Flavour Profiling

Overview

The diversity among individuals and populations is cultural and learnt, and there could well be a genetic aspect to defining likes and dislikes for specific tastes and aromas. Being able to identify the factors that might define such a shared predisposition to like certain tastes and flavours would have an obvious commercial premium in the search for the wine markets of tomorrow.

The Big Picture - Who Likes What and Why?

If you are trying to sell a red wine to the Japanese market, how do you know what wine would be most preferred?

To do this, it is necessary to understand the expectations and preferences of individuals and populations for wine flavour. This could be achieved through research into the genomics of wine taste and smell so as to benefit from recent scientific advances in this new field of science.

Although some of the diversity among individuals and populations is cultural and learnt, there could well be a genetic aspect to defining likes and dislikes for specific tastes and aromas. Scientists are working to define fully the genetic differences among individuals' sensory perception and to do that it is necessary to assign particular tastants (taste compounds) and odorants (odour compounds) to their corresponding receptors (sensory 'organs'). Considering that taste and smell receptors constitute the largest, and possibly most diverse, gene family in the human genome, this is a challenging undertaking, but one that will potentially offer great benefits to the wine industry.

Although determining the basis for preferences is difficult, the unravelling of the human genome sequence is beginning to provide a scientific understanding of how we process aromas and flavours.

Moreover, advances in knowledge as to how flavour perception is influenced by factors such as ethnicity, gender and age are also being made. These studies can be used to develop an individual's 'flavour print' as a means to measure a person's capacity to detect key flavour compounds in wine, thus providing an entry point towards establishing measures for predicting flavour preferences in market segments.

Humans, although not so dependent on the chemical senses as other mammals, are still able to detect and discriminate between thousands of different odours. The question is: How many genes are required to allow us to sense this chemical universe? In this outline, you will be introduced to the genomics of taste and smell and the genetic basis.

The Genomics of Taste

Despite the structural diversity of taste compounds (tastants), the gustatory (taste) system senses only five types (modalities): sour, salty, bitter, sweet and umami (savoury, the taste of the amino acids, glutamate and aspartate, and their salts—e.g. MSG). Specialised cells named taste receptor (TR) cells mediate recognition of these five types of tastants. These cells are tightly packed into tastebuds, mainly on the surface of the tongue.

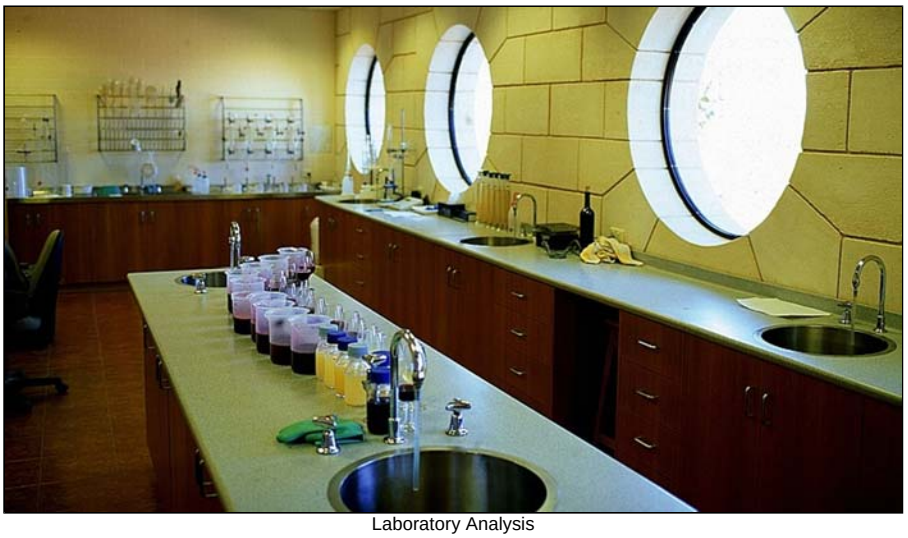
The Genomics of Smell

Compared to the human tongue, our powers of smell—scientifically called olfaction—are infinitely greater. Not only can we detect thousands of different odorant compounds that vary considerably in size and chemical structure, we also can distinguish and identify these odours.

Genetic Basis for Individual Variation

It is well known that individuals differ in the flavours they prefer and that the inability to detect specific smells and tastes can be hereditary. The question is how much of this variation depends on changes in the taste and odour receptor parts of the human genome? In addition, do specific populations have particular modifications in their taste and smell repertoires and how much is a learned response dictated by exposure to foodstuffs throughout a lifetime? If this is the case, it could be a key factor in understanding the 'genetic prisms' of different population groups and targeting specific wine styles to particular consumer segments as well as gaining entry into new markets.

It is important to remember that, in addition to the aforementioned genetic variations, sensory experiences are also dictated by a kaleidoscope of other interactive factors, including vision, emotion and memory. As an illustration of this complex interactivity, when a white wine was artificially coloured red with an odourless dye, it was olfactorily described as a red wine by a panel of tasters. This simple psychophysical experiment demonstrated that, because of the visual information, the tasters discounted the olfactory information and that this perceptual illusion occurred during the verbalisation phase of odour determination. It is therefore clear that there is still much work to do before the complete gustatory and olfactory codes are cracked, but thanks to the advances that are now being made, it is at least starting to look like a tractable objective.



Laboratory Analysis

A Case In Point - Dr Leigh Francis, Principal Research Sensory Scientist - The Australian Wine Research Institute

"Formal sensory evaluation to obtain reliable information about the sensory properties of a set of wines will be increasingly important for the wine industry. To ensure that wines meet consumer requirements, companies need to have data on the links between wine sensory attributes and consumer preferences. The linking of sensory profile information with consumer preference data is extremely valuable for all types of purposes, from grape and wine production decisions to assessing new closures and wine shelf-life.

One of the potential misconceptions about the use of sensory consumer studies is that they might bring about homogenous wine styles. On the contrary, information about the diversity of consumer preferences allows winemakers to tailor wines that most consumers will enjoy, as well as to produce wines that appeal more strongly to specific groups of consumers. The variety and subtlety of wine flavours and tastes is part of the continued attraction of wine and this will not change.

Varietal labelling will remain helpful to the consumer as it provides a useful guide to what types of flavours might be expected in a wine. In conjunction with other label cues such as vintage, region and producer, the grape variety information on a label helps the consumer to decide, based on past experience, whether they might like the wine in the bottle. Further indication of wine style can also be helpful, whether on a back label or an explicit designation such as, 'lightly oaked,' or 'soft fruity style.'"

Summary

It is well known that individuals differ in the flavours they prefer and that the inability to detect specific smells and tastes can be hereditary. It is also important to consider that, in addition to the aforementioned genetic variations, sensory experiences are also dictated by a powerful kaleidoscope of other interactive factors: vision, emotion and memory. Discovering why individuals are more receptive to different tastes and smells is an area that will enable winemakers to capture new audiences in a changing global marketplace.

CHECKLIST

- Flavour profiling relates to specific predisposition and preference humans have for certain tastes and flavours in wine.
- Australian researchers are investigating the link between genetics and preference for specific tastes and aromas.
- Results of research potentially offer great benefits to the wine industry.
- **3 key areas of consideration in relation to wine:**
  - **Taste** - Essentially, humans only detect 5 types of taste: sour, salty, bitter, sweet and savoury
  - **Smell** – humans are able to detect thousands of different odours and distinguish and identify these
  - **Other** – what influence do pre-disposed or genetic factors have on our preferences, along with environmental influences.
- Research has commenced into learning and understanding more about how we smell and taste.
- Factors such as ethnicity, gender and age are also being considered as potential influences of flavour perception.
- The aim is to create 'flavour profiles' that can assist with the prediction of flavour preferences in specific market segments.

Acknowledgements

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