Sensory Analysis of Table Olives

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The purpose of this method is to perform the sensory classification of table olives according to the intensity of any defects as determined by a group of 8–10 tasters who have undergone selection, training and skill building and who make up a panel.

METHOD
SENSORY ANALYSIS OF TABLE OLIVES

1. Purpose

The purpose of this method is to perform the sensory classification of table olives. The method establishes the necessary criteria and procedure for the sensory analysis of the odour, taste and texture of table olives and sets out the systematics for their commercial classification. It is applicable solely to the fruit of the cultivated olive tree (*Olea europaea* L.) which has been suitably treated or processed and which has been prepared for trade or for final consumption as table olives in accordance with the trade standard applying to table olives referenced COI/OT/NC No 1 of December 2004.
Final products of fermentation

- Pyruvic Acid
  - Streptococcus, Lactobacillus, Bacillus
  - Saccharomyces (yeast)
  - Propionibacterium
  - Clostridium
  - Escherichia, Salmonella
  - Enterobacter

<table>
<thead>
<tr>
<th>Organism</th>
<th>Fermentation end-product(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus,</td>
<td>Lactic acid</td>
</tr>
<tr>
<td>Lactobacillus,</td>
<td></td>
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<tr>
<td>Bacillus</td>
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<tr>
<td>Saccharomyces (yeast)</td>
<td>Ethanol and CO₂</td>
</tr>
<tr>
<td>Propionibacterium</td>
<td>Propionic acid, acetic acid, CO₂, and H₂</td>
</tr>
<tr>
<td>Clostridium</td>
<td>Butyric acid, butanol, acetone, isopropyl</td>
</tr>
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<td>alcohol, CO₂, and CO₂</td>
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<tr>
<td>Escherichia,</td>
<td>Ethanol, lactic acid, succinic acid, acetic</td>
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<tr>
<td>Salmonella</td>
<td>acid, CO₂, and H₂</td>
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<tr>
<td>Enterobacter</td>
<td>Ethanol, lactic acid, formic acid, butanediol,</td>
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<td>acetoin, CO₂, and H₂</td>
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</tbody>
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Abnormal fermentation

Olfactory sensation perceived directly or retronasally, characteristic of abnormal fermentations. Such fermentation may be:

- Putrid: sensation reminiscent of the odour of decomposing organic matter.
- Butyric: sensation reminiscent of butter or cheese.
- Zapateria: sensation caused by the combination of volatile fatty acids reminiscent of rotten leather.

Abnormal fermentations in table-olive processing: microbial origin and sensory evaluation

Barbara Lanza*
## Negative attributes - Others

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Musty</td>
<td>Olfactory-gustatory sensation perceived directly or retronasally, characteristic of olives attacked by mould.</td>
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<tr>
<td>Rancid</td>
<td>Olfactory sensation perceived directly or retronasally, characteristic of olives that have undergone a process of rancidity.</td>
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<tr>
<td>Cooking effect</td>
<td>Olfactory sensation perceived directly or retronasally, characteristic of olives that have undergone excessive heating in terms of temperature and/or duration during pasteurisation or sterilisation.</td>
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<tr>
<td>Soapy</td>
<td>Olfactory–gustatory sensation reminiscent of soap.</td>
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<tr>
<td>Metallic</td>
<td>Olfactory–gustatory sensation reminiscent of metals.</td>
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<tr>
<td>Earthy</td>
<td>Olfactory-gustatory sensation reminiscent of soil or dust.</td>
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<tr>
<td>Winey–vinegary</td>
<td>Olfactory–gustatory sensation reminiscent of wine or vinegar.</td>
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</tbody>
</table>
Descriptive gustatory

<table>
<thead>
<tr>
<th>Taste</th>
<th>Description</th>
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<tbody>
<tr>
<td>Salty</td>
<td>Basic taste produced by aqueous solutions of substances such as sodium chloride.</td>
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<tr>
<td>Bitter</td>
<td>Basic taste produced by dilute aqueous solutions of substances such as quinine or caffeine.</td>
</tr>
<tr>
<td>Acid</td>
<td>Basic taste produced by dilute aqueous solutions of most acid substances, such as tartaric acid, citric acid.</td>
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</tbody>
</table>
Kinaesthetic sensations

**Hardness**
Mechanical textural attribute relating to the force required to attain the deformation of a product or for an object to penetrate it (knife, teeth, ...). It is evaluated by compressing the product between the teeth (solids) or between the tongue and palate (semi-solids).

**Fibrousness**
Geometric textural attribute relating to the perception of the shape and the orientation of particles in a product. Fibrousness refers to the elongated conformation of the particles, oriented in the same direction. It is evaluated by perceiving the fibres between the tongue and palate when chewing the olive.

**Crunchiness:**
Attribute relating to the noise produced by friction or fracture between two surfaces. It is related to the force required to fracture a product with the teeth and is determined by compressing the fruit between the molars.
Facilities and equipment

Facilities and equipment

Equipment

- Standard glasses containing the samples, code numbered and covered with a watch-glass.

- Plastic or metal cocktail sticks, two-pronged fork, spoon or tongs.

- Profile sheet on hard or soft copy. The line for each attribute must measure exactly 10 cm.

- Pen.

- Glass of water at ambient temperature.

- Spitoons.

- Paper napkins.
Sensory laboratory

- Sampling preparation area
- Reception area
- Training/Briefing room
- Technical personnel office
- Sensory booths

- The sampling preparation area should be in a different place to avoid the transfer of noise and smells that could distract the attention of the tasters
- The tasters should not be able to see the samples and/or their preparation
- Avoid the use of pictures on the walls, ornamental plants that could affect the attention of tasters and introduce smells in the area.
Storage and preparation of olive samples

• Prior to sensory analysis, the test samples shall be properly stored in conditions that do not cause their alteration.

• They shall be kept refrigerated at a temperature between 8 and 12°C and

• They shall be taken out sufficiently in advance to allow them to come to the temperature of the test room when they are to be tasted.
Based on their content in table olives containers can be classified as:

- Large containers (≥1.000 kg)
- Small containers (≥10 kg <1.000 kg)
- Packages (<10 kg)

The sample of table olives intended for sensory analysis, whether loose or packed, shall be representative of homogenous batches in accordance with the sampling rules. The sample shall weigh not less than 1 kg.
The sampler used for taking samples from large containers shall be fitted with a lid which can be opened and shut at the sample collection point to avoid taking samples from other parts of the container, and shall be long enough to reach any point in the container.

A similar utensil or open ladle may be used for smaller containers. Every effort should be made to take the bulk of the sample from the desired point.
Sensory evaluation: Sampling

- By an *individual analysis of containers*. I evaluate the quality of all the containers one by one: we can say for example the first is good, the second not so good, the third bad etc.

- By a *global or overall analysis of containers*. I evaluate the quality of the sum of the containers: we can say for example the batch is good or the batch it’s no good

In any case all the containers shall be sampled
Individual organoleptic appraisal of containers

Large containers

**Container sample**
- 3.5 Kg - small or medium olives
- 5.0 Kg - large olives

**Panel sample**
- 1.0 Kg - small or medium olives
- 1.5 Kg - large olives

A sample of brine shall also be taken from each unit for chemical analyses.
Individual organoleptic appraisal of containers:

Small containers

Container sample
- 1.5 Kg - small or medium olives
- 2.5 Kg - large olives

Panel sample
- 1.0 Kg - small or medium olives
- 1.5 Kg - large olives

A sample of brine shall also be taken from the middle part of each container for chemical analyses.
GENERAL GUIDELINES ON SAMPLING
CAC/GL 50-2004

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Appraisal of the overall quality of a batch - step 1

Large containers

Container sample
1.5 Kg - small or medium olives
2.5 Kg - large olives

A sample of brine shall also be taken from each unit for chemical analyses.
Appraisal of the overall quality of a batch - step 2

Large containers

- 13.5 Kg - small/medium size olives
- 22.5 Kg - large olives
- 3.0 Kg - small/medium size olives
- 5.0 Kg - large olives

Panel sample
- 1.0 Kg - small/medium size olives
- 1.5 Kg - large size olives
Appraisal of the overall quality of a batch

Small containers

Take 2 samples. If 1 sample is taken then take it from the bottom

**Container sample**
- 0.6 Kg - small/medium size olives
- 1.0 Kg - large size olives

**Panel sample**
- 1.0 Kg - small or medium olives
- 1.5 Kg - large olives
## Appraisal of the overall quality of a batch

### Small containers

<table>
<thead>
<tr>
<th>Batch (number of containers)</th>
<th>Sample of containers for analysis</th>
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The glass shall contain as many olives as the bottom of the glass can hold when the olives are placed side by side in a single layer. When brined table olives are undergoing analysis, sufficient covering liquid shall be poured over the olives to cover them fully.
The taster shall remove the watch-glass and smell the sample, taking slow deep breaths to evaluate the direct olfactory sensations cited in the profile sheet. Smelling shall not last more than 20 seconds. If no conclusion has been reached during this time, the tasters shall take a short rest before trying again.
Sensory evaluation process

The taster shall then assess the other sensations cited in the profile sheet. To do so, they shall place one of the olives contained in the glass in their mouth; they shall chew the olive after removing the stone, making sure to spread the chewed olive throughout the whole of the mouth cavity.

They shall concentrate on:
• salty
• bitter
• acid
• hardness
• fibrousness
• crispness

Finally, they will spit out the chewed olives, rinse out their mouth with water and recommence the assessment.
Sensory evaluation process

• If the tasters perceive any negative attributes not listed on the profile sheet, they shall record them under the 'Other defects' heading.

• When a defect under the 'Other defects' heading is perceived by 50% of the panel tasters, then the panel leader shall carry out the statistical calculation of this defect.

• Tasters may refuse from placing the olives in their mouth when they observe an extremely intense negative attribute. They must mark however the intensity of the odorous attribute on the corresponding scale.
**TABLE OLIVE PROFILE SHEET**

**INTENSITY**

---

10 cm wide

nothing

all

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1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11

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*Note:*
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<th>Sample 1</th>
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<th>Cook</th>
<th>Rancid</th>
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The panel leader will take into account the attributes with robust coefficient of variation of 20% or less.
METHOD
SENSORY ANALYSIS OF TABLE OLIVES

1. Purpose

This method establishes the necessary criteria for the sensory analysis of the odour, taste and texture of table olives and sets out the methodology for their quality classification.

2. Field of application

The method applies to the fruit of the cultivated olive tree (*Olea europaea* L.) which has been suitably treated or processed and which is offered for trade or for final consumption as table olives according to the trade standard applying to table olives referenced COI/OT/NC No 1 of December 2004.

The method is only applicable for the quality classification of table olives according to the intensity of the defects as determined by a group of 8–10 tasters selected and trained as a panel (ISO 32199:03, Guidelines for the accreditation of virgin olive oil sensory testing laboratories ref. COI/T.28/Doc. No 1).
Classification of table olive sample

Defect Predominantly Perceived (DPP)

Extra or Fancy: DPP ≤ 3

First, 1st, Choice or Select: 3 < DPP ≤ 4.5

Second, 2nd or Standard: 4.5 < DPP ≤ 7.0

Olives that may not be sold as table olives: DPP > 7.0
Tasting sessions

To avoid tasting fatigue and the appearance of bias or contrast effects, each tasting session should entail the sensory analysis of not more than three samples.

Between each session the tasters should rinse out their mouth fully and take a break of at least fifteen minutes.

No more than three tasting sessions should be conducted in any given day.

It should be borne in mind that the morning, before lunch, is the period when olfactory-gustatory sharpness is optimal (between 10 a.m. and 12 noon).
Training of the taste panel is critical
<table>
<thead>
<tr>
<th>Negative attribute</th>
<th>Compound(s)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory Quality</td>
<td>Off-flavor Volatiles</td>
<td>References</td>
</tr>
<tr>
<td>-----------------</td>
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</tbody>
</table>
Training with standard solutions

Abnormal fermentation

Butyric fermentation

0.5 mM butyric acid
1.0 mM butyric acid
Training with standard solutions

Abnormal fermentation

Zapateria

0.15 mM Cyclohexanoic acid

1.0 mM Cyclohexanoic acid
Training with standard solutions

Abnormal fermentation

Putrid

0.1 mM 2-mercaptoethanol
1.0 mM 2-mercaptoethanol
Training with standard solutions

Salty

3% aqueous solution of sodium chloride
9% aqueous solution of sodium chloride

nothing 1

3,5

10,0

all 11
Training with standard solutions

Acid

0.2 % aqueous solution of lactic acid
0.8 % aqueous solution of lactic acid

nothing
1

2.5

7.0

all
11
**Training with standard solutions**

**Bitter**

- 0.01 mM aqueous solution of quinine
- 0.1 mM aqueous solution of quinine

![Chemical structure of quinine](image)
Training with standards

Hardness

Cheese Leerdammer

Slices of raw carrot

nothing 1

4.0

10.5

all 11
Training with standards

Fibrousness

Granny Smith (green apple)
Pineapple (centre of the fruit)
Training with standards

Crunchiness

- Peach in syrup
- Celery

Nothing: 1

2.5

10.0

All: 11
Work flow of sensory assessment

- Recruitment
- Sampling
- Briefing/Training
- Testing
- Debriefing
Taste Panel

Panel Leader
(1)

Panelists
(8-10)
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