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Commission Regulation (EC) No 640/2008 of 4 July 2008 amending
Regulation (EEC) No 2568/91 on the characteristics of olive oil
and olive-residue oil and on the relevant methods of analysis

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ANNEX

ANNEX XII

THE INTERNATIONAL OLIVE COUNCIL'S METHOD FOR THE ORGANOLEPTIC ASSESSMENT OF VIRGIN OLIVE OIL

1. PURPOSE AND SCOPE

This method is based on Decision No DEC-21/95-V/2007 of 16 November 2007 on the International Olive Council's revised method for the organoleptic assessment of virgin olive oil. Its purpose is to determine the procedure for assessing the organoleptic characteristics of virgin olive oil within the meaning of point 1 of Annex XVI to Regulation (EC) No 1234/2007 and to establish the method for its grading on the basis of those characteristics. It also provides indications for optional labelling.

The method described is applicable only to virgin olive oil and to the grading or labelling of such oil according to the intensity of the defects perceived, their fruitiness and other positive attributes, as determined by a group of tasters selected, trained and monitored as a panel.

2. GENERAL

For the general basic vocabulary, the tasting room, the tasting glass and any other matters relating to this method, compliance with the stipulations of the International Olive Council, and in particular with Decision No DEC-21/95-V/2007 of 16 November 2007 on the revised method for the organoleptic assessment of virgin olive oil, is recommended.

3. SPECIFIC VOCABULARY

3.1. Positive attributes

- Fruity** : range of smells (dependent on variety) characteristic of oil from healthy fresh fruit, green or ripe, perceived directly and/or retronasally.
- Fruitiness is qualified as *green* if the range of smells is reminiscent of green fruit and is characteristic of oil from green fruit.
- Fruitiness is qualified as *ripe* if the range of smells is reminiscent of ripe fruit and is characteristic of oil from green and ripe fruit.
- Bitter** : characteristic primary taste of oil from green olives or olives turning colour. It is detected by the circumvallate papillae in the "V" region of the tongue.
- Pungent** : tingling sensation characteristic of oil made at the beginning of the season mainly from olives that are still green. It can be perceived throughout the mouth cavity, particularly in the throat.

3.2. Negative attributes

- Fusty/muddy sediment** : characteristic flavour of oil from olives that have been piled or stored in such a way as to have reached 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 oil from olives in which large numbers of fungi and yeasts have developed as a result of storage for several days in humid conditions.

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Winey-vinegary/ acid-sour	: characteristic flavour of certain oils reminiscent of wine or vinegar. This flavour is mainly due to the aerobic fermentation of the olives or of olive paste left on pressing mats which have not been properly cleaned, leading to the formation of acetic acid, ethyl acetate and ethanol.
Metallic	: flavour reminiscent of metal, characteristic of oil that has been in prolonged contact with metallic surfaces during crushing, mixing, pressing or storage.
Rancid	: flavour of oil that has undergone an intense process of oxidation.
Heated or burnt	: characteristic flavour caused by excessive and/or prolonged heating during production, particularly by thermo-mixing of the paste in unsuitable conditions.
Hay/wood	: characteristic flavour of certain oils from dry olives.
Rough	: thick and pasty mouthfeel produced by certain old oils.
Greasy	: flavour reminiscent of diesel, grease or mineral oil.
Vegetable water	: flavour acquired by the oil as a result of prolonged contact with vegetable water which has undergone fermentation.
Brine	: flavour of oil extracted from olives which have been preserved in brine.
Esparto	: characteristic flavour of oil from olives pressed in new esparto mats. The flavour may vary depending on whether the mats are made of green or dried esparto.
Earthy	: flavour of oil from olives collected with earth or mud on them and not washed.
Grubby	: flavour of oil from olives heavily attacked by grubs of the olive fly (<i>Bactrocera oleae</i>).
Cucumber	: characteristic flavour of oil kept too long in hermetically sealed containers, notably in tins, attributed to formation of 2,6-nonadienal.
Wet wood	: characteristic flavour of oil extracted from olives damaged by frost while on the tree.

3.3. Optional terminology for labelling purposes

Upon request, the panel head may certify that the oils which have been assessed comply with the definitions and ranges that correspond to the following adjectives according to the intensity and perception of the attributes:

- (a) for each of the positive attributes mentioned under point 3.1 (*fruity* — whether *green* or *ripe* — *pungent* or *bitter*):
 - (i) the term “intense” may be used where the median of the attribute concerned is greater than 6;
 - (ii) the term “medium” may be used where the median of the attribute concerned is between 3 and 6;
 - (iii) the term “light” may be used where the median of the attribute concerned is less than 3;
 - (iv) the attributes in question may be used without the adjectives given in points (i), (ii) and (iii) where the median of the attribute concerned is 3 or more;
- (b) the term “well balanced” may be used where the oil does not display a lack of balance, which is defined as the smell, taste and feel that oil has when the median of the *bitter* and/or *pungent* attributes is two points higher than the median of its *fruitiness*;
- (c) the term “mild oil” may be used where the median of the *bitter* and *pungent* attributes is 2 or less.

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4. PANEL

The panel consists of a panel head and from eight to 12 tasters.

The panel head must be a soundly trained expert in the various types of oil. He or she is responsible for the panel and its organisation and operation, including preparation, coding and presentation of the samples to the tasters and collection and processing of the data.

He or she selects the tasters, sees to their training and checks that their performance remains of adequate standard.

The testers must be selected and trained on account of their skill in distinguishing between similar samples. The International Olive Council's manual on the selection, training and monitoring of qualified virgin olive oil tasters must be followed.

Panels must undertake to participate in national, Community and international organoleptic assessments organised for the purposes of periodic monitoring and harmonisation of perception criteria. In the case of panels approved in accordance with Article 4(1) of this Regulation, they must also provide the Member State concerned with full information each year on the composition of the panel and the number of assessments made in their capacity as an approved panel.

5. PROCEDURE FOR ORGANOLEPTIC ASSESSMENT AND GRADING

5.1. Use of profile sheet by taster

The profile sheet to be used by the taster is reproduced as Appendix A.

Tasters must each smell and then taste⁽¹⁾ the oil submitted for examination, marking the intensity of their perception of each negative and positive attribute on the 10-cm scale provided on the profile sheet. If a taster perceives the fruitiness to be of a green or ripe character, he or she must tick the corresponding box on the profile sheet.

If the tasters perceive any negative attributes not listed on the profile sheet, these must be noted under "Other", using the term or terms that describe them best from among those defined above.

5.2. Processing of data by panel head

The panel head collects the profile sheets completed by the tasters and scrutinises the intensities assigned to the various attributes. In the event of an anomaly he or she will ask tasters to re-examine their sheet and if necessary repeat the test.

The panel head may feed each tester's data into a computer programme to calculate the median in accordance with Appendix B. Input of each sample shall be made with the help of a grid with nine columns for the nine sensory attributes and one line for each panel member.

If a negative attribute is perceived and mentioned under "Other" by at least 50 % of the panel, the head must calculate the median for this attribute and grade accordingly.

The panel head may certify that the oil submitted for examination meets the conditions set out under point 3.3(a) for the use of the terms "green" and "ripe" only if at least 50 % of the panel perceived that the fruitiness had this character and noted it down.

For assessments intended to monitor compliance, one test shall be carried out. In the event of contradictory assessments, the panel head shall arrange for the assessment to be carried out in duplicate. For confirmation assessments, the assessment must be carried out in triplicate. In

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these cases, the median of the attributes shall be calculated from the average of the medians. Repeat tests must be carried out at different sessions.

5.3. Grading of oils

The oil is graded as follows in line with the median of the defects and the median for “fruity”. The median of the defects is defined as the median of the defect perceived with the greatest intensity. The median of the defects and the median for “fruity” are expressed to one decimal place, and the value of the robust variation coefficient which defines them must be no greater than 20 %.

The oil is graded by comparing the median value of the defects and the median for “fruity” with the reference ranges given below. The error of the method was taken into account when determining the limits of these intervals, which are therefore considered to be absolute. The software packages allow visualised grading using a table of statistics or a graph.

- (a) extra virgin : the median of the defects is 0 and the median for “fruity” is above 0;
olive oil
- (b) virgin olive oil : the median of the defects is above 0 but not above 3,5 and the median for “fruity” is above 0;
- (c) lampante olive : the median of the defects is above 3,5; or the median of the defects is
oil not above 3,5 and the median for “fruity” is 0.

5.4. Special case

If the median of a positive attribute other than “fruity” is above 5,0, the panel head must note this on the analysis certificate.

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Appendix A

Profile sheet for virgin olive oil

INTENSITY OF PERCEPTION OF DEFECTS

Fusty/muddy sediment	_____ →
Musty-humid-earthly	_____ →
Winey-vinegary — acid-sour	_____ →
Metallic	_____ →
Rancid	_____ →
Other (specify)	_____ →

INTENSITY OF PERCEPTION OF POSITIVE ATTRIBUTES

Fruity	_____ →
	greenly <input type="checkbox"/> ripely <input type="checkbox"/>
Bitter	_____ →
Pungent	_____ →

Name of taster:

Sample code:

Date:

Comments:

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Appendix B

METHOD FOR CALCULATING THE MEDIAN AND CONFIDENCE INTERVALS

Median

$$Me = [P(X < X_m) \leq 1/2 \wedge P(X \leq X_m) \geq 1/2]$$

The median is defined as the real number X_m characterised by the fact that the probability (P) that the distribution values (X) are below that number (X_m) is not more than 0,5 and that simultaneously the probability (P) that the distribution values (X) are not above X_m is not less than 0,5. Another definition considers the median to be the 50th percentile of a distribution of numbers ranked in ascending order. In other words, the median is the central value of an ordered series with an uneven number of values or the average of the two central values of an ordered series with an even number of values.

Robust standard deviation

To obtain a reliable estimate of the variability that arises around the median, recourse is required to the Stuart and Kendall method of estimating the robust standard deviation. The following formula gives the asymptotic standard deviation, i.e. the robust estimate of the variability of the data under consideration, where N is the number of observations and IQR the interquartile range, which covers exactly 50 % of the cases of any probability distribution.

$$S^* = \frac{1,25 \text{ IQR}}{1,35\sqrt{N}}$$

The interquartile range is obtained by calculating the magnitude of the deviation between the 75th and the 25th percentiles.

$$\text{IQR} = 75\text{th percentile} - 25\text{th percentile}$$

The percentile is the value X_{pc} characterised by the fact that the probability (P) that the distribution values are below X_{pc} is not more than a determined hundredth and that simultaneously the probability (P) that the distribution values are not above X_{pc} is not less than the said hundredth. The hundredth indicates the distribution fraction used. For the median, this is 50/100.

$$\text{Percentile} = \left[P(X < X_{pc}) \leq \frac{n}{100} \wedge P(X \leq X_{pc}) \geq \frac{n}{100} \right]$$

In practice, the percentile is the distribution value corresponding to a determined area plotted from the distribution or density curve. For example, the 25th percentile is the distribution value corresponding to an area equal to 0,25 or 25/100.

Robust variation coefficient %

The rVC % is a pure number, i.e. without dimension, that indicates the percentage of variability of the series of numbers analysed. For that reason, it is very useful for verifying the reliability of the panel members.

$$\text{rVC \%} = \frac{S^*}{Me} \cdot 100$$

Confidence intervals at 95 % on the median

The confidence intervals at 95 % (value of the error of first kind equal to 0,05 or 5 %) represent the range in which the value of the median would be able to vary should it be possible to repeat the experiment an infinite number of times. In practice, this interval indicates the range of variability of the test under the operating conditions selected, based on the assumption that it is possible to repeat the test several times. As with the rVC %, the interval helps evaluate the reliability of the test.

$$\text{Upper C.I.} = Me + (c \cdot S^*)$$

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Lower C.I. = $Me - (c.S^*)$

where c is equal to 1,96 for a confidence interval of 0,95.

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- (1) Tasters may refrain from tasting if they note some extremely intense negative attribute when smelling the oil, in which case they must note this exceptional circumstance on the profile sheet.

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