

Diversity of Olive Oil Aroma

Interactive
program





Important Varieties (after: COI, 1998)

| Land | Sorte |
|-----------|---|
| Algeria | Chemial, Azeradj |
| Argentina | Arbequina , Arauco |
| France | Aglandeau |
| Greece | Koroneiki , Mastoidis |
| Israel | Souri |
| Italy | Frantoio , Moraiolo, Leccino, Coratina , Carolea, Nocellara , Cerasuola , Biancolilla , Tonda Iblea |
| Croatia | Obliza, Zutica |
| Lebanon | Souri |
| Morocco | Picholine |
| Portugal | Galega, Carrasquena, Redondil |
| Spain | Picual , Hojiblanca , Cornicabra, Lecchin, Verdial de Badajoz, Empeltre, Arbequina , Cacerena |
| Syria | Al-Zeity, Al-Sorani |
| Tunisia | Chemlali, Chetoui |
| Turkey | Ayvalik , Memecik , Cakir |



Sensory characteristics of olive oils (Vossen, 2006)

| Variety | Characteristics |
|-------------------|--|
| Arbequina | aromatic, ripely-fruity, low bitterness and pungency |
| Coratina | intense "green" aroma, bitter, pungent |
| Cornicabra | intense fruitiness and aroma, medium bitterness and pungency |
| Frantoio | intense fruitiness and aroma, medium bitterness; intense pungency |
| Hojiblanca | fruity and aromatic, low pungency and bitterness |
| Koroneiki | intense fruitiness, low bitterness and pungency |
| Lechin de Sevilla | intense fruitiness, low bitterness and pungency |
| Leccino | medium fruitiness, low bitterness and pungency |
| Manzanillo | fruity, aromatic, medium bitterness and intense pungency |
| Moraiolo | intense fruitiness, medium bitterness and pungency |
| Picudo | intense aromatic and ripely-fruity, medium pungency and low bitterness |
| Picual | fruity and aromatic, medium bitterness |
| Picholine | intense aroma, medium fruitiness, bitterness, pungency |
| Taggiasca | low fruitiness (light), low bitterness and pungency |

Paneltest → „basics“

- Defects (?)
- Fruitiness
- Bitterness
- Pungency

Paneltest → „basics“

Defects

- Fusty / Muddy Sediment
 - Characteristic flavour of oil obtained from olives piled or stored in such conditions as to have undergone an advanced stage of anaerobic fermentation, or of oil which has been left in contact with the sediment that settles in underground tanks and vats and which has also undergone a process of anaerobic fermentation.
- Musty-Humid
 - Characteristic flavour of oils obtained from fruit in which large numbers of fungi and yeasts have developed as a result of its being stored in humid conditions for several days.

Paneltest → „basics“

- Winey-Vinegary
 - Characteristic flavour of certain oils reminiscent of wine or vinegar. This flavour is mainly due to a process of aerobic fermentation in the olives or in acid-sour olive paste left on pressing mats which have not been properly cleaned and leads to the formation of acetic acid, ethyl acetate and ethanol.
- Metallic
 - Flavour that is reminiscent of metals. It is characteristic of oil which has been in prolonged contact with metallic surfaces during crushing, mixing, pressing or storage.
- Rancid
 - Flavour of oils which have undergone an intense process of oxidation

Aroma vs. Perception

Flüchtige Substanzen in Olivenöl und ihre sensorischen Deskriptoren (5) [Angerosa, 2004]

| Substanz | Deskriptor |
|--------------------|-------------------------|
| Säuren | |
| Essigsäure | scharf, nach Essigsäure |
| Prionsäure | aromatisch, scharf |
| Butansäure | buttrig, ranzig |
| Pentansäure | schweissig, scharf |
| Hexansäure | schweissig, scharf |
| 3-Methylbutansäure | schweissig, scharf |
| 2-Methylbutansäure | schweissig |
| Andere | |
| Methylbenzene | nach Lösungsmittel |
| Ethylbenzene | stark |
| Ethylfuran | süss, ranzig |
| Dimethylsulfid | organisch, nasse Erde |
| Dipropyldisulfid | gekochtes Fleisch |
| Cycloproan | Moschus |

Paneltest → „basics“

Other Defects

- Heated or Burnt
 - Characteristic flavour of oils caused by excessive and/or prolonged heating during processing, particularly when the paste is thermally mixed, if this is done under unsuitable thermal conditions.
- Hay-wood
 - Characteristic flavour of certain oils produced from olives that have dried out.
- Rough
 - Thick, pasty mouthfeel sensation produced by certain old oils.
- Greasy
 - Flavour of oil reminiscent of that of diesel oil, grease or mineral oil.
- Vegetable Water
 - Flavour acquired by the oil as a result of prolonged contact with vegetable water which has undergone fermentation processes.
- Brine
 - Flavour of oil extracted from olives which have been preserved in brine.

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Paneltest → „basics“

- Esparto
 - Characteristic flavour of oil obtained from olives pressed in new esparto mats. The flavour may differ depending on whether the mats are made of green esparto or dried esparto.
- Earthy
 - Flavour of oil obtained from olives which have been collected with earth or mud on them and not washed.
- Grubby
 - Flavour of oil obtained from olives which have been heavily attacked by the grubs of the olive fly (*Bactrocera oleae*).
- Cucumber
 - Flavour produced when an oil is hermetically packed for too long, particularly in tin containers, and which is attributed to the formation of 2,6 nonadienal.
- Wet wood
 - Characteristic flavour of oils extracted from olives which have been injured by frost while on the tree.

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Paneltest → „basics“

Positive Characteristics

- Fruity
 - Set of olfactory sensations characteristic of the oil which depends on the variety and comes from sound, fresh olives, either ripe or unripe. It is perceived directly and/or through the back of the nose.
- Bitter
 - Characteristic primary taste of oil obtained from green olives or olives turning colour. It is perceived in the circumvallate papillae on the “V” region of the tongue. It defines the primary taste associated with aqueous solutions of substances like quinine and caffeine.
- Pungent
 - Biting tactile sensation characteristic of oils produced at the start of the crop year, primarily from olives that are still unripe. It can be perceived throughout the whole of the mouth cavity, particularly in the throat.

Paneltest → „basics“

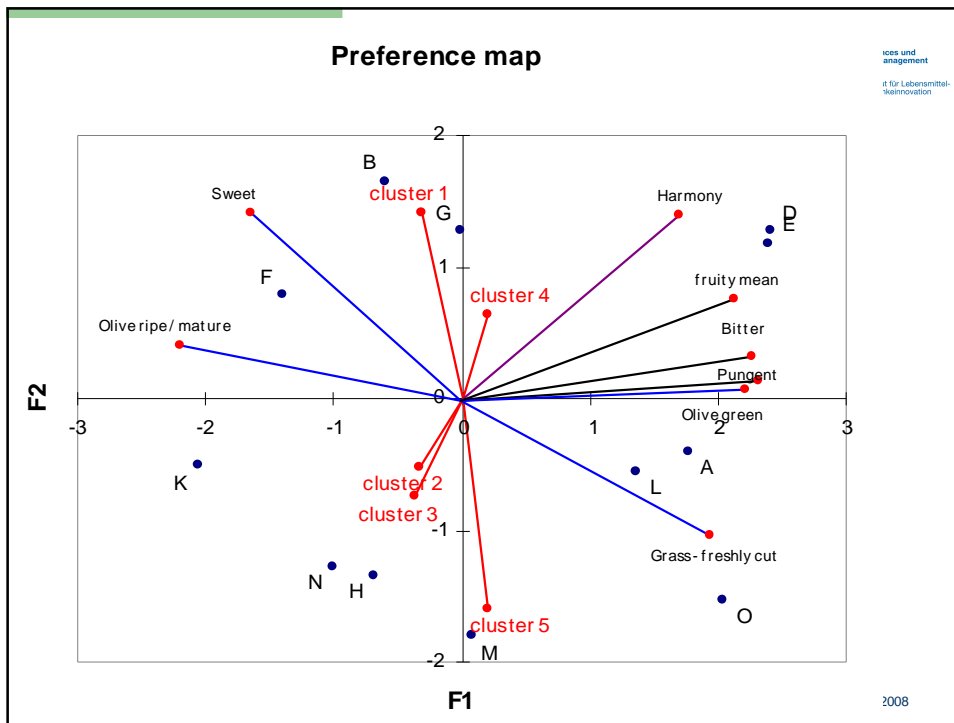
- Fruity
 - Intense when the median of the fruitiness is more than 4.5
 - Medium when the median of the fruitiness is between 3 and 4.5
 - Light when the median of the fruitiness is less than 3
 - Greenly fruity
 - Set of olfactory sensations characteristic of the oil which is reminiscent of green fruit, depends on the variety of olive and comes from green, sound, fresh olives. It is perceived directly and/or through the back of the nose.
 - Ripely fruity
 - Set of olfactory sensations characteristic of the oil which is reminiscent of ripe fruit, depends on the variety of olive and comes from sound, fresh olives, green or ripe. It is perceived directly and/or through the back of the nose.

Aroma Description → „added value“

- Harmony and Persistence
- Positive Characteristics

Aroma Description → „added value“

- Harmony
 - Oil which does not display a lack of balance, by which is meant the olfactory-gustatory and tactile sensation where the median of the bitter and / or pungent attributes is about two points higher than the median of the fruitiness.
- Persistence
 - Length of time that mostly retronasal sensations persist after the sip of olive oil is no longer in the mouth



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Aroma Description → „added value“

Positive Characteristics:

- Almond
- Apple
- Artichoke
- Camomile
- Citrus fruit
- Eucalyptus
- Exotic fruit
- Fig leaf
- Flowers
- Grass
- Green pepper

- Green
- Greenly fruity
- Herbs
- Olive leaf
- Pear
- Pine kernel
- Ripely fruity
- Soft fruit
- Sweet pepper
- Tomato
- Vanilla
- Walnut

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Aroma Parcours → Green

- Grass
 - Olfactory sensation typical of freshly mown grass
 - Green
 - Complex olfactory sensation reminiscent of the typical odour of fruit before it ripens
 - Greenly fruity
 - Olfactory sensation typical of oils obtained from olives that have been harvested before or during colour change
-
- Olive leaf
 - Olfactory sensation reminiscent of the odour of fresh olive leaves
 - Fig leaf
 - Olfactory sensation typical of fig leaves



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Aroma Parcours → Green

- Artichoke
 - Olfactory sensation of artichokes
- Green pepper
 - Olfactory sensation of green peppercorns
- Herbs
 - Olfactory sensation reminiscent of that of herbs
- Tomato
 - Olfactory sensation typical of tomato leaves



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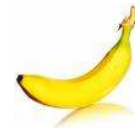


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Aroma Parcours → Ripe

- Ripely fruity
 - Olfactory sensation typical of oils obtained from olives that have been harvested when fully ripe
- Soft fruit
 - Olfactory sensation typical of soft fruit: blackberries, raspberries, bilberries, blackcurrants and redcurrants
- Exotic fruit
 - Olfactory sensation reminiscent of the characteristic odours of exotic fruit (pineapple, banana, passion fruit, mango, papaya, etc.)



Aroma Parcours → Nut

- Almond
 - Olfactory sensation reminiscent of fresh almonds
- Pine kernel
 - Olfactory sensation reminiscent of the odour of fresh pine kernels
- Walnut
 - Olfactory sensation typical of shelled walnuts



Aroma Parcours → Fruit

- Apple
 - Olfactory sensation reminiscent of the odour of fresh apples
- Citrus fruit
 - Olfactory sensation reminiscent of that of citrus fruit (lemon, orange, bergamot, mandarin and grapefruit)
- Exotic fruit
 - Olfactory sensation reminiscent of the characteristic odours of exotic fruit (pineapple, banana, passion fruit, mango, papaya)
- Pear
 - Olfactory sensation typical of fresh pears
- Soft fruit
 - Olfactory sensation typical of soft fruit: blackberries, raspberries, bilberries, blackcurrants and redcurrants



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Aroma Parcours → Vegetable

- Artichoke
 - Olfactory sensation of artichokes
- Camomile
 - Olfactory sensation reminiscent of that of camomile flowers
- Eucalyptus
 - Olfactory sensation typical of Eucalyptus leaves
- Green pepper
 - Olfactory sensation of green peppercorns
- Herbs
 - Olfactory sensation reminiscent of that of herbs
- Sweet pepper
 - Olfactory sensation reminiscent of fresh sweet red or green peppers
- Tomato
 - Olfactory sensation typical of tomato leaves



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Aroma Parcours → others

- Flowers
 - Complex olfactory sensation generally reminiscent of the odour of flours, also known as floral
- Vanilla
 - Olfactory sensation of natural dried vanilla powder or pods, different from the sensation of vanillin



Identification and Description of Aroma (Fruitiness) Identifizierung und Beschreibung des Aromas (Fruchtigkeit)

| green | grün | ripe | reif |
|---|---|---|---|
| Green Olive Grass freshly mown Green Fruit | Grüne Olive Gras frisch geschn. Unreife Früchte | Ripe Olive Sweet Ripe Fruit | Reife Olive Süß Reife Früchte |
| Nut (fresh) | Nuss (frisch) | Nut (dried) | Nuss (getrocknet) |
| Walnut Hazelnut Almond Pine Kernel | Walnuss Haselnuss Mandel Pinienkern | Walnut Hazelnut Almond Pine Kernel | Walnuss Haselnuss Mandel Pinienkern |
| Fruit (green) | Früchte (grün) | Fruit (ripe) | Früchte (reif) |
| Green Apple | Grüner Apfel | Exotic Fruit Ananas, Banana, Passion Fruit, Mango, Papaya | Exotic Fruit / Ananas, Banane, Passions- frucht, Mango, Papaya |
| Citrus Fruit Citron, Orange, Bergamotte, Mandarin, Grapefruit | Zitrusfrüchte Zitrone, Orange, Bergamotte, Mandarine, Grapefruit | Soft Fruit Black-, Rasp-, Bilberries, Black- / Red-Currants | Beerenfrüchte Brom-, Him-, Blau-, Johannis- beeren (schwarz, rot) |
| Vegetable, ... (green) | Gemüse, ... (grün) | Vegetable, ... (ripe) | Gemüse, ... (reif) |
| Artichoke Green Tomato Herbs Eucalyptus Green Pepper Camomille | Artischocke Grüne Tomate Kräuter Eukalyptus Grüner Pfeffer Kamille | Ripe Tomato Mushrooms Sweet Pepper Vanilla Flowery Honey | Reife Tomate Pilze Gemüsepaprika Vanille Floral Honig |

Aroma Parcours

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Parcours A

Aroma-Parcours → Green

- Grass, freshly cut
- Green Tomato
- Green Apple
- Artichoke
- Herbs



Aroma vs. Perception

Flüchtige Substanzen in Olivenöl und ihre sensorischen Deskriptoren (2) [Angerosa, 2004]

| Substanz | Deskriptor |
|---------------------|---|
| Aldehyde (2) | |
| 2-Octenal | fruchtig, Seife, fettig |
| cis-2-Nonenal | grün, fettig |
| trans-2-Nonenal | nach Papier, fettig, scharf, geschnittenes Gras |
| 2-Decanal | fettig |
| 2,4-Hexadienal | geschnittenes Gras |
| 2,4-Heptadienal | fettig, nussig |
| 2,4-Nonadienal | nach Gurke |
| 2,4-Decadienal | frittiert |
| Benaldehyde | Mandel |
| Phenylacetaldehyde | scharf, phenolisch |

Aroma vs. Perception

Flüchtige Substanzen in Olivenöl und ihre sensorischen Deskriptoren (1) [Angerosa, 2004]

| Substanz | Deskriptor |
|--------------------|--|
| Aldehyde | |
| Acetaldehyd | scharf, süss, floral |
| Propanal | süss, scharf, floral |
| 2-Methyl-Propanal | gekocht, Karamell |
| Hexanal | grün, Apfel, geschnittenes Gras |
| Heptanal | fettig |
| Octanal | citrisch, seifig |
| Nonanal | seifig, citrisch |
| Decanal | seifig, citrisch |
| 1-Methyl-Butanal | malzig |
| 3-Methyl-Butanal | süss, fruchtig, malzig |
| 2-Methyl-3-Butenal | Apfel |
| trans-2-Pentenal | grün, Apfel, floral |
| cis-2-Pentenal | grün, (angenehm) |
| trans-2-Hexenal | bitter, Mandeln, grün, grüner Apfel, fettig, geschnittenes Gras |
| cis-2-Hexenal | grün, fruchtig, süss |
| trans-3-Hexenal | Artischocke, grün, floral |
| cis-3-Hexenal | grüne Blätter, grasig, grün, Apfel, blätterartig, geschnittenes G. |

Green → Countries

- Italy, Sicily
- Slovenia, Istria
- Spain, Jaen
- Spain, Saragossa



Green → Countries

- Italy, Sicily
- Slovenia, Istria
- Spain, Jaen
- Spain, Saragossa



Parcours A

Green → Countries

- Italy, Sicily
- Slovenia, Istria
- Spain, Jaen
- Spain, Saragossa



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Parcours B

Aroma Parcours → Ripe

- Banana
- Apple
- Ripe Olive
- Sweet



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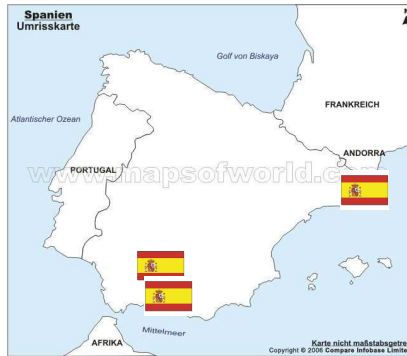


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Ripe → Countries

- Spain, Cordoba
- Spain, Andalusia
- Spain, Catalonia
- Italy, Umbria



Ripe → Countries

- Spain, Cordoba
- Spain, Andalusia
- Spain, Catalonia
- Italy, Umbria



Aroma Parcours → Nut

- Almond
- Nut
- Walnut



Nut → Countries

- Australia
- Spain, Granada
- Spain, Catalonia



Parcours C

Nut → Countries

- Australia
- Spain, Granada
- Spain, Catalonia



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Parcours D

Aroma Parcours → Fruit

- Green Apple
- Citrus
- Raspberry
- Cassis



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Aroma vs. Perception

Flüchtige Substanzen in Olivenöl und ihre sensorischen Deskriptoren (4) [Angerosa, 2004]

| Substanz | Deskriptor |
|------------------------|--|
| Ester | |
| Methylacetat | Ester |
| Butylacetat | grün, scharf, süss |
| Ethylacetat | süss, aromatisch |
| Ethylpropanoat | süss, Erdbeere, Apfel |
| Ethylbutyrat | nach Käse, fruchtig |
| Ethylisobutyrat | fruchtig |
| Ethyl-2-methylbutyrat | fruchtig |
| Ethyl-3-methylbutyrat | fruchtig |
| cis-3-Hexenylacetat | grüne Banane, fruchtig, Grün, grüne Blätter, floral, Ester |
| Hexylacetat | süss, fruchtig, floral |
| 3-Methylbutylacetat | Banane |
| Methyl-2-Methylbutyrat | fruchtig |
| Methyldecanoat | frisch |
| Methylnonanoat | fruchtig, süss, floral |

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Aroma vs. Perception

Flüchtige Substanzen in Olivenöl und ihre sensorischen Deskriptoren (3) [Angerosa, 2004]

| Substanz | Deskriptor |
|----------------------------------|--|
| Ketone | |
| Pentan-3-on | süss |
| 1-Penten-3-on | süss, Erdbeere, scharf, grün, metallisch |
| 1-Octen-3-on | nach Pilzen |
| Alkohole | |
| Ethanol | alkoholisch, reifer Apfel, floral |
| Pentan-1-ol | scharf |
| Hexan-1-ol | fruchtig, aromatisch, sanft, geschnittenes Grass |
| 2-Methylpropan-1-ol | nach Essigsäure |
| 2-Methylbutan-1-ol | Fischöl |
| 4-Methoxy-2-methyl-2-butanethiol | schwarze Johannisbeere, Cassis |
| cis-2-Penten-1-ol | Banane |
| trans-3-Hexen-1-ol | fruchtig, fettig, scharf, geschnittenes Grass |
| cis-3-Hexen-1-ol | Banane, nach Blättern, fruchtig-grün, scharf |
| trans-2-Hexen-1-ol | grün, grasig, fruchtig, fettig, scharf |
| cis-2-Hexen-1-ol | grüne Frucht, fruchtig-grün |
| 1-Penten-3-ol | feuchte Erde |

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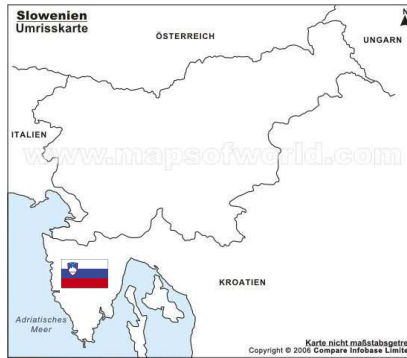
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Fruit → Countries

- Slovenia, Istria
- Italy, Tuscany
- Spain, Saragossa
- Spain, Cordoba
- Spain, Jumilla



Fruit → Countries

- Slovenia, Istria
- Italy, Tuscany
- Spain, Saragossa
- Spain, Cordoba
- Spain, Jumilla



Fruit → Countries

- Slovenia, Istria
- Italy, Tuscany
- Spain, Saragossa
- Spain, Cordoba
- Spain, Jumilla



Aroma Parcours → others

- Honey
- Flower



others → Countries

- Honey
- Flower



others → Countries

- Honey
- Flower

