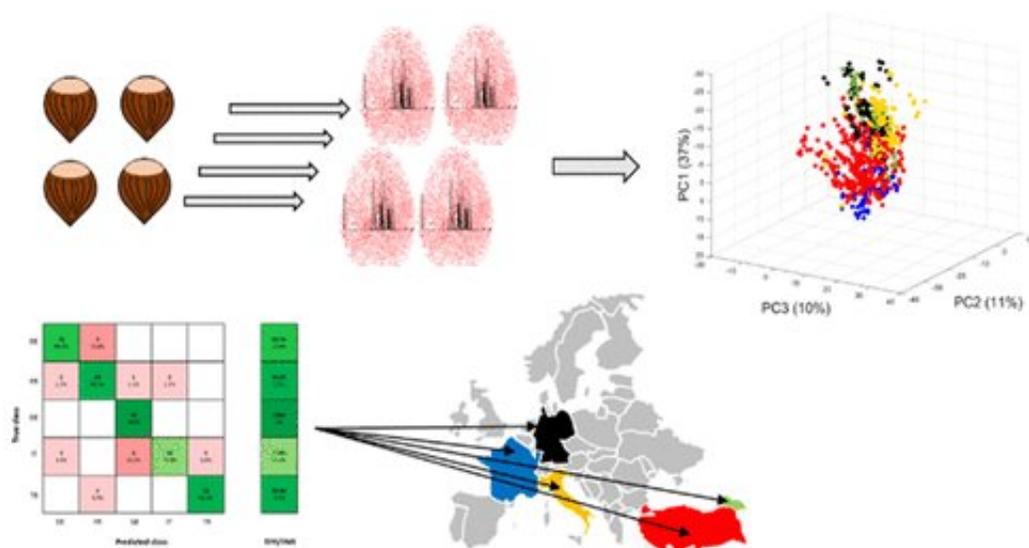


Authenticating the geographic origin of hazelnuts

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Credit: American Chemical Society

Hazelnuts, like olive oil, cheese and other agricultural products, differ in flavor depending on their geographic origin. Because consumers and processors are willing to pay more for better nuts—especially in fine chocolates and other delicacies—testing methods are needed to reliably authenticate the nuts' country of origin. Researchers now report in ACS' *Journal of Agricultural and Food Chemistry* that NMR analysis could fill the bill.

People have eaten hazelnuts since at least the Mesolithic era. Today,

they're the third most commonly grown nut, after almonds and walnuts. Italian hazelnuts fetch the highest price, followed by those from Turkey, the U.S., Georgia and Azerbaijan. A few previous studies evaluated analytical techniques for chemically profiling hazelnuts, but they focused either on a small region or on particular hazelnut varieties. Thomas Hackl and colleagues wanted to find a method that could pinpoint geographic origin regardless of variety.

The researchers ground up 262 nut samples from different regions around the world and extracted the metabolites, which they identified with proton NMR spectroscopy. The spectra showed that nuts from different regions had different [metabolite](#) profiles, with certain compounds proving distinctive for specific areas. For example, the amount of betaine, an amino acid derivative, varied significantly in nuts from different countries. Thus, betaine could potentially be a good biomarker in a future test to identify the source of a particular batch of nuts, the researchers say. For an even more accurate determination, the team's new NMR method—which had an accuracy of 96 percent—could be used in combination with a previously devised test that assessed a different group of hazelnut metabolites using liquid chromatography and mass spectrometry.

More information: René Bachmann et al. ¹H NMR Spectroscopy for Determination of the Geographical Origin of Hazelnuts, *Journal of Agricultural and Food Chemistry* (2018). [DOI: 10.1021/acs.jafc.8b03724](https://doi.org/10.1021/acs.jafc.8b03724)

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