



Mango Agribusiness Research Program

Session 7: An Introduction to Sensory Evaluation

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Information
Markets
Biosecurity
Quality





1. Understanding the basics of sensory evaluation

The human senses



Sensory evaluation



Product

**Sensory
interaction**



Human



The human senses



- ▶ Visual
- ▶ Sound
- ▶ Aroma/odour
- ▶ Taste
- ▶ Texture



Visual

- ▶ Overall impression and acceptability
- ▶ Indicator of quality, maturity, degree of flavour
- ▶ Effect on flavour - anticipation





Sound

- ▶ Noise produced during mastication
- ▶ May have positive or negative impact
- ▶ Consumer use sound as an indicator of quality – eg. A crunchy apple





Taste

- ▶ Five basic tastes
 - ▶ Sweet
 - ▶ Salt
 - ▶ Sour
 - ▶ Bitter
 - ▶ Umami (savoury)
- ▶ Perception is affected by a number of conditions – eg. Personal phenotype and illnesses



Taste exercise

- ▶ Five basic tastes

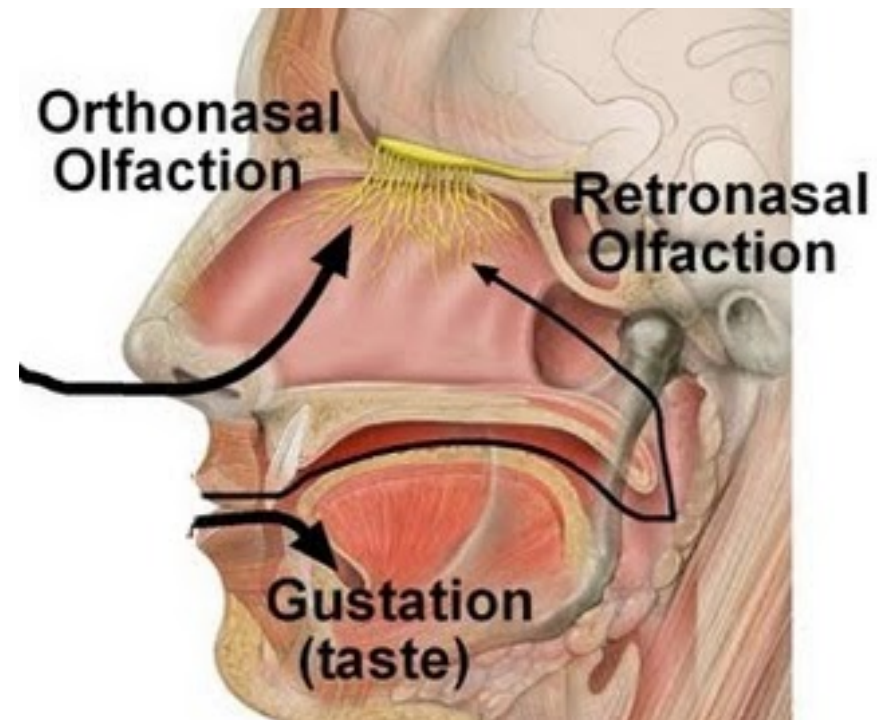


Aroma/odour

- ▶ Detected via 2 pathways
 - ▶ The nose – orthonasal
 - ▶ The mouth – retronasal
- ▶ Thresholds of detection vary from person to person
 - ▶ Some people have specific anosmias (a lack of ability to smell)

Aroma exercise

- ▶ Mint





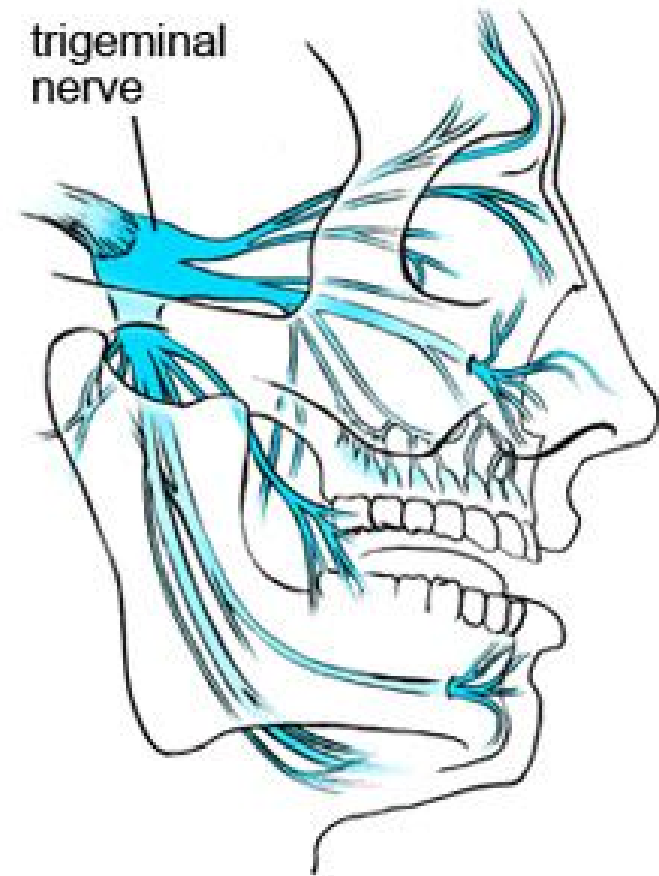
Texture

- ▶ Rheological and structural attributes
- ▶ Perceived through sight, touch and sound
- ▶ Texture assessment is made as food is moved around the mouth
- ▶ It is important to consumers as an indicator of quality
- ▶ Astringency is a common texture attribute



Trigeminal nerve

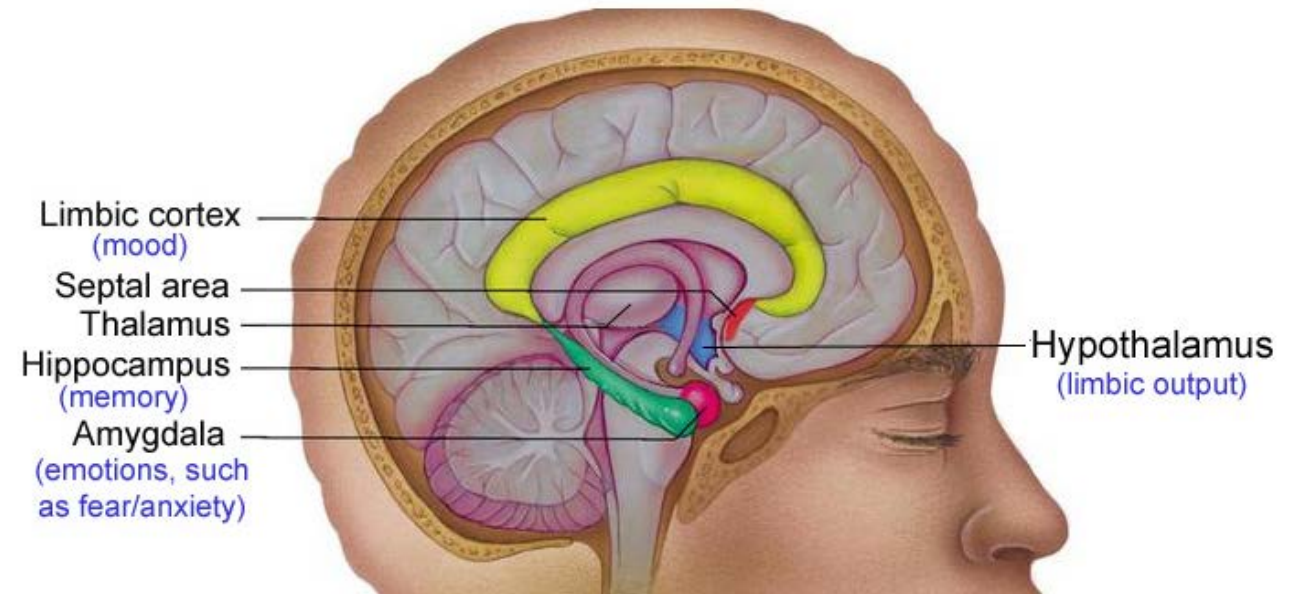
- ▶ Senses detected through the trigeminal nerve
 - ▶ Pungency of ginger
 - ▶ Heat of chilli
 - ▶ Cooling of menthol
 - ▶ Temperature of a product





Limbic system

- ▶ Part of our brain structure, includes the olfactory bulb
- ▶ Supports many functions including smell, emotion, behaviour, motivation and long term memories
- ▶ Humans have a strong emotional connection to food





2. Understanding the basics of sensory evaluation

Sensory test types



Test types – an overview

▶ Sensory evaluation

▶ **Difference testing**

- ▶ Using standard test types to determine a difference
- ▶ e.g. triangle test, ranking test, paired comparison....

▶ **Descriptive profiling**

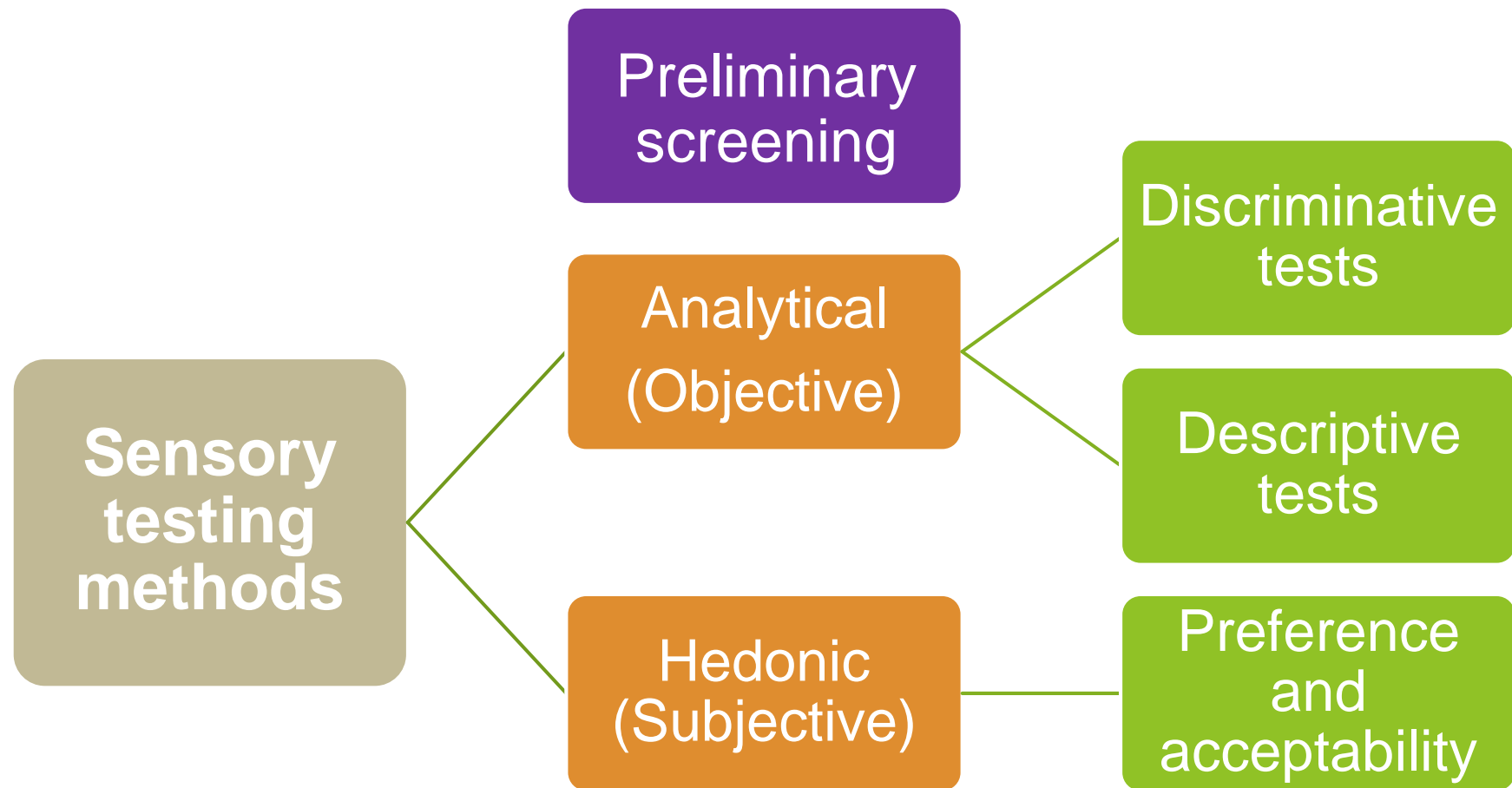
- ▶ Profiling samples qualitatively and quantitatively

▶ Consumer evaluation

- ▶ Acceptability and preference testing
- ▶ Focus groups
- ▶ Behaviour / Psychology



Test types – an overview





3. Understanding the basics of sensory evaluation

The testing environment and sample preparation



Sensory principles and practices

Sensory evaluation;

“A scientific method to evoke, measure, analyse and interpret those responses to products as perceived through the senses of sight, smell, touch, taste and hearing”

(Stone and Sidel, 1993)

Things to consider

- ▶ People / panellists
- ▶ Designing the experiment
- ▶ Samples
- ▶ Test environment
- ▶ Logistics





People / panellists

- ▶ Appropriate for your test type
- ▶ Age / gender / ethnic group
- ▶ Likes / dislikes
- ▶ Allergies and intolerances
- ▶ Eating / smoking before testing
- ▶ Perfume / aftershave
- ▶ Motivation





Samples – preparation considerations

- ▶ Hygiene and safety
- ▶ How much sample do you need per person per test
- ▶ Uniform temperature, cooking methods
- ▶ Representative of product as a whole
- ▶ Representative as a commercial product
- ▶ How long before testing can you prepare samples?



Samples – serving considerations

- ▶ Adequate size / volume but not excessive
 - ▶ Usually 10 – 50 g but depends on sample type
- ▶ How do you ensure uniform temperature
- ▶ Plates / serving vessels / trays (white / colourless)
- ▶ Number of samples to serve at a time (fatigue)
- ▶ Pace presentation of samples
 - ▶ Consider a delay between samples to avoid fatigue



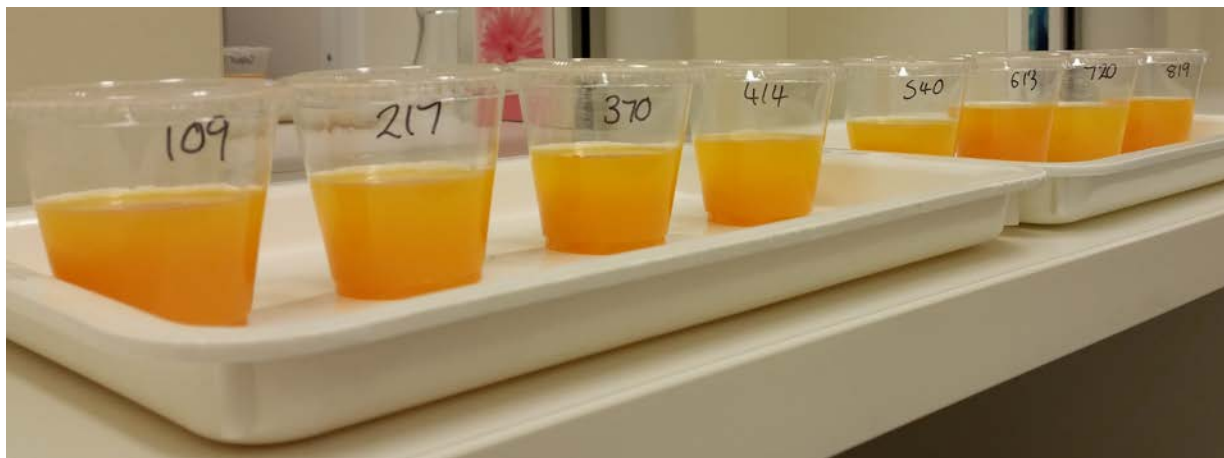
Samples – palate cleansers

- ▶ Some common options
 - ▶ Filtered water
 - ▶ Sparkling water
 - ▶ Plain water crackers / dry bread
 - ▶ Green apple slices
- ▶ Think about your product and what would help to cleanse the palate





Samples - examples





Testing environment – when a controlled environment is applicable

- ▶ To provide an area which is constant and controllable and allows panellists to make their assessments with minimal distraction.
 - ▶ Uniform lighting
 - ▶ Constant and comfortable temperature
 - ▶ Odour free
- ▶ Sensory booths can be permanent or temporary
- ▶ Spittoons, tissues, napkins etc.
- ▶ Meeting rooms for discussion and individual tastings if booths not available

Refer to International standard (ISO 8589 - 1988)

Testing environment – in the field

- ▶ Still important to practice good sensory methods
- ▶ Clean environment
- ▶ Sample preparation standardised
- ▶ Include multiple panellists – team, co-workers, related and/or unrelated to the product





4. Putting it into practice

Assessment across the mango supply chain

- ▶ Objective measurements - **the retail industry**
 - ▶ Appearance
 - ▶ Aroma
 - ▶ Flavour
 - ▶ Mouthfeel
- ▶ Subjective measurements – **the end consumer**
 - ▶ Overall acceptability



Objective measurements

▶ Test type & aim

- ▶ **Profiling** – to determine what sensory attributes are present and how they change over time; appearance, aroma, flavour and mouthfeel.

▶ Panellists required

- ▶ Up to 10 individual consumers

▶ Testing conditions

- ▶ Central meeting location

▶ Sample preparation

- ▶ Identical preparation for all samples, placed in individually blind coded pots/plates.

▶ Methodology

- ▶ Assess each product and identify the intensity of the aroma and flavour as well as individual sensory attributes present.





Product profiling

Name..... Date

Instructions:

Taste the samples provided.

1. score them for aroma and flavour intensity and
2. identify the aroma, flavour and mouthfeel attributes present

Aroma/flavour intensity – rate the intensity on the scale below

1	Low	Below level of acceptability
2	Low-medium	
3	Medium	At the level of acceptability
4	Medium-high	
5	High	High level of acceptability

Sensory attributes – identify the sensory attributes present and note any others detected.

<u>Aroma</u>	<u>Flavour</u>	<u>Mouthfeel</u>
Fresh	Fresh	Firm
Tropical	Tropical	Soft
Citrus	Citrus	Juicy
Musty/stale	Sour	Dry
	Sweet	Stringy
	Bitter	Smooth

Any other attribute(s)



Objective measurements

▶ Test type & aim

- ▶ **Triangle Test** – to determine whether a significant difference exists between 2 samples (eg. Control vs. test sample)

▶ Panellists required

- ▶ >10 trained sensory assessors

▶ Testing conditions

- ▶ Isolated sensory booths/individual assessment area

▶ Sample preparation

- ▶ Identical preparation for both samples, placed in individually blind coded pots/plates. Samples to be randomised.

▶ Assessment of outcome

- ▶ Refer to statistical table defining critical number of correct responses in a Triangle Test.



Triangle Test

Name..... Date

Instructions:

Taste the samples on the tray from left to right.

Two samples are identical; one is different.

Select the odd/different sample and indicate by placing an X next to the corresponding code.

Samples on tray	Indicate odd sample	Remarks
.....
.....
.....

If you wish to comments on the reasons for your choice or if you wish to comment on the product characteristics, you may do so under 'Remarks'.



Objective measurements

▶ Test type & aim

- ▶ **Difference-from-control test** – to determine whether a difference exists between 1 or more samples and a control and estimate the size of any such differences.

▶ Panellists required

- ▶ 20-50 assessors

▶ Testing conditions

- ▶ Isolated sensory booths/individual assessment area

▶ Sample preparation

- ▶ Identical preparation for all samples. A labelled control sample must be presented with each test sample, placed in individually blind coded pots/plates.

▶ Assessment of outcome

- ▶ Analysis of variance (ANOVA) appropriate for randomized (complete) block design; the assessors are the “blocks” in the design.



Subjective assessments

- ▶ **Test type & aim**
 - ▶ **Acceptance testing** – to determine overall liking of a product.
- ▶ **Panellists required**
 - ▶ Consumers of the product. With the aim of having a cross section of age and gender.
- ▶ **Testing conditions**
 - ▶ Suitable testing environment; meeting room, retail store, market place etc.
- ▶ **Sample preparation**
 - ▶ Identical preparation for all samples. Blind coding required to prevent consumer bias.
- ▶ **Assessment of outcome**
 - ▶ Mean score
 - ▶ Analysis of variance (ANOVA) when >1 sample assessed for comparison of liking





Acceptance testing

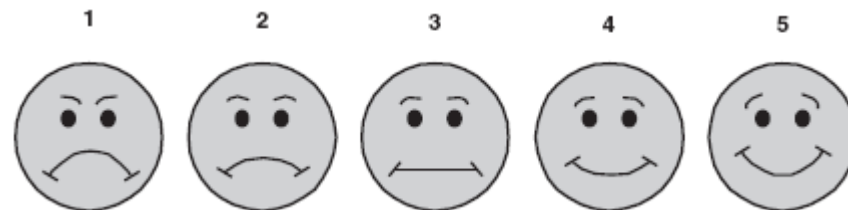
Name..... Date

Instructions:

Please smell and taste each of the products and answer the questions provided.

How much do you like the sample 123 overall? (Scale types are optional).

- 1 Dislike very much
 - 2 Dislike slightly
 - 3 Neither like nor dislike
 - 4 Like slightly
 - 5 Like very much
- OR



(question can be repeated for aroma, flavour, texture and overall liking)

Remarks

.....

If you wish to comment on any particular likes or dislikes of this sample you may do so under 'Remarks'.



5. Helpful information

▶ **Text books**

▶ **“Sensory Evaluation Techniques, Fourth Edition”**

- ▶ Meilguard, Civille & Carr
- ▶ CRC Press 2007

▶ **“Sensory Evaluation of Food”**

- ▶ Lawless & Heymann
- ▶ International Thompson Publishing

▶ **ISO & ASTM standards**

- ▶ **ISO 8586** Sensory Analysis – General guidelines for the selection, training and monitoring of selected assessors and sensory assessors
- ▶ **ASTM E2164-08** Standard test method for directional difference test
- ▶ **ISO 4120** Sensory Analysis – Methodology – Triangle test