Unveiling the Origin of Pine Nuts through Sesquiterpene fingerprint

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Pine nuts are worldwide valuated nuts, widely used in culinary preparations due to their exceptional sensory attributes and nutritional value. The most consumed pine nut species are *Pinus pinea*, mainly cultivated in the Mediterranean countries, and *Pinus koraiensis*, mostly produced in China. The diverse pine nut species and their geographical origins contribute to variations in nutritional and sensory attributes[1,2], which subsequently impact market prices. Consequently, pine nuts are suceptible to economically motivated fraud and it becomes crucial to develop suitable tools to verify their identity, ensuring their authenticity and protecting consumers.

The present study aims to assess the suitability of the sesquiterpene hydrocarbon (SH) fingerprint to verify the botanical and geographical authenticity of pine nuts. For this purpose, 104 *Pinus pinea* samples from two producer regions in Spain, Castile and León (n=27) and Catalonia (n=43), and Asian *P. koraiensis* (Asia) (n=34) were analysed by Headspace Solid Phase Microextraction-Gas Chromatography-Mass Spectrometry. A three-class Partial least squares discriminant analysis (PLS-DA) classification models were built to discriminate samples according to their identity (*P. pinea* from Castile and León and from Catalonia, and Asian *P. koraiensis*). External validation conducted with 20% of the sample set resulted in a 96% of overall correct classification, proving the suitability of SH fingerprint as a pine nut authentication tool.

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[1] Evaristo et al., 2013, In: Mutke, Piqué, Calama (eds.) Mediterranean stone pine for agroforestry. (Opt. Médit. Série A. Séminaires Méditerranéens; n. 105), 99-104.

[2] Loewe-Muñoz et al., 2018, *Plant Biosystems - An International Journal Dealing with all Aspects of Plant Biology*, 152:3, 547-555.