Don't blame it on the pine nut!

Did you know that not all pine nuts are edible? Here, Antonina Constantine explains how DNA-based techniques can prevent you from serving up a dodgy one.

HAVE YOU EVER had a 'bad' pine nut that ruined your meal? Did you have a strange taste lingering on for days or for weeks? If yes, then don't blame the pine nut! Some pine nut species are simply not meant for human consumption. So we are here to debunk the pine nut world for you.

As a quick summary, *P. koraiensis, P. sibirica, P. yunnanensis, P. griffithii* and *P. pumila* are all suitable for consumption. *P. armandii, P. massoniana* and *P. tabulaeformis* are not. *Pinus armandii* is the pine nut believed to cause dysgeusia (taste distortion) among consumers.

It is therefore vital to know which species you are buying or selling – but how can you be sure? A reliable testing method now exists which is based on DNA analysis.

How does the test work?

DNA-based methods are becoming more and more standard in the industry. They are, for example, routinely used to identify the GMOs of pathogens in production or within food products, as well as

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Nina Constantine is currently responsible for the Food and Environment markets at Eurofins Genomics. Within the food market, Eurofins Genomics has been pioneering DNA-based analytical technologies to improve the safety and authenticity of food products. The portfolio includes food authenticity testing in meat, fish, plants and spices, high-precision meat traceability and pathogen traceability. The environment portfolio aims to enhance environmental monitoring by applying NGS methods to eDNA. Nina also launched DNA testing services for the hemp and cannabis markets at Eurofins Genomics. The services include strain authentication, microbial detection, as well as genotyping and breeding. Within those markets, she is additionally responsible for developing innovative products and services – such as Whole Genome Sequencing or NGS-based applications for food safety or environmental monitoring, authentication and genotyping of cannabis and hemp, microbiology techniques, and combining technologies such as DNA-based analysis with blockchain, visual tools, apps (and others) to better enhance food safety and traceability.

for allergens and the identification of a variety of fungal, microbial, animal and plant species used in food production. As such, these methods can also be very helpful in combatting food fraud or other deceptive practices.

For pine nuts, we mainly receive requests based on the absence of certain species or the replacement of more expensive ones – mainly for the absence of *Pinus armandii* (the taste altering species) or for the replacement of *Pinus pinea* (the most expensive pine nut) by *Pinus gerardiana* (when bleached).

The DNA method analyses known sequence differences (DNA markers) that have been identified between the varied species. Those DNA markers were originally found through comparing sequences that differed between, but not within, the species. The challenge of this endeavour originally was to find reliable and variable DNA markers that discriminate between edible and inedible species. Reference material of known origin for the dozens of different pine nut species from across Asia, Europe and North America were gathered and analysed. The outcome of that was a DNA-based method that can differentiate between the pine species with eight regions in seven genes found to be variable.

Conclusion

Reliable, independent and trusted testing methods are necessary to help consumers make the most informed and safe decisions when it comes to their food. DNA-based methods are strong tools that can be used to do just that. In addition to pine nuts, there are numerous high-quality varieties of wheat, spices and other food products that can be tested using DNA. As an example, another such developed method helps differentiate between various varieties of Basmati rice. There are adulterations that can sometimes occur with common long grain rice, which can be less than half the price of Basmati.

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