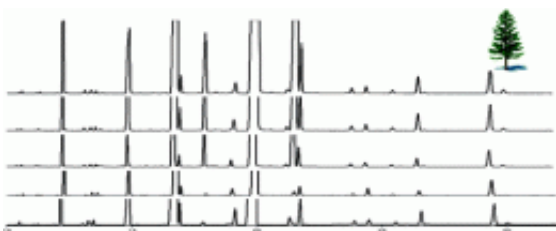


# New study of pine nuts leaves mystery of 'pine mouth' unsolved

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A new study of the composition of pine nuts, including those associated with "pine mouth," leaves unsolved the decade-old mystery of why thousands of people around the world have experienced disturbances in taste after eating pine nuts. The report on pine nuts or pignolia — delicious edible nuts from pine trees enjoyed plain or added to foods ranging from pasta to cookies — appears in *ACS' Journal of Agricultural & Food Chemistry*.

Ali Reza Fardin-Kia, Sara M. Handy and Jeanne I. Rader note that more than 20,000 tons of pine nuts are produced each year worldwide. "Pine mouth," first reported in Belgium in 2000, is a bitter metallic taste that develops within one to two days of eating pine nuts and can last from one to two weeks. In 2009, the French Food Safety Administration reported a possible link between "pine mouth" and consumption of nuts of *Pinus armandii*, a pine species whose nuts are not traditionally eaten

by humans. Researchers have identified certain fatty acids whose levels vary among pine species, making them a potentially useful tool for telling different species apart. To determine the source of pine nuts sold in the U.S., the first such effort, they measured the ratio of these compounds to the overall amount of [fatty acids](#) in the nuts.

Using fatty acid composition and a fatty acid diagnostic index (DI) along with DNA analysis, they found that most pine nuts sold in the U.S. are mixtures of nuts from different pine species, including *Pinus armandii*. They report that combining the fatty acid DI and DNA analysis is a useful way to determine which samples of pine nuts are mixtures of nuts from several species, but that this information itself may not definitively predict which pine nuts may cause "pine mouth." Its cause remains a mystery.

**More information:** Characterization of Pine Nuts in the U.S. Market, Including Those Associated with “Pine Mouth”, by GC-FID, *J. Agric. Food Chem.*, 2012, 60 (10), pp 2701–2711. [DOI: 10.1021/jf205188m](https://doi.org/10.1021/jf205188m)

### Abstract

Taste disturbances following consumption of pine nuts, referred to as “pine mouth”, have been reported by consumers in the United States and Europe. Nuts of *Pinus armandii* have been associated with pine mouth, and a diagnostic index (DI) measuring the content of  $\Delta^5$ -unsaturated fatty acids relative to that of their fatty acid precursors has been proposed for identifying nuts from this species. A 100 m SLB-IL 111 GC column was used to improve fatty acid separations, and 45 pine nut samples were analyzed, including pine mouth-associated samples. This study examined the use of a DI for the identification of mixtures of pine nut species and showed the limitation of morphological characteristics for species identification. DI values for many commercial samples did not match those of known reference species, indicating that the majority of pine nuts collected in the U.S. market, including those associated with

pine mouth, are mixtures of nuts from different Pinus species.

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