



the white book of

FRUITOLOGY[®]

EDITORIAL

A TASTE FOR SHARING

At Les vergers Boiron, our work is more than a job, it's a passion for fruit that spans three generations.

We approach our craft with dedication, knowing fruit is a living matter that nature never duplicates. From sourcing and relationships with growers to varieties, terroirs, production conditions, harvesting, and weather, our industry is shaped by many complexities. Over time, we've developed unique and ever-evolving expertise in fruit and fruit processing, especially through sensory analysis.

Today, fruit purees are much more than simple ingredients for professionals like you. Understanding their textures, flavors, appearance, history, and culture is essential to elevating your recipes and impressing your customers.

Unlike other ingredients, fruit puree lacked its own descriptive language. That's why we created Fruitology® - to reveal its secrets and make fruit even more refined and delicious.

This expertise is central to our mission : we strive for fruit and gastronomy that connect and care for living.

*We hope you enjoy
discovering Fruitology®!*

Alain Boiron
Chairman of Les vergers Boiron

Wine has oenology,
beer has zythology,
cheese has caseology.
Since 2019, fruit purees has

FRUITOLOGY®

As with all food products, fruits have distinct characteristics that are crucial during tasting, whether enjoyed raw or processed.

Fruitology® is founded on the belief that mastering fruit puree begins with truly understanding the fruit itself, recognizing its nuances and unique qualities. This deeper knowledge allows you to fully appreciate each blend.

Fruitology® goes even further by sharing the story behind every puree: the varieties, terroirs, and the passionate people dedicated to delivering excellence. The quality of each puree is the result of expertise, daily dedication, and deep understanding.

The expertise of Les vergers Boiron has enabled us to create and develop this new discipline, through the definition of linguistic markers and methodologies based on sensory analysis techniques.

This book is intended for anyone seeking to deepen their knowledge of fruit puree. Both enthusiasts and professionals in the world of taste and fruit will discover a wealth of practical and inspiring information to elevate their craft and creativity. Inside, you'll find our aroma wheels and definitions for the descriptors used in the sensory profiles of our purees.



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UNDERSTANDING SENSORY

ANALYSIS



SENSORY ANALYSIS

DEFINITION

Sensory analysis is a remarkable technique that combines precise scientific methods with the subjectivity of human senses: sight, touch, taste, hearing, and smell.

Measurements are obtained using strictly defined methodologies, and results are analysed statistically. However, since human being is the measuring tool, variability is inevitable. The challenge is to manage this variability, depending on the study's objectives.

Sensory analysis aims to better understand consumers - their expectations and needs - to refine existing products or develop new ones.

SENSORY PERCEPTIONS AND SCIENCE

Each human being is inherently unique; genetical, physiological, and cultural differences naturally lead to variations in product perception. Some individuals are more skilled at identifying and interpreting characteristics than others.

Using an objective method for expressing characteristics and reducing differences in perception is therefore fundamental to get reliable results.

To achieve this, groups of experts internal and external to our company are selected and trained in order to develop descriptors allowing to characterize the products. Then, they evaluate the intensity on a common scale.

Did you know?

This method was developed by the US Army in the 1950s.

At that time, soldiers were refusing food rations designed for nutritional balance but lacking in taste and enjoyment.

This caused a significant problem that researchers sought to address. As a solution, they created a taste evaluation program for military food, aiming to balance soldiers' preferences with the nutritional value and flavor of the rations: this marked the beginning of sensory analysis.

In the 1970s, the food industry adopted these techniques to tackle a key commercial challenge: satisfying all sensory expectations of consumers by better understanding and anticipating their needs.



HOW DO THE SENSES WORK?

The five senses share a similar mechanism: anatomical receptors detect signals, which are relayed through the nervous system to the brain. The brain interprets these signals, transforms them into “messages”, and immediately sends responses back to us.

However, interpretation differs from one person to another: for one, a dish may seem bland due to less salt; for another, a sauce might be too spicy. A scent might trigger a childhood memory.

This immediate reaction that seeks pleasure or avoid pain and discomfort, and which results from the expression of a judgement, is called hedonism.

Perception through physical senses – sight, touch, and hearing – tends to be consistent among individuals. In contrast, chemical senses – taste and smell – vary more, as differences in receptors can create greater diversity in perception.

Fruitology® focuses on sight, taste and touch.

SIGHT

Sight is typically our first interaction with a product, often shaping our initial judgement and whether or not we want to explore further.

It can help us to determine whether a fruit is fresh or not, if a cake is cooked enough, making the product more or less attractive to consume.

In sensory analysis of fruit purees, sight helps to assess parameters such as color, viscosity, or texture.

TOUCH

Touch is mainly used during tasting when something is in contact with the skin or mucous membranes of the mouth and thermal perceptions.

For example, pressing fruit puree between the tongue and the palate reveals if it is frothy, sticky, or granular.

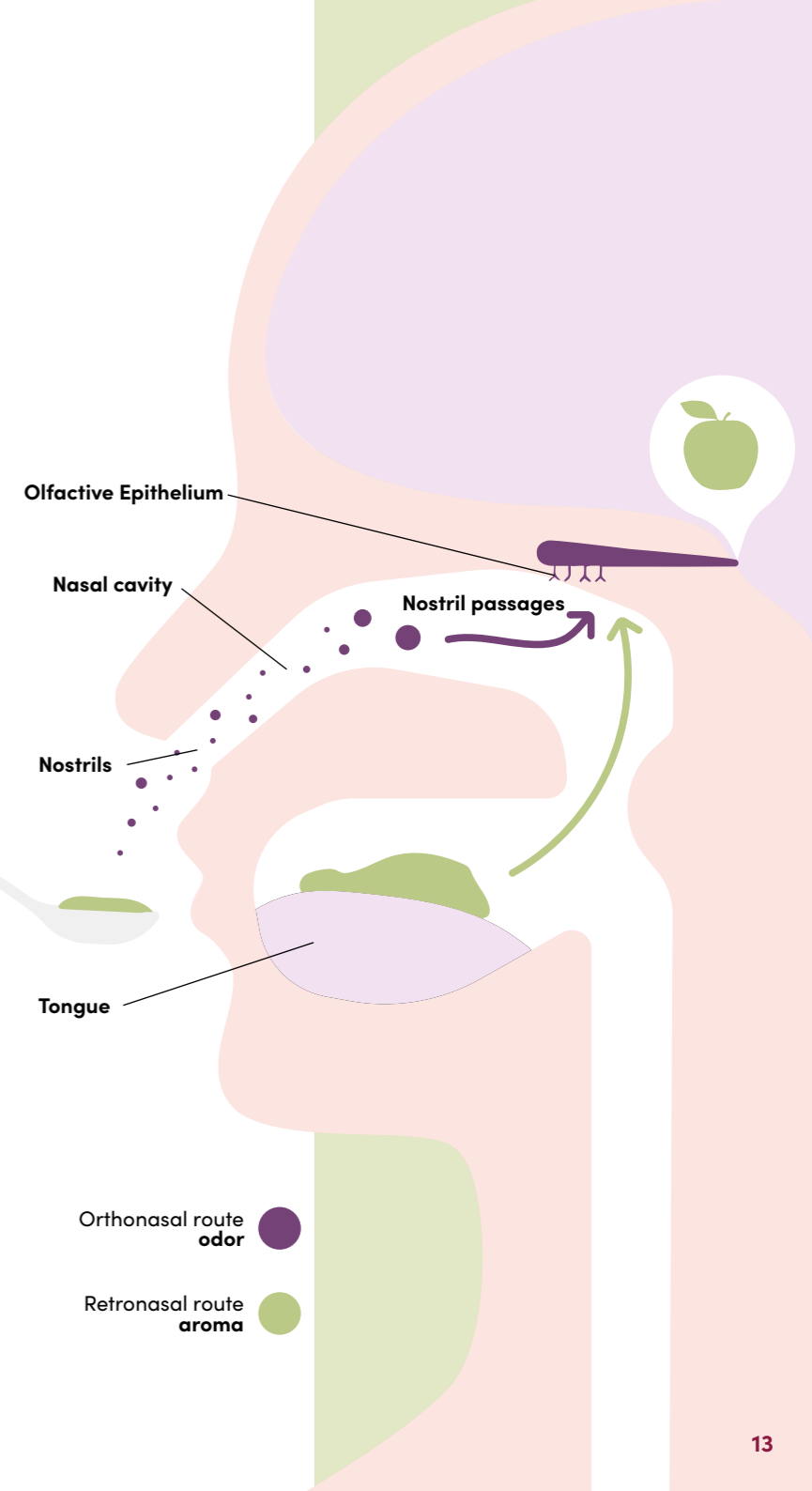
TASTE

Taste involves two complementary and indissociable perception areas: the tongue, for basic tastes, and the olfactory epithelium, which detects aromas.

These are inseparable: 80% of what we perceive as “taste” is actually sensed by the nose. This explains why a cold or blocked nose diminishes flavor perception.

Here's how they work:

- Basic tastes (savory, sweet, bitter, sour, umami) are detected by taste buds scattered across the tongue, activated by molecules dissolved in saliva. The number and distribution of taste buds vary, making each person's perception unique.
- Aromas, which are volatile compounds released during chewing, reach the olfactory epithelium via the retronasal route, and activate it just like odors do.



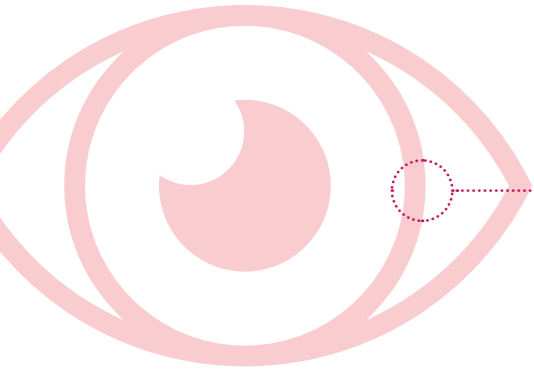


EVALUATION OF A

FRUIT PUREE



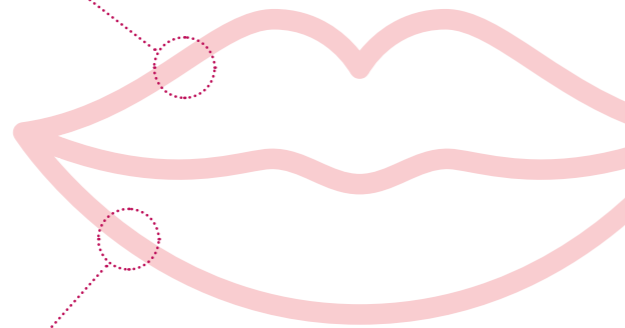
HOW TO DESCRIBE A FRUIT PUREE?



Evaluation of
the visual aspect
Color, viscosity, grainy...

Evaluation of the taste

TASTE = basic tastes + aromatic notes



Evaluation of
the texture in mouth

Lumpy, sticky, mouth-coating...



Evaluation of the visual aspect



COLOR

Yellow, green, blue, red, pink, purple are all colors, but it's important to know that color isn't limited to the tint. A color is above all a visual perception of light reflected on a surface.

A color has several components:

- **the tint** (a so-called "pure" or defined color, such as red)
- **intensity** (from light to dark)
- **brightness** (from dull to shiny)
- **purity** (a "raw" color or one made up of several colors: a brick red contains orange, a raspberry red contains violet).

In the case of fruit purees that are out of phase, colors may change before and after mixing, when the pulp and the liquid are homogenized.

AIRY

Air bubbles from processing can appear on the surface of fruit purees. These may vary in quantity and size.

E.g.: *the surface of a freshly-squeezed fruit smoothie*

GRAINY

The surface of a fruit puree may appear to be either smooth or irregular. When the surface is irregular, it is said to be grainy.

E.g.: *a creamy dessert is smooth, while crystallized honey feels grainy*

OILY

When a puree contains fats, they can clump together on the surface, sometimes forming an iridescent pattern. Mixing can remove this effect.

E.g.: *gasolin stain, sauce from an oven dish cooked in oil*

VISCOSITY

The viscosity of a product is measured by how quickly the puree flows from a spoon: the more liquid it is, the faster it flows; the thicker it is, the slower it flows.

E.g.: *water is liquid, while chestnut cream is thick*

SYRUPY

Describes a thick, concentrated liquid that pours more slowly due to a high sugar content.

E.g.: *maple syrup*

HETEROGENEITY

Heterogeneity describes the presence of different textures within the same product, whereas homogeneity describes a consistent texture throughout.

E.g.: *an unmixed fruit compote*

PULPY

When particles remain suspended in a liquid product (juice) after mixing, the product is said to be pulpy. The amount and size of particles may vary.

E.g.: *orange juice with pulp*

Did you know?

For citrus fruits, the pulp often comes from the “cells” of the fruit, small hermetically sealed pouches that contain the juice. When the fruit is processed, these pouches break down into particles of various sizes that can be filtered or not, thus defining how pulpy the product is.



EVALUATION OF THE TASTE

To assess the taste of a fruit puree when tasting it, the first question to ask is: is the fruit in question recognisable? Personal experience and taste memory play a key role here. We can also consider the overall intensity of the taste, its complexity and its persistence on the palate.

THE 4 BASIC TASTES OF FRUIT PUREES

Sweet



Bitter




Sour





Salty




Generally speaking, the enjoyment of a fruit puree comes from the harmonious balance of sweet, sour, and bitter. Interestingly, you might even detect occasional salty notes!

 **Sweetness** brings a pleasant, gentle sensation. When present in moderation, it enhances the fruit's aromas. But if overly dominant, it can overwhelm and mask these nuances. Human beings are naturally drawn to sweetness, as it is a component of breast milk.

 **Bitter**, in contrast, often triggers an instinctive aversion, rooted in our evolutionary association of bitterness with poisonous plants. However, in modern times, a touch of bitterness is expected and appreciated in certain fruits. People also vary widely in their sensitivity to bitterness.

 **Sourness** is a fundamental taste linked to liveliness and freshness. Depending on its strength, sourness can even cause a reflex reaction that makes your cheeks contract.

 **Salty** and sweet foods are frequently seen as opposites. Saltiness is the taste found in seawater, tears and preserved foods such as cheese and charcuterie. However, excessive saltiness can leave you feeling thirsty.

AROMATIC NOTES

Aromas are molecules released in the mouth and sensed through the retronasal pathway. They contribute to the product's aromatic richness and complexity, allowing us to identify and describe all its characteristics.

This is the most subtle aspect of evaluating a product.

Sensations detected by both the nose and mouth complement each other, refining the overall aromatic experience.



TRIGEMINAL SENSATIONS

Although they influence the overall perception of flavor, trigeminal sensations are neither basic tastes nor aromas.

They result from the activation of the trigeminal nerve, which serves the mouth, nose, and eyes, detecting changes in temperature, pain, and chemical reactions, then relaying this information to the brain.

The trigeminal sensations that may be present in a fruit puree include:

ASTRINGENT

This is a drying sensation in the mouth caused by the contraction of mucous membranes, as seen with wine tannins. When combined with roughness, it is described as pungent (like an unripe banana), or as tart if accompanied by acidity (such as with sour milk).

METALLIC

A metallic sensation is produced by specific molecules (aluminium, zinc, iron, etc.), evoking the experience of touching your tongue to a can, a teaspoon, or the taste of blood, which is especially rich in iron.

TINGLY

This describes a sensation akin to tingling or a pins-and-needles feeling. Depending on its strength, it can lightly tickle the palate, as experienced at the beginning of fermentation, or even become painful, as experienced with strong mustard.



DESCRIBING AROMATIC NOTES

Aromatic descriptors help tasters to clearly distinguish and accurately identify the taste characteristics of a product - in this case, fruit puree.

Since the perception of aroma, basic taste, or smell is subjective and varies based on individual sensitivity and experience, providing clear definitions for these sensations minimizes differences in interpretation.

Based on the work of a panel of sensory experts, the aromatic notes used to describe fruit purees were determined and grouped by family, within the “wheel of aromas”.



THE FUNNEL METHOD

When tasting a product, certain aromatic notes are often immediately apparent, making them easy to identify and name specifically.

For more ambiguous sensations, identification can occur in stages.

First, the taster determines the broader family the note belongs to – such as “floral.” With this narrowed focus, the taster then selects the specific note closest to their perception; for example, identifying a “rose” note within the floral family.

FRUITY NOTES

In fruit purees, it is common to detect aromatic notes of fruits not present in the actual blend. For instance, a white peach puree might evoke the aroma of Mirabelle plum.

If pinpointing the exact note proves challenging, the taster can use the funnel method: first, recognize the broad family, then try to identify the particular fruit.

White fruits

apple,
pear,
quince...



Yellow fruits

peach, white nectarine,
yellow nectarine,
apricot,
plum...



Red berries

raspberry,
strawberry,
cherry,
redcurrant...



Black fruits

blackberry,
blueberry,
blackcurrant...



Tropical fruits

pineapple,
mango,
passion fruit,
litchi...



Citrous fruits

lemon, lime, orange,
grapefruit,
mandarin,
bergamot...



Nuts

almond,
walnut,
hazelnut,
pistachio...



Dried fruits

raisin,
dried fig,
prune,
dried apricot...

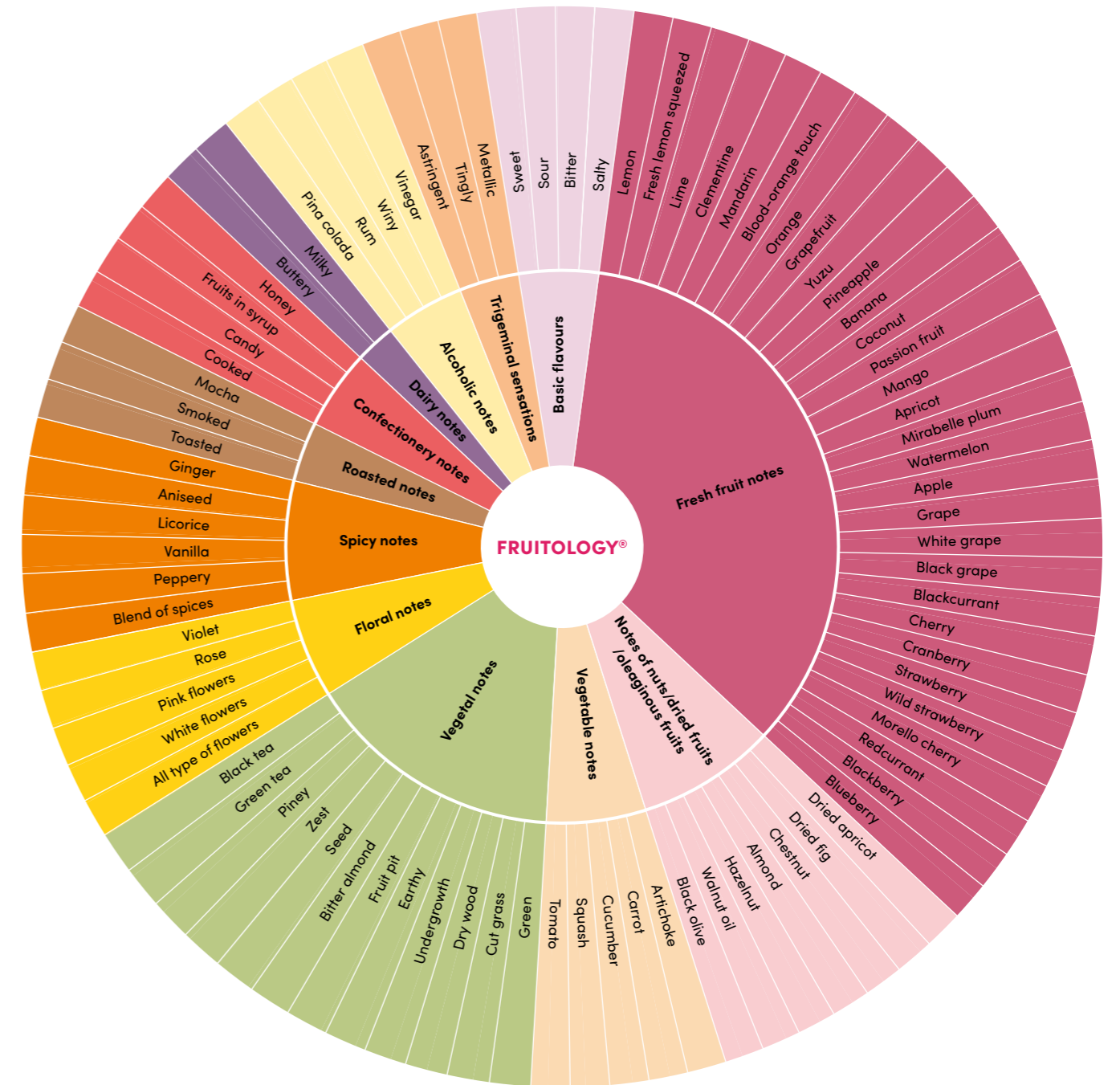


THE AROMA WHEEL

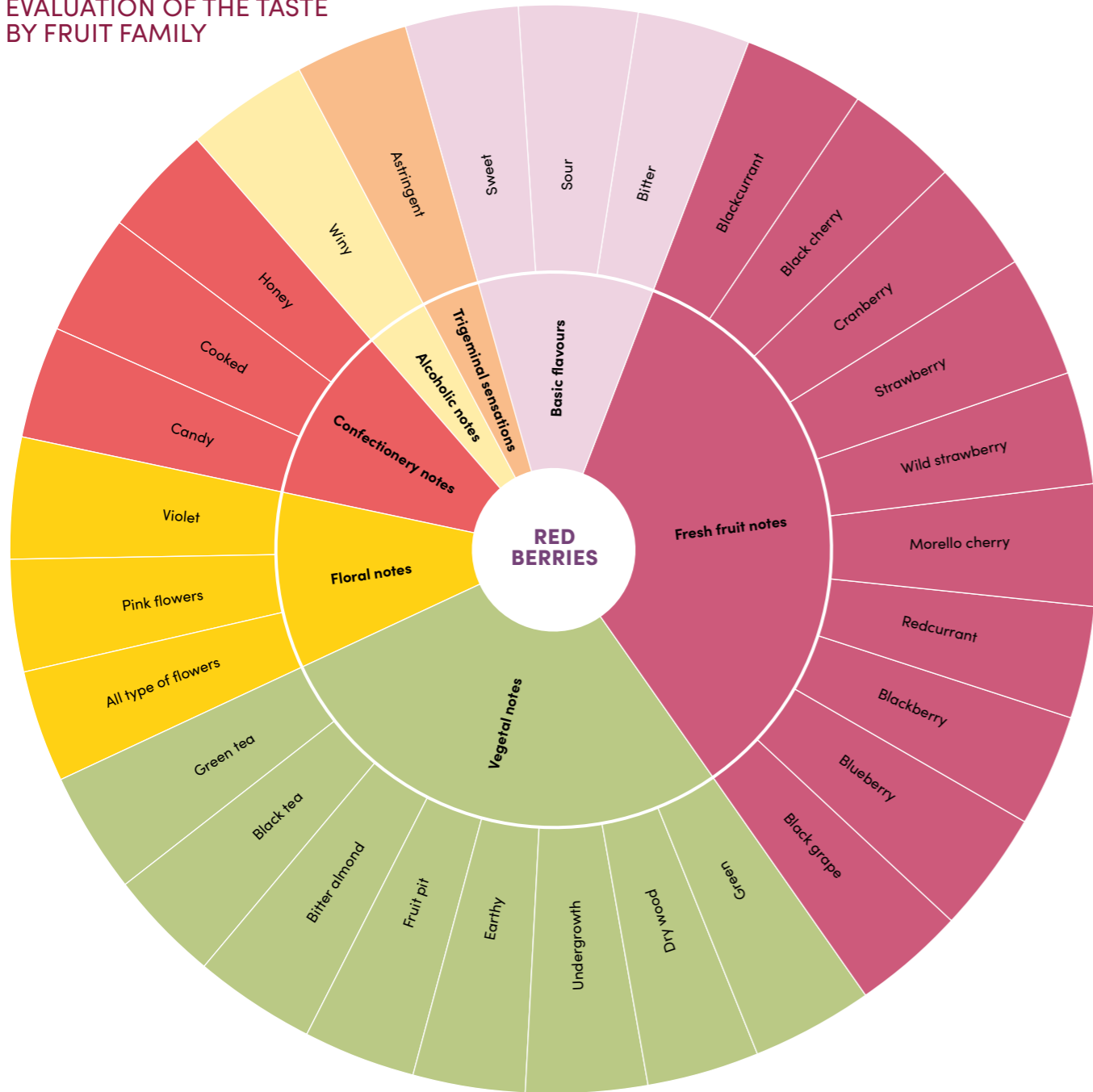
The **aroma wheel** compiles all identifiable descriptors found in the realm of fruit purees, categorizing them by their respective aroma families. It serves as an essential tool for the taster.

Recognising certain notes such as rose or lemon is straightforward due to their universal familiarity and cultural standardization. They do not require any additional clarification.

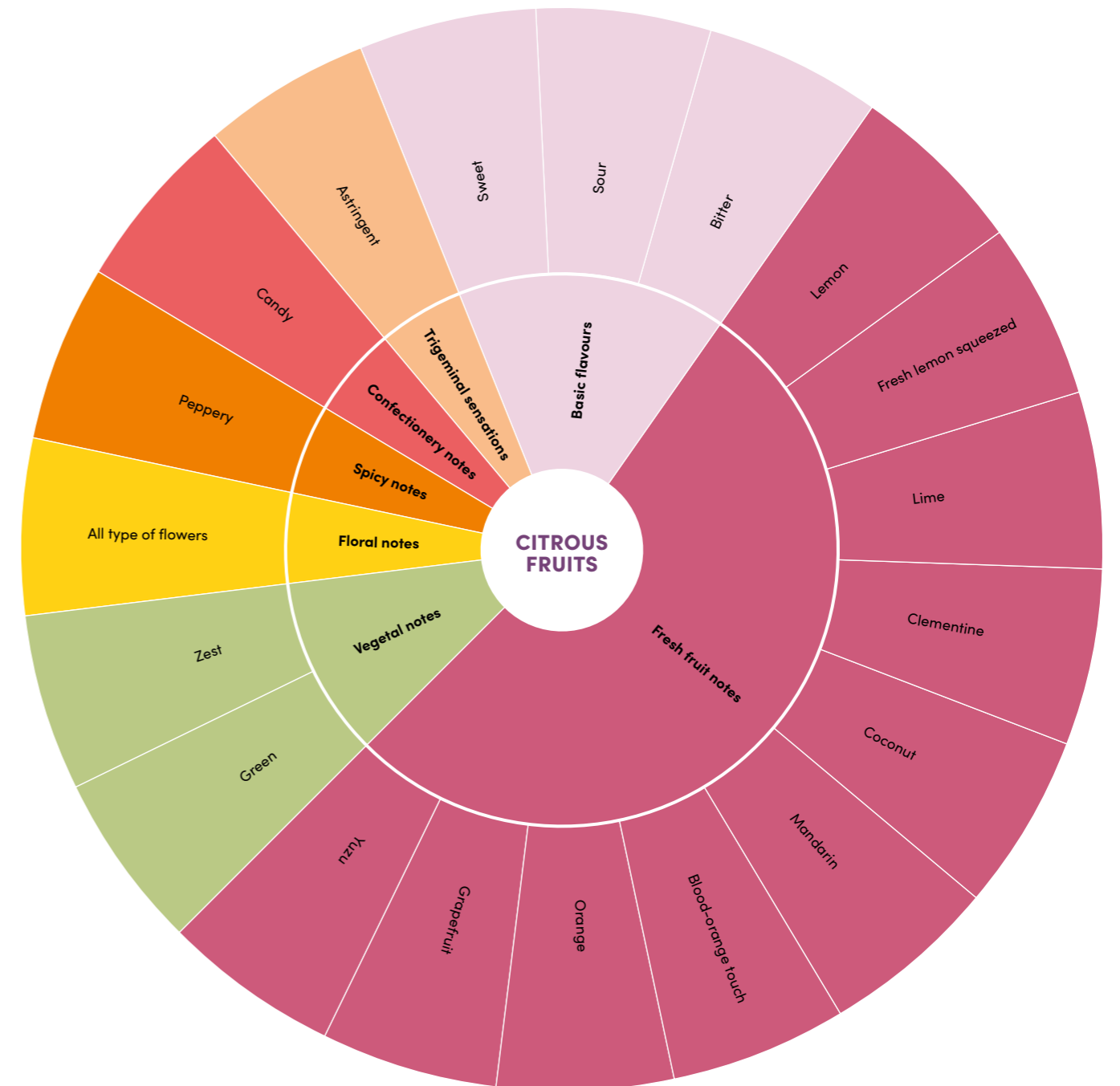
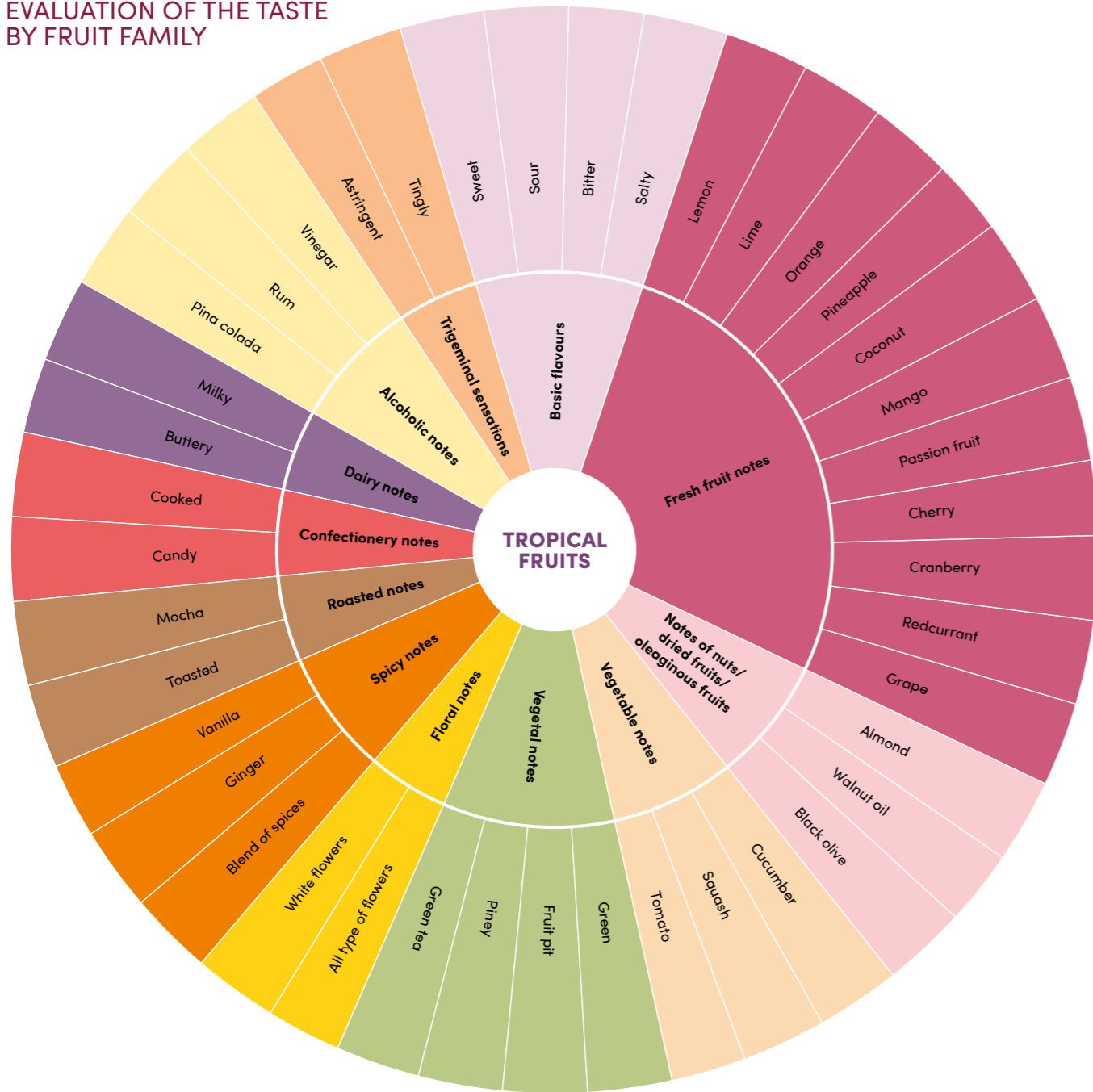
However, other notes can be more challenging to pinpoint, as their descriptors may be open to interpretation and influenced by individual perception. As a result, the conceptual boundaries of these aromas become broader and less defined. For example, what exactly is implied when we say “piney” or “fruit pit”? Cultural differences may shape understanding, leading to differences in interpretation.



EVALUATION OF THE TASTE
BY FRUIT FAMILY



EVALUATION OF THE TASTE
BY FRUIT FAMILY



DEFINITION OF AROMATIC NOTES

The **glossary** of aromatic notes is the second fundamental tool for tasting fruit puree.

B

BLOOD ORANGE TOUCH

Directly refers to the taste of blood orange, as opposed to blonde orange. A mixture of acidity enhanced by a touch of sweetness. It also calls to mind wine and orange-based drinks like sangria.

BUTTERY

This note conveys a sensation of richness and smoothness on the palate, reminiscent of freshly baked buttery cookies or delicate Viennese pastries.

C

CANDY

Characterized by a sweet and tangy flavor, this note captures the slightly artificial, fruity taste often found in English sweets or confections.

COOKED

More indulgent than fresh fruit, cooked notes evoke the sensation of **stewed** or **jammy** fruit, especially when sweetness is intensified and fruity aromas become more concentrated.

F

FLORAL

A floral note encompasses the broad spectrum of flower scents: white flowers like jasmine and lily of the valley often impart a fresh, delicate perfume, while pink flowers such as rose, violet, and

geranium offer a softer, sweeter fragrance. Experiencing this note is akin to inhaling the scent of a blooming bouquet or breathing in the fragrant air of a flower-filled meadow in springtime.

FRUIT PIT

Evokes **the almond-like flavor found in fruit stones** or certain **seeds**, noticeable in apricot jam cooked with kernels or when tasting a lychee pit. It also recalls the distinct **bitterness of almond extract** used in baking.

G

GREEN

Manifests either as a moist sensation, like **freshly cut grass** and lush vegetation, or as a drier note reminiscent of **tea leaves**.

M

MILKY

This note is soft and subtly creamy, reminiscent of fresh milk or yoghurt made solely from unfermented, unmaturing dairy products.

MOCHA

Suggests a harmonious blend of cocoa and coffee, bringing to mind the warmth of freshly roasted coffee beans mingled with pure cocoa, often with a gentle hint of acidity.



P

PINEY

Resembles the scent of pine cones or conifer sap, as experienced during a walk through a pine forest.

S

SMOKED

This note refers to aromas derived from wood-smoked foods. It can range from subtle, as in lightly smoked ham, to pronounced, like the lingering scent on clothes after sitting by a wood-burning fireplace for hours.

SPICY

The perception of a spicy note emerges from the recognition of a distinct spice, such as chilli pepper, ginger, cinnamon, or a blend of spices.

T

TOASTED

Reminiscent of the smell of toasted bread, when it's just popped out of the toaster.

V

VINEGAR

The combination of fruity notes and powerful acidity.



EVALUATION OF THE TASTE
DEFINITION OF AROMATIC NOTES

W

WINY

Evokes the distinct character of red wine, featuring pronounced tannins. It also recalls the blend of fermented grapes, alcohol, cork, and cask wood aromas.

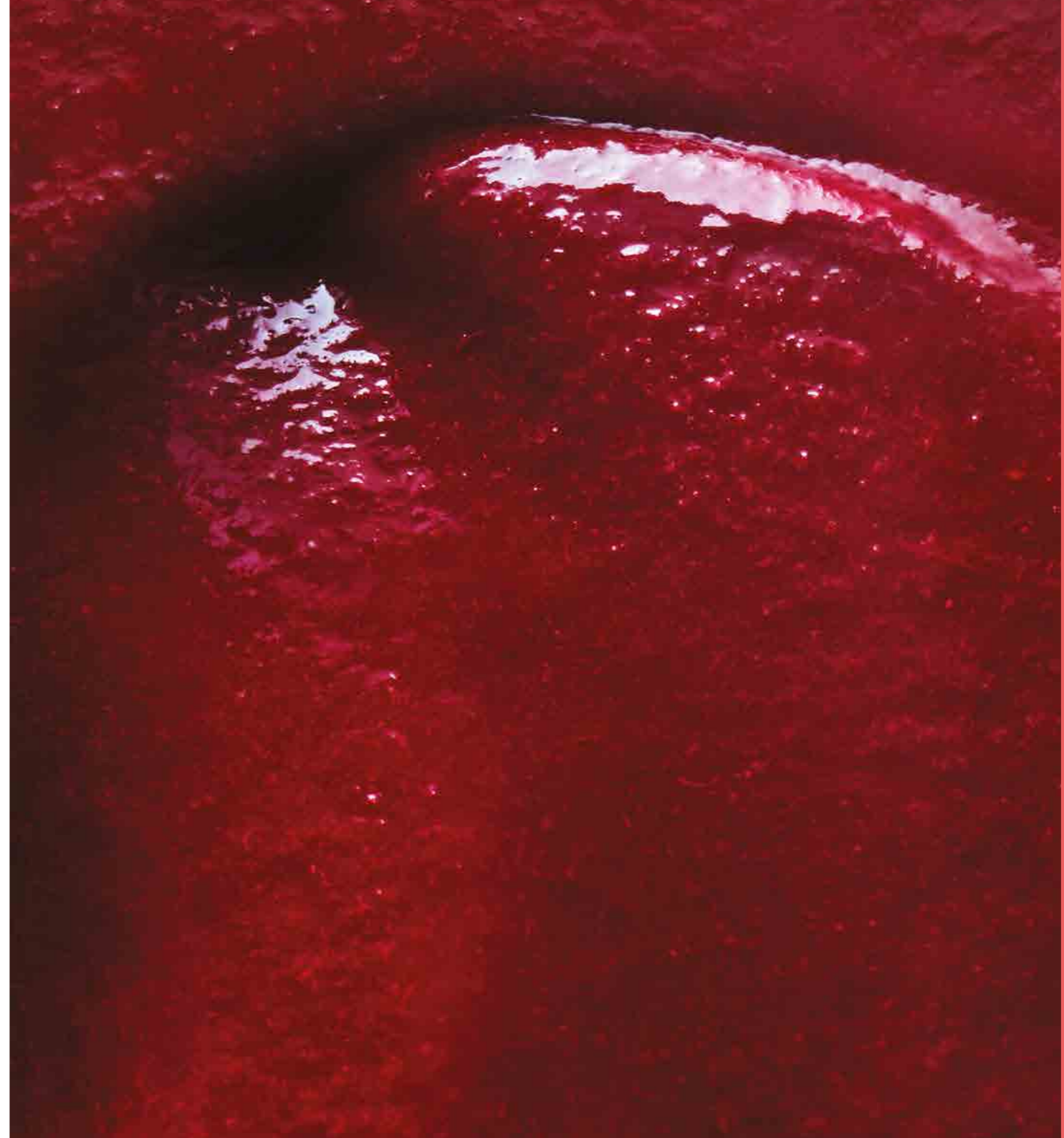
WOODY

A nuanced aromatic family; woody notes may be “**dry wood**”, evoking the scent of raw wood, tree bark, or a sauna; “**undergrowth**”, recalling humidity and the earthy aroma of moss or humus; or “**earthy**”, reminiscent of fresh soil or raw beetroot.

Z

ZEST

Typical of citrus fruits, this note comes from **essential oils** mainly in the peel. Often accompanied by bitterness, as the peel lacks the sweetness of the fruit’s flesh.



Evaluation of
the texture in mouth



Depending on the fruit and its transformation, the mouthfeel varies: some flavors feature perceptible particles between tongue and palate, others highlight fat content.

Particles in products may differ in number and hardness upon tasting. The product can then be described in different ways.

The sensation of greater or lesser heterogeneity may or may not match the first impression from the visual aspect.

LUMPY

A lumpy texture is defined by the presence of soft particles - small clusters that are easily crushed between the tongue and the palate.

E.g.: *cottage cheese*

FLOURY

A floury texture gives a dry, powdery, and slightly grainy mouthfeel, reminiscent of flour or starch.

E.g.: *oat flakes, pulses*

GRAINY

A grainy texture involves sensing solid particles in the mouth.

E.g.: *pear seeds, raspberry achenes, blackcurrant skin, etc.*

FIBROUS

A fibrous texture creates a sensation of fibres or filaments, noticeable when rubbing the tongue against the palate or teeth.

E.g.: *rhubarb*

FROTHY

A lively sensation caused by tiny air bubbles popping when the tongue presses against the palate.

E.g.: *chocolate mousse*

STICKY

Gives the feeling of the tongue adhering to the palate.

E.g.: *soft caramel*

GREASY

A fatty quality comes from lipids in products, creating an oily or greasy feel when tasted.

E.g.: *oil*

MOUTH COATING

A covering quality leaving a rich, lingering sensation in the mouth even after swallowing.

E.g.: *sour cream*



DESCRIBING A SENSORY

PROFILE



SENSORY PROFILE OF MANGO PUREE

To better understand Fruitology® in practice, by relying on the main principles of sensory analysis and the reality of aromatic descriptors, here is the example of the sensory profile of our frozen mango puree, which results from the blend of 2 Indian varieties: **Alphonso and Kesar**.

Each fruit's variety, terroir, climate, and cultivation conditions shape its unique color, complexity, and aromatic strength.

Creating a fruit puree involves studying various varieties, selecting and blending them to achieve the ideal sensory profile.

This process requires expertise in combining subtle aromatic notes.

MANGO

ASPECT

Orange color



Viscosity



TEXTURE IN MOUTH

Mouth coating



TASTE

Sweet



Green



Spicy



Piney



Buttery



Cooked



Sour



Visual aspect and texture: Alphonso gives a puree that is yellow in color and thicker than Kesar which is more liquid and more orange (Kesar means saffron in Hindi). The combination of the two varieties produces a bright yellow/orange puree, not very thick. In the mouth, its texture is soft, enveloping the palate.

Aroma: Alphonso is known for its sweet and sour balance. Kesar is sweeter and naturally highlights this flavor. It also brings interesting spicy notes.

N.B. : This example represents the distinctive aromatic notes found in Les vergers Boiron frozen mango puree. For more details on the full sensory profiles of our range based on in-house research, visit the my-vb.com website.



GOOD TASTING PRACTICES

Prior to testing

For optimal results, tasters should avoid consuming items that cause lingering after tastes during the **30 minutes** leading up to a tasting session. This helps preserve the sensitivity of the olfactory and taste organs.

It is therefore best to refrain from consuming:



During tasting

It is essential to follow a specific tasting order based on increasing intensity. This approach minimizes the effect of previously sampled products and helps maintain the accuracy of subsequent perceptions.

An infographic with a light pink background. At the top, there are three horizontal bars representing the tasting order. The first bar is pink and labeled 'SWEET' with a sugar packet icon. The second bar is brown and labeled 'BITTER' with a coffee cup icon. The third bar is yellow and labeled 'SOUR' with a lemon slice icon. To the left of the bars is a minus sign icon, and to the right is a plus sign icon. Below the bars, there is a text box and a sequence of fruit icons: watermelon, strawberry, orange, and lemon, each with a right-pointing arrow between them. At the bottom, there is a warning icon (exclamation mark in a circle) followed by text.

For instance, always taste unsweetened products before sweetened ones to ensure the aromatic nuances of the first are not overshadowed by the sugar in the second. Similarly, highly sour or bitter items, like citrus fruits or passion fruit, should be sampled at the end of the session.

Between samples, it is advisable to rinse the mouth with still, neutral water to prevent lingering flavors and reduce sensory fatigue, which can diminish tasting accuracy.

The white book of Fruitology®

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