vinetur

Study Identifies 2 Compounds Behind Shaoxing Huangjiu’s Signature Aroma

Researchers used chemical analysis, sensory panels and receptor modeling to link pleasant notes to benzyl benzoate and 2-phenylethyl acetate.

Wednesday, September 30, 2026



Researchers reported new details on what makes the aroma of Shaoxing Huangjiu appealing, using a mix of chemical analysis, sensory testing, and computer modeling to link specific compounds in the traditional Chinese rice wine to the way they may activate smell receptors.

The findings were published in Food Chemistry and focus on Shaoxing Huangjiu, a well-known rice wine from eastern China that is valued for a layered aroma developed through fermentation and aging. The study set out to identify which volatile substances play the biggest role in that aroma and to explain, at a molecular level, how those substances may be recognized by the human olfactory system.

According to the paper, the researchers analyzed the wine’s volatile profile with gas chromatography-mass spectrometry, or GC-MS, a standard technique used to separate and identify aroma-related compounds. They paired that work with sensory evaluation panels, which assessed the smell characteristics perceived by people, and with molecular docking, a computational method used to estimate how strongly a molecule may bind to a target protein. The target proteins in this case were olfactory receptors associated with pleasant aroma perception.

The study found that esters, alcohols, and aldehydes were among the compound groups that matter most to the fragrance of Shaoxing Huangjiu. The authors said the docking results supported the sensory and chemical data by showing that key aroma compounds had strong binding affinity for olfactory receptors tied to favorable smell responses.

Among the substances highlighted in the research, benzyl benzoate and 2-phenylethyl acetate received the highest scores in the study’s overall assessment, according to the monitor summary of the paper. That places them at the center of the researchers’ effort to explain why some notes in Shaoxing Huangjiu are experienced as especially pleasant. Both compounds are known in flavor and fragrance work for contributing sweet, floral, or soft aromatic qualities, although the exact sensory effect can change depending on concentration and the broader chemical matrix of the beverage.

The work is part of a broader trend in food and beverage science that moves beyond simply listing volatile compounds. For years, researchers have been able to detect hundreds of aroma molecules in fermented drinks, but not every detectable molecule has the same sensory weight. Some are present in trace amounts but have a strong effect on perception, while others are abundant but less important to what drinkers actually smell. By combining instrumental analysis with human sensory data and receptor-level modeling, the study tried to narrow that gap.

That matters because aroma is one of the most difficult quality traits to control in traditional fermented beverages. Shaoxing Huangjiu develops its character through a long production process influenced by raw materials, microbial activity, fermentation conditions, and maturation. Small changes in any of those steps can alter the final aromatic profile. A more precise map of which compounds matter most, and how they may interact with smell receptors, could give producers a clearer way to manage flavor development.

The research may also have broader implications for the beverage industry beyond Huangjiu itself. If producers can connect specific aroma compounds to sensory responses with more confidence, they may be able to fine-tune fermentation and aging practices with less trial and error. That approach could be relevant for wine, beer, spirits, and other fermented drinks where aroma is a major part of quality, product consistency, and brand identity. In practical terms, it could help guide decisions on yeast selection, process timing, storage conditions, or blending strategies aimed at reproducing desired aromatic styles.

The paper also reflects growing interest in using computational tools in flavor science. Molecular docking does not replace human tasting, but it can offer a plausible mechanism for why certain compounds stand out. In studies like this one, it serves as a bridge between chemistry and perception. Instead of stopping at the question of which compounds are present, researchers can ask which ones are more likely to bind to receptors involved in pleasant smell and whether those predictions match panel evaluations.

The source text says the integrated method provided insights into the flavor chemistry of Shaoxing Huangjiu and could support quality control and product enhancement. That is a notable point for a category of beverage that carries both commercial value and cultural importance in China. Traditional products often depend on craftsmanship and accumulated experience, but scientific tools are increasingly being used to document and preserve the sensory traits that define them.

Shaoxing Huangjiu has long been recognized for its rich aroma, yet the exact basis of that appeal has been difficult to pin down because of the complexity of fermented wine volatiles. This study adds evidence that the pleasurable character of the drink is not driven by a single note, but by a set of key compounds whose sensory importance can be tested from several angles at once. By identifying likely high-impact substances and modeling how they may interact with olfactory receptors, the researchers offered a more detailed framework for understanding why the wine smells the way it does.