# METHOD FOR THE ORGANOLEPTIC ASSESSMENT OF EXTRA VIRGIN OLIVE OIL APPLYING TO USE A DESIGNATION OF ORIGIN

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RESOLUTION NO. RES-2/93-IV/05


# METHOD FOR THE ORGANOLEPTIC ASSESSMENT OF EXTRA VIRGIN OLIVE OIL APPLYING TO USE A DESIGNATION OF ORIGIN


## THE INTERNATIONAL OLIVE OIL COUNCIL,

**Having regard** to the International Agreement on Olive Oil and Table Olives, 1986, as amended and extended, 1993, and last prolonged, 2004, in particular article 26 thereof concerning the designations and definitions of olive oils and olive-pomace oils as last amended by Decision no. DEC-1/75-IV/96 of 20 November 1996, article 28 thereof concerning indications of source and appellations of origin and article 36 thereof concerning standards for physical, chemical and organoleptic characteristics and methods of analysis,

**Having regard** to Resolution no. RES-3/75-IV/96 of 20 November 1996 whereby the International Olive Oil Council adopted the revised method for the *Organoleptic assessment of virgin olive oil* (COI/T.20/Doc. no. 15/Rev. 1), the *General methodology for the organoleptic assessment of virgin olive oil* (standard COI/T.20/Doc. no. 13/Rev. 1) and the *Guide for the selection, training and monitoring of skilled virgin olive oil tasters* (standard COI/T.20/Doc. no. 14/Rev. 1) and it endorsed the validity of the standards for *Sensory analysis: general basic vocabulary* (COI/T.20/Doc. no. 4 of 18 June 1987), *Glass for oil tasting* (COI/T.20/Doc. no. 5 of 18 June 1987) and *Guide for the installation of a test room* (COI/T.20/Doc. no. 6 of 18 June 1987),

**Whereas**, in view of the growing number of designations of origin and indications of source of the Members of the International Olive Oil Council covering geographical regions which are sometimes very close to each other, and as part of a policy of product quality and retail product differentiation, a working group of sensory analysis experts was created with the brief of drawing up a method for recommendation to the Members as a uniform tool for assessing the sensory attributes of extra virgin olive oils characteristic of a geographical indication (designations of origin and indications of source);

**Whereas**, on a proposal of the Committee on Olive Oil Chemistry and Standards Setting, the Members of the International Olive Oil Council decided to organise a seminar on the organoleptic assessment of extra virgin olive oil applying for designation of origin (DO) status with a view to presenting a preliminary draft method for this purpose to the DO bodies and authorities of the Council Members;

**Whereas** the application of such a method will help to harmonise the procedures employed for characterising the sensory attributes of extra virgin olive oils by the bodies responsible for controlling geographical indications,

## DECIDES

The method for the *Organoleptic assessment of extra virgin olive oil applying to use a designation of origin* referenced COI/T.20/Doc. no. 22 shall be adopted and its application shall be recommended to the bodies responsible for designations of origin.

Madrid, 18 November 2005.

INTERNATIONAL

OLIVE OIL

COUNCIL

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# METHOD FOR THE ORGANOLEPTIC ASSESSMENT OF EXTRA VIRGIN OLIVE OIL APPLYING TO USE A DESIGNATION OF ORIGIN

## 1. PURPOSE

The purpose of this international method is to establish the necessary criteria to assess the olfactory, gustatory, tactile and kinaesthetic characteristics of extra virgin olive oil and to develop the methodology for granting designation of origin (D.O.) status.

## 2. FIELD OF APPLICATION

The method described is applicable to the assessment of the characteristic attributes of extra virgin olive oil, as recognised by the body responsible for the designation of origin (D.O. authority), which assessment is carried out by a group of tasters selected and trained as a panel.

## 3. PRINCIPLE

The D.O. authority shall select the characteristic descriptors of the designation of origin from amongst those defined in this method and shall enter them in the taster profile sheet provided in Figure 1.

The maximum and minimum limits of the median of each descriptor listed in the profile sheet and of the profile confidence intervals shall be established and entered in the *software package* accompanying the method. By doing so, the D.O. authority shall have determined the characteristic sensory profile of its designation of origin.

The tasters on the panel shall assess the intensity of perception of the descriptors cited in the profile sheet drawn up by the D.O. authority.

The intensities with which the descriptors are perceived shall be statistically processed and the panel supervisor shall judge whether the sensory profile of the oil that has been tested matches the sensory profile drawn up and recognised by the D.O. authority.

## 4. FACILITIES AND MATERIAL

4.1. Test room

Refer to standard COI/T.20/Doc. no. 6, *Guide for the installation of a test room*.

4.2. Glass for tasting

Refer to standard COI/T.20/Doc. no. 5, *Glass for oil tasting*.

4.3. Accessories

The following accessories, which tasters need to perform their task properly, shall be supplied in each booth and shall be within easy reach:

- Standardised glasses containing the samples, code numbered, covered with a watch-glass and kept at $28^{\circ}$ C $\pm$ $2^{\circ}$ C;
- Hard or soft copy of the profile sheet (Figure 1 of the method);
- Pencil or ballpoint pen;
- Tray with slices of apple;
- Glass of water at ambient temperature.

The panel supervisor shall be equipped with the following:

- The software package (*IOOC spreadsheet folder-profile*) for the correct statistical analysis of the profile sheet data of the panel tasters according to the method.
- A computer compatible with the software.

## 5.  LIST OF DESCRIPTORS FOR D.O. EXTRA VIRGIN OLIVE OILS

5.1.  <u>Direct or retronasal aromatic olfactory sensations</u>

**Almond**   Olfactory sensation reminiscent of fresh almonds

**Apple**   Olfactory sensation reminiscent of the odour of fresh apples

**Artichoke**   Olfactory sensation of artichokes

**Camomile**   Olfactory sensation reminiscent of that of camomile flowers

**Citrus fruit**   Olfactory sensation reminiscent of that of citrus fruit (lemon, orange, bergamot, mandarin and grapefruit)

**Eucalyptus**   Olfactory sensation typical of *Eucalyptus* leaves

**Exotic fruit**   Olfactory sensation reminiscent of the characteristic odours of exotic fruit (pineapple, banana, passion fruit, mango, papaya, etc.)

**Fig leaf**   Olfactory sensation typical of fig leaves

**Flowers**   Complex olfactory sensation generally reminiscent of the odour of flours, also known as floral

**Grass**   Olfactory sensation typical of freshly mown grass

**Green pepper**   Olfactory sensation of green peppercorns

**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

**Herbs**   Olfactory sensation reminiscent of that of herbs

**Olive leaf**       Olfactory sensation reminiscent of the odour of fresh olive leaves

**Pear**       Olfactory sensation typical of fresh pears

**Pine kernel**       Olfactory sensation reminiscent of the odour of fresh pine kernels

**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

**Sweet pepper**       Olfactory sensation reminiscent of fresh sweet red or green peppers

**Tomato**       Olfactory sensation typical of tomato leaves

**Vanilla**       Olfactory sensation of natural dried vanilla powder or pods, different from the sensation of vanillin

**Walnut**       Olfactory sensation typical of shelled walnuts

5.2.   Gustatory sensations

**Bitter**       Characteristic taste of oil obtained from green olives or olives turning colour; it defines the primary taste associated with aqueous solutions of substances like quinine and caffeine

**"Sweet"**       *Complex* gustatory-kinaesthetic sensation characteristic of oil obtained from olives that have reached full maturity

5.3.   Qualitative retronasal sensation

**Retronasal persistence**       Length of time that retronasal sensations persist after the sip of olive oil is no longer in the mouth

5.4.    Tactile or kinaesthetic sensations

**Fluidity**          Kinaesthetic characteristics of the rheological properties of the oil, the set of which are capable of stimulating the mechanical receptors located in the mouth during the test

**Pungent**          Biting tactile sensation characteristic of oils produced at the start of the crop year, primarily from olives that are still unripe

## 6.    METHODOLOGY

Refer to the latest version of the following standards:

-    COI/T.20/Doc. no. 4, *Sensory analysis: general basic vocabulary;*
-    COI/T.20/Doc. no. 13, *General methodology for the organoleptic assessment of virgin olive oil;*
-    COI/T.20/Doc. no. 14, *Guide for the selection, training and monitoring of skilled virgin olive oil tasters.*

Also refer to method COI/T.20/Doc. no. 15, *Organoleptic assessment of virgin olive oil*, which is applied to classify virgin olive oils according to the intensity of their defects, as determined by a group of selected, trained tasters.

## 7.    PROCEDURE

The method for the sensory assessment of extra virgin olive oils applying to use a designation of origin is divided into two stages:

-  Determination of the characteristic sensory profile;
-  Evaluation of the consistency of the sensory profile of the oil with the characteristic profile of the designation of origin.

7.1.    Determination of the characteristic sensory profile

The D.O. authority shall select the characteristic descriptors of the designation of origin (10 at the most) from those defined in section 5 above and shall incorporate them into the profile sheet (Profile Sheet) given in Figure 1 of this method. When doing so it shall follow the instructions provided in the guide for determining the profile of D.O. extra virgin olive oils contained in Annex 1 of this method.

The D.O. authority shall fix the maximum and minimum limits of the median for each descriptor included in the profile sheet and it shall establish the limits for the robust coefficient of variation of each descriptor. It shall then enter these values in the *IOOC spreadsheet folder-profile* (software) accompanying this method in order to define the intervals of the characteristic sensory profile of the designation of origin.

The D.O. authority may consider it necessary to evaluate the harmony of the oil, as defined in standard COI/T.20/Doc. no. 4.

7.2.  Evaluation of the consistency of the sensory profile with the characteristic profile of the designation of origin

The panel supervisor shall enter the data of each taster in the *IOOC spreadsheet folder-profile* (software) designed for the designation of origin in accordance with section 7.1. of this method. When doing so, he shall follow the instructions provided in the guide for evaluating the consistency with the characteristic sensory profile of the D.O. extra virgin olive oil, attached as Annex 2 of this method.

The extra virgin olive oil that has been tested complies with the sensory characteristics defined for the designation of origin when the sensory profile (Figure 1) that emerges from the statistical processing carried out by the software package matches that fixed by the D.O. authority.

7.3.  Use of the profile sheet by the tasters

Each taster on the panel shall sniff and then taste the oil contained in the tasting glass in order to analyse the olfactory, gustatory, qualitative retronasal, tactile and kinaesthetic sensations. In the profile sheet provided for this purpose he shall then enter the intensity with which each of the descriptors is perceived.

7.4.  Use of the data by the panel supervisor

The panel supervisor shall collect the profile sheets completed by each taster and shall review the intensities recorded. Should he find any anomaly, he shall invite the taster to revise his profile sheet and, if necessary, to repeat the test.

The method of calculation, complete with explanatory example, is given in Annex 3 of this method.

**Figure 1**

## PROFILE SHEET
## FOR EXTRA VIRGIN OLIVE OIL
## APPLYING TO USE A DESIGNATION OF ORIGIN
(for completion by tasters)

**INTENSITY OF PERCEPTION**:

Fruity……….

…………..……

........................

........................

........................

........................

........................

........................

........................

........................

**Name of taster:**

**Sample code**:

**Date:**

# GUIDE FOR DETERMINING THE CHARACTERISTIC PROFILE OF D.O. EXTRA VIRGIN OLIVE OILS

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## 1. Purpose

This guide provides the D.O. authority with the necessary instructions for applying section 7.1. of the method for the organoleptic assessment of extra virgin olive oil applying to use a designation of origin. Such instructions are to:

- select the characteristic descriptors of the designation of origin;
- draw up and validate the list of the most important descriptors of the designation of origin concerned (10 at the most, taken from those listed in section 5 of method COI/T.20/Doc. no. 22);
- enter the descriptors in the profile sheet (Figure 1);
- statistically process the data using the accompanying spreadsheet (MS-Excel®) and to determine the median, to determine the confidence intervals of the individual descriptors from the median, and to determine the robust percentage coefficients of variation and the related minimum and maximum limits;
- evaluate the defining intervals of the attributes used;
- compile and present the characteristic sensory profile.

## 2. References

. COI/T.20/Doc. no. 15/Rev. 1 of 20 November 1996, *Method for the organoleptic assessment of virgin olive oil*

. COI/T.20/Doc. no. 22, *Method for the organoleptic assessment of extra virgin olive oils applying to use a designation of origin*

. ISO/DIS 13299.2, *Sensory analysis – Methodology – General guidelines for drawing up a sensory profile*

## 3. Selection of the characteristic descriptors of the designation of origin and determination of the characteristic profile

3.1. <u>Identification of the characteristic descriptors of the designation concerned</u>

The characteristic descriptors are identified according to the round-table method (Round table – ISO/DIS 13299.2 ISO 11035) – Annex 2.

In the round table the panel supervisor leads a discussion based on a series of samples of products of known origin that display the most important specific characteristics of the virgin olive oil undergoing preparatory analysis.

These characteristics should belong to the list of descriptors proposed in document COI/T.20/Doc. no. 22.

<u>Example:</u> D.O. extra virgin olive oil

Possible descriptors for the D.O. extra virgin olive oil taken from the list:

| | |
|---|---|
| Sweet: | Complex gustatory-kinaesthetic sensation characteristic of oil obtained from olives that have reached full maturity |
| Bitter: | Characteristic taste of oil obtained from green olives or olives turning colour |
| Pungent: | Biting tactile sensation characteristic of oils produced at the start of the crop year, primarily from olives that are still unripe |
| Artichoke: | Olfactory sensation of artichokes |
| Almond: | Olfactory sensation reminiscent of fresh almonds |

3.2. <u>List of descriptors</u>

After this discussion involving all the panel members (tasters), the list is drawn up of all the possible descriptors, which should be taken from the list given in section 5 of document COI/T.20/Doc. no. 22.

<u>Example:</u> D.O. extra virgin olive oil

Possible descriptors for the D.O. extra virgin olive oil taken from the list:
Sweet, bitter, pungent, artichoke, almond

3.3.    Validation

Differential quantitative evaluation can be used to select and validate solely those descriptors that are considered to be most important and to be characteristic of the designation that is undergoing preparatory analysis. Validation should take into account the possible natural variations that may occur in the oil from one crop year to the next.

Example:  D.O. extra virgin olive oil

Differential test

Sweet:        + + + + + + = +
Bitter:         + + + + + + + +
Pungent:      + + + + + = = +
Artichoke:    + + - - + - + -
Almond:      - - - - - + + -

Example:  D.O. extra virgin olive oil

The artichoke descriptor is not accepted because it is not perceived unequivocally by all the tasters. In this case, there are two possible solutions: either to delete the descriptor or, if it is of some importance, to intensify panel training.

The almond descriptor is deleted during validation because it is not always found clearly in oil from different crop years since it appears to be linked more to seasonal conditions than to the cultivar and growing environment.

3.4.    Application

Following the selection of the most important characteristic descriptors and the completion of sensory and operational validation, the final list of descriptors can be entered in the profile sheet.

The descriptor card is completed by following the instructions given in section 7.1. of the Procedure chapter of document COI/T.20/Doc. no. 22 and by using the profile sheet presented in Figure 1. The distinctive characteristic descriptors for the designation undergoing preparatory analysis are entered in the empty boxes, up to a maximum of 10 descriptors in all.

The card is then complete.

Example: D.O. extra virgin olive oil

| DO | | | | |
|---|---|---|---|---|
| Taster | Fruity | Sweet | Bitter | Pungent |
| C1 | | | | |
| C2 | | | | |
| C3 | | | | |
| C4 | | | | |
| C5 | | | | |
| C6 | | | | |
| C7 | | | | |
| C8 | | | | |

## 3.5.  Sensory assessment

The sensory analyses are performed on different extra virgin olive oils already holding designation of origin status, using the characteristic profile sheet referred to in section 3.4. of the method.

The tasters assess the perceptible intensity of each of the descriptors listed on the sheet (section 7.3 of the method).

After assessing the raw data (section 7.4 of the method), the panel supervisor enters them in the data sheet of the accompanying spreadsheet (MS-Excel®), which contains a maximum of five samples at any one time.

These are recorded once only in the first table of the first spreadsheet headed Data. They will then be copied automatically in the other parts of the spreadsheet.

*Limitations:* the number of columns is limited to the number of descriptors in the profile sheet.

## 3.6.  Data processing

The panel supervisor carefully examines the statistics sheet where he will see the median for each descriptor, the percentage robust coefficient of variation and the lower and upper confidence intervals (C.I.), calculated as explained in COI/T.20/Doc. no. 15/Rev. 1.

Example: D.O. extra virgin olive oil

Calculation of C.I. of three DO oils

| Sample 1 | Fruity | Sweet | Bitter | Pungent |
|---|---|---|---|---|
| DO | | | | |
| Median | 2.4 | 3.3 | 0.0 | 1.0 |
| Interquartile range | 1.3 | 0.6 | 1.0 | 0.3 |
| Robust standard deviation | 0.42 | 0.20 | 0.33 | 0.08 |
| Robust % C.V. | 17.39 | 6.20 | 0.00 | 8.18 |
| Upper limit C.I. | 3.22 | 3.70 | 0.64 | 1.16 |
| Lower limit C.I. | 1.58 | 2.90 | -0.64 | 0.84 |

| Sample 2 | Fruity | Sweet | Bitter | Pungent |
|---|---|---|---|---|
| DO | | | | |
| Median | 2.5 | 3.0 | 0.0 | 1.3 |
| Interquartile range | 0.9 | 0.2 | 1.0 | 0.9 |
| Robust standard deviation | 0.29 | 0.07 | 0.33 | 0.29 |
| Robust % C.V. | 11.69 | 2.18 | 0.00 | 22.92 |
| Upper limit C.I. | 3.01 | 3.13 | 0.64 | 1.81 |
| Lower limit C.I. | 1.89 | 2.87 | -0.64 | 0.69 |

| Sample 3 | Fruity | Sweet | Bitter | Pungent |
|---|---|---|---|---|
| DO | | | | |
| Median | 3.0 | 3.0 | 0.0 | 1.0 |
| Interquartile range | 1.5 | 1.0 | 1.0 | 1.1 |
| Robust standard deviation | 0.50 | 0.33 | 0.33 | 0.34 |
| Robust % C.V. | 16.64 | 10.91 | 0.00 | 34.37 |
| Upper limit C.I. | 3.98 | 3.64 | 0.64 | 1.67 |
| Lower limit C.I. | 2.02 | 2.36 | -0.64 | 0.33 |

3.7    Evaluation of the confidence intervals

The lower and upper confidence intervals, C.I., are used to evaluate the potential intervals for defining the median of the individual descriptors of the D.O. extra virgin olive oil being examined.

By calculating the mean of the confidence intervals of the different samples of oil tested, and taking into account the percentage robust coefficients of variation, the potential intervals defining the descriptors for the specific designation of origin can be determined.

Average of the C.I. of three DO products under examination

| Samples | Limits | Fruity | Sweet | Bitter | Pungent |
|---|---|---|---|---|---|
| Sample 1 | Upper limit C.I. | 3.22 | 3.70 | 0.64 | 1.16 |
| | Lower limit C.I. | 1.58 | 2.90 | -0.64 | 0.84 |
| Sample 2 | Upper limit C.I. | 3.01 | 3.13 | 0.64 | 1.81 |
| | Lower limit C.I. | 1.89 | 2.87 | -0.64 | 0.69 |
| Sample 3 | Upper limit C.I. | 3.98 | 3.64 | 0.64 | 1.67 |
| | Lower limit C.I. | 2.02 | 2.36 | -0.64 | 0.33 |
| | | | | | |
| **Averages** | Upper limit C.I. | **3.40** | **3.49** | **0.64** | **1.54** |
| Potential intervals | Lower limit C.I. | **1.83** | **2.71** | **-0.64** | **0.62** |

3.8.    Evaluation of the defining intervals

After careful operational evaluation of the mathematically determined confidence intervals, it is possible to define the actual intervals defining the characteristic profile of the extra virgin olive oil concerned, which may differ from the confidence intervals (Limits sheet of the software package).

If a descriptor has a high percentage robust coefficient of variation, the relative coefficient of definition has to be very well validated because it could be linked to large variations between different samples of oil belonging to the specific designation.

These stages of validation and checking are very important because the characteristic sensory profile of the designation of origin has to bear in mind the normal fluctuations in the oil due to various causes and to the normal ageing of the finished product.

The actual defining intervals of the designation are entered by inserting the upper limit and the lower limit (maximum and minimum) of the characteristic descriptors of the specific designation in the spreadsheet headed **Limits**.

*Notice*: When there is no lower limit (min) the number **0** should be inserted. If there is no upper limit (max), the maximum value on the evaluation scale should be entered, i.e. **10**.

Example: D.O. extra virgin olive oil

Defining intervals assessed according to calculated C.I.

| Profile | Fruity | Sweet | Bitter | Pungent |
|---------|--------|-------|--------|---------|
| Upper limit | 3.5 | 10 | 1.5 | 2.50 |
| Lower limit | 1.5 | 2.5 | 0 | 0 |

The limits of the defining intervals have been calculated by taking into account the assessment factors, the value of the CVr% and the possible fluctuations in the characteristics of the oil.

## Graph of the characteristic sensory profile

Using the spreadsheet (MS-Excel®) the graph of the characteristic sensory profile of the DO extra virgin olive oil is obtained from the data for the intensity medians of the individual characteristic descriptors listed in the profile sheet (Figure 1) and the medians of the defining intervals (section 3.1.).



"Name of designation"
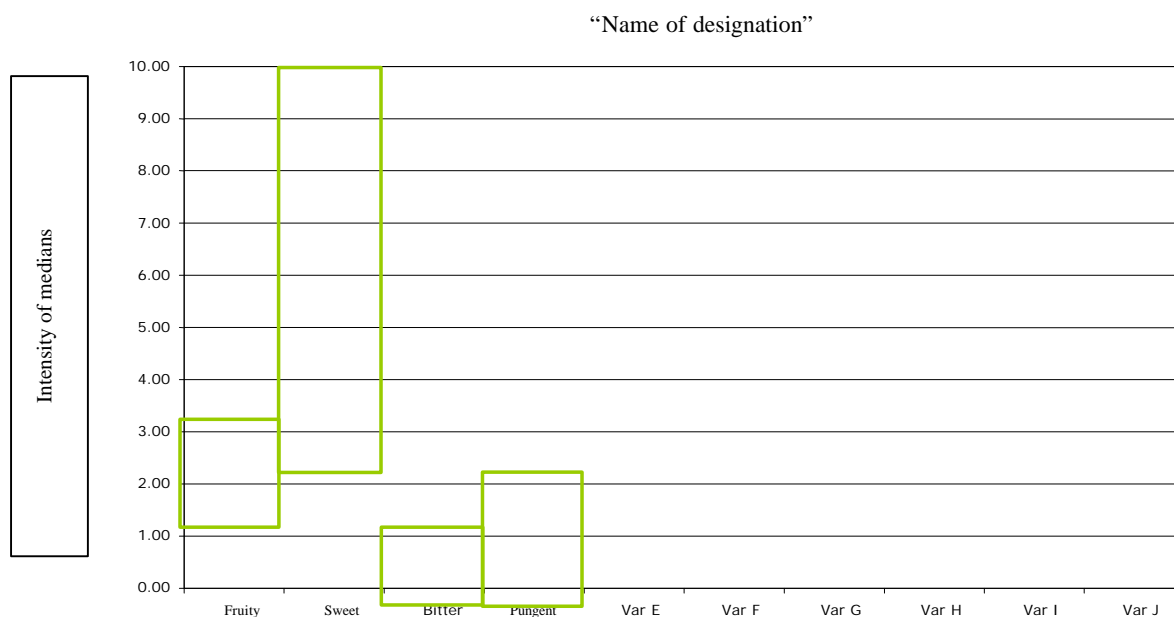
## **Instructions for holding the round table**

The round-table method is a very powerful tool for extrapolating the specific descriptors of a product directly from the sensations perceived by the panel. It makes it possible to arrive at much more robust descriptors because they are the direct result of the descriptive ability of the panel members. The round table and discussion are also used for training purposes to strengthen the ability of future panel members to describe the products tested and to train the panel in sensory description.

## **Preparation of the samples**

### **Stage one**

The samples are prepared blind, according to typology, and are presented to the panel members in pairs. As far as possible the pairs of samples should have very different characteristics in order to heighten the discriminatory ability of the panel members. It is easier to describe an item in terms of its differences with regard to another item than to describe it on its own, in absolute terms.

### **Stage two**

The samples are presented in pairs (if possible, they should be different from those presented in stage one) and are labelled with a one-digit code (sample 1 and sample 2). They are prepared in the same way as in stage one.

## **Round table**

### **Stage one. Description**

In the first stage of the round table the panel members describe the samples they have been assigned. Each panel member who analyses the samples presented should write down on a sheet of paper the descriptors or sensory variables that characterise the product being examined.

The number of descriptors depends on the experience and training of the panel members.

The list of descriptors should keep to a precise, logical order where the sensory variables are arranged in terms of:

. olfactory sensations (direct)
. gustatory sensations
. retro-olfactory sensations (indirect)

Arranging the sensory variables inside these categories makes it easier to handle them.

When the descriptor recognition stage is completed, the panel supervisor opens discussions with the panel members in order to:

. combine the descriptors that have the same meaning into a single term;
. delete the descriptors perceived the least frequently;
. show the panel members how to use the semantic labels correctly;
. harmonise panel interpretation of the stimulus.

## Stage two. Checking

A set of two, code-numbered samples is distributed to the panel members. Using the descriptors that emerged during stage one of the analysis, they have to evaluate the two samples in relative terms, i.e. if the intensity of a descriptor is stronger in sample 1 than in sample 2, the first sample is assigned (+) and the second is assigned (-). If the intensity is similar, the samples are assigned (=). At the end of the assessment, the reliability and validity of each descriptor can be evaluated from the sequence of (+), (-) and (=) signs assigned by each taster for the descriptor.

If the sequence is at least 80% uniform , the descriptor has been interpreted unequivocally by the whole panel. Conversely, if the sequence has the same number of (+) and (-) signs, the descriptor has not been interpreted correctly or unequivocally by the whole panel.

The decision as to whether to retain or discard a descriptor will depend on the following parameters:

. Purpose of the test
. Strategic importance of the descriptor
. Standard of panel training
. Pre-established tolerance level
. Depth required in the descriptive profile

If opinions are at variance on a descriptor that is considered to be important, the following solutions can be adopted:

. To resume training, using standard chemical or product samples
. To discuss the descriptors in depth during the round table
. To hold another round table

Upon completion of stage two, the panel supervisor will have a descriptive card of the product.

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# GUIDE FOR EVALUATING THE CONSISTENCY OF THE SENSORY PROFILE OF THE EXTRA VIRGIN OLIVE OIL WITH THE CHARACTERISTIC SENSORY PROFILE OF THE DESIGNATION OF ORIGIN

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## 1. Purpose

This guide provides the necessary instructions for applying section 7.4. of the method for the organoleptic assessment of extra virgin olive oil applying to use a designation of origin.

It is designed to provide the D.O. authority with whatever indications are necessary to evaluate whether the sensory profile of the oil being tested is consistent with the characteristic sensory profile determined for the designation of origin. This entails:

- checking that the oil belongs to the *extra virgin olive oil* grade, according to method COI/T.20/Doc. no. 15/Rev. 1;
- statistically processing the data using the accompanying software package (MS-Excel®), as prepared according to section 7.1. of the method;
- checking consistency;
- presenting the results of the evaluation.


## 2. References

. COI/T.20/Doc. no. 15/Rev. 1 of 20 November 1996, *Method for the organoleptic assessment of virgin olive oil*

. COI/T.20/Doc. no. 22, *Method for the organoleptic assessment of extra virgin olive oils applying to use a designation of origin*

## 3. Checking the grade of virgin olive oil applying for designation of origin status

The panel supervisor has to organoleptically assess the oil applying for designation of origin status according to method COI/T.20/Doc. no. 15/Rev. 1 of 20 November 1996 in order to make sure that the applicant oil has the organoleptic characteristics of the *extra virgin olive oil* grade.

When more than one sample is to undergo organoleptic assessment per tasting session, the panel supervisor is recommended to present the oils to the tasters in random order.

If the oil presented does not comply with the requirements for the *extra virgin olive oil* grade, it is not entitled to the designation of origin.

Example D.O. extra virgin olive oil

Classification – raw data

| Sample | Taster | Fusty | Musty | Winey | Muddy sediment | Metallic | Rancid | Other | Fruity | Bitter | Pungent |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DO | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 0 | 1 |
| DO | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 1 | 1 |
| DO | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| DO | D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 1 | 2 |
| DO | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 2 |
| DO | F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 0 | 1 |
| DO | G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| DO | H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.2 | 0 | 1 |

Classification – statistics

| Statistics | Fusty | Musty | Winey | Muddy sediment | Metallic | Rancid | Others | Fruity | Bitter | Pungent |
|---|---|---|---|---|---|---|---|---|---|---|
| DO | | | | | | | | | | |
| Median | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 1.0 |
| Interquartile range | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.0 | 0.3 |
| Robust standard deviation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.3 | 0.1 |
| Robust % C.V. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.39 | 0.00 | 8.18 |
| Upper limit C.I. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | 0.6 | 1.2 |
| Lower limit C.I. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | -0.6 | 0.8 |
| Grade assigned | **Extra V.** | | | | | | | | | |

**4.      Checking the consistency of the sensory profile of the extra virgin olive oil with that of the designation of origin**

4.1.     Use of the profile sheet and the profile sheet data

The panel supervisor has to present the oils to the tasters (in random order when several samples are assessed per tasting session) along with the specific profile sheet for the designation of origin, as established according to section 7.1. of the method for the organoleptic assessment of extra virgin olive oil applying to use a designation of origin.

The panel supervisor requests the tasters to assess the intensity with which they perceive each of the descriptors listed on the profile sheet, in accordance with section 7.3. of the method.

In compliance with the instructions given in section 7.4 of the method, the supervisor then collects the profile sheets completed by the tasters, checks the intensities assigned and enters the values in the software package determined for the designation of origin according to section 7.2. and Annex 1 of the method (Guide for determining the characteristic sensory profile of D.O. extra virgin olive oil).

4.2.     Entry of data in the software

The data are entered in the specified boxes in the first spreadsheet, headed **Data**.

The data for five samples can be entered and processed simultaneously in this spreadsheet.

## 4.3. Evaluation of the profile sheet data

After the data have been entered, the program will statistically process them in the spreadsheet headed **Calculation**.

Example: D.O. extra virgin olive oil

Statistics

|  | Fruity | Sweet | Bitter | Pungent |
|---|---|---|---|---|
| DO |  |  |  |  |
| Median | 2.4 | 3.3 | 0.0 | 1.0 |
| Interquartile range | 1.3 | 0.6 | 1.0 | 0.3 |
| Robust standard deviation | 0.42 | 0.20 | 0.33 | 0.08 |
| Robust %C.V. | 17.39 | 6.20 | 0.00 | 8.18 |
| Upper limit C.I. | 3.22 | 3.70 | 0.64 | 1.16 |
| Lower limit C.I. | 1.58 | 2.90 | -0.64 | 0.84 |

## 4.4. Evaluation of the compliance of the oil with D.O. requirements

The panel supervisor validates the test and assesses whether the oil is consistent with the designation of origin, using the sheet headed **Output**. This is done by calculating the median of the intensity with which each descriptor is perceived and the robust coefficients of variation (CVr%) for each descriptor.

The CVr% are assessed according to the pre-established limit. If the CVr% of the descriptors of a sample are below the established limit, the test is reliable. If the opposite is the case, the test has to be repeated.

The CVr% limits are decided according to the descriptor concerned. If the descriptor represents a characteristic that is of particular importance to the designation of origin, the CVr% limit should be as low as possible in order to ensure good precision and reliable measurement. Reasonable reliability or precision may, however, be sufficient.

**Table of CVr% limit**

| CVr% | Reliability |
|------|-------------|
| 0-5 | Excellent |
| 6-10 | Good |
| 11-20 | Reasonable |
| 21-30 | Poor |
| >30 | Bad |
| >30 | Bad |

<u>Example</u> DO extra virgin olive oil

Results

| Profile | Fruity | Sweet | Bitter | Pungent |
|---------|--------|-------|--------|---------|
| DO | 2.40 | 3.30 | 0.00 | 1.00 |
| | | | | |
| Variability(CVr%) | 17.30 | 6.20 | 0.00 | 8.18 |

The consistency table shows whether the sensory profile (all the descriptors) of the samples that have been tested matches the limits laid down in the D.O. requirements.

A situation may arise where only one or a few of the descriptors are not consistent. In such cases, the panel supervisor and the D.O. technical management committee should evaluate the cases where only one descriptor is not consistent.

<u>Example</u>: D.O. extra virgin olive oil

Consistency results

| Consistency | Fruity | Sweet | Bitter | Pungent |
|-------------|--------|-------|--------|---------|
| DO | C | C | C | C |

4.5.    Sensory profile graph of the oil tested

Extra virgin olive oil being tested
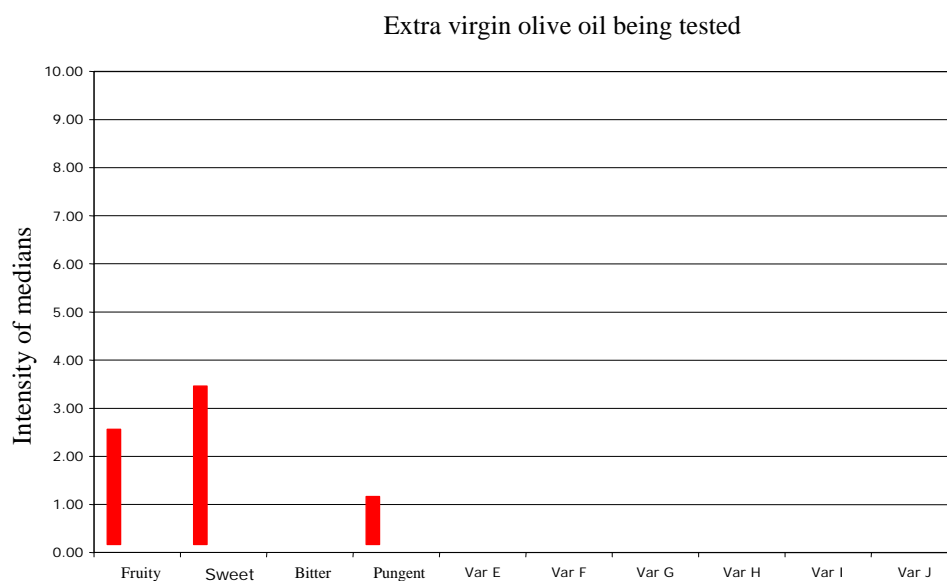


4.6    Presentation of results in graph form

The final evaluation as to whether the oil tested complies with the requirements for the designation of origin is represented in graph form on the last two pages of the spreadsheet, which show the extent to which the sensory profile of the oil being tested matches the profile of the DO oil and gives the variability of the test results (CVr%)

EXTRA VIRGIN OLIVE OIL BEING TESTED
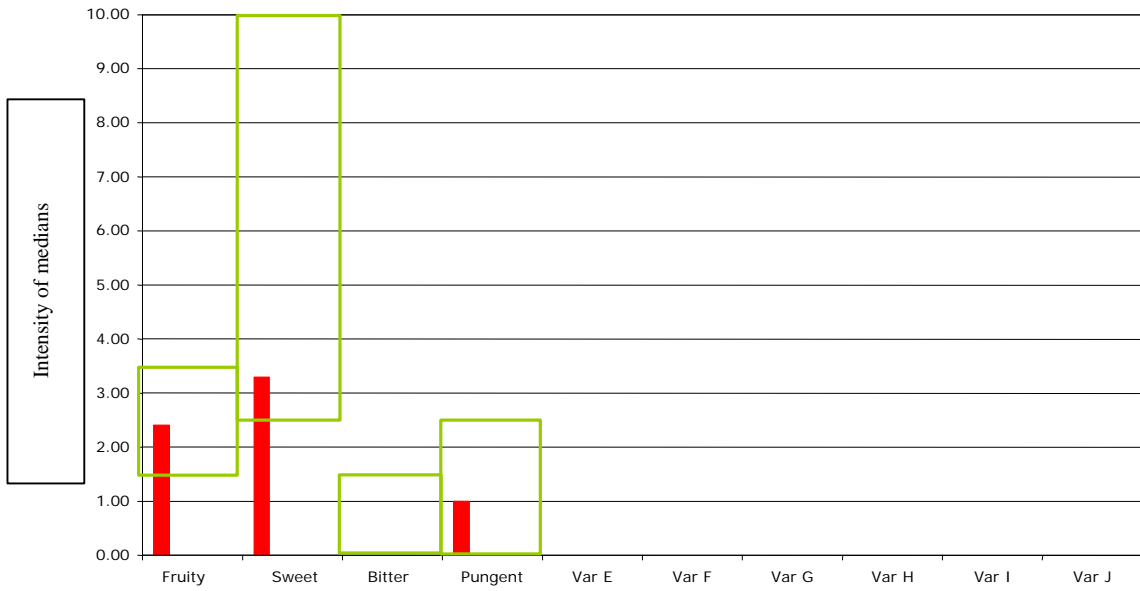


VARIABILITY INDEX
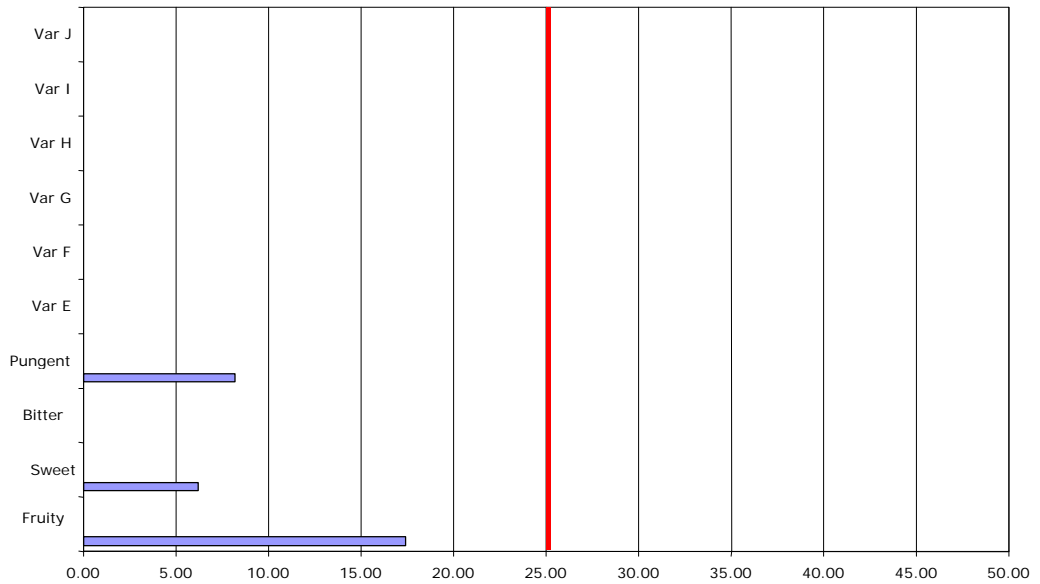
# **Method of calculation**

**Median**

$$Me = [P\,(X < x_m) \leq \tfrac{1}{2} \;\wedge\; P\,(X \leq x_m) \geq \tfrac{1}{2}]$$

The median is the real number $X_m$ characterised by the fact that the probability (P) that the distribution values (X) are below this number ($X_m$), is less than and equal to 0.5 and that simultaneously the probability (P) that the distribution values (X) are below or equal to $X_m$ is greater than and equal to 0.5. A more practical definition is that the median is the 50th percentile of a distribution of numbers arranged in increasing order. In other words, it is the midpoint of an ordered set of odd numbers, or the mean of two midpoints of an ordered set of even numbers.

**Robust standard deviation**

$$s^* = \frac{1{,}251\,IQR}{1{,}35\sqrt{N}}$$

In order to arrive at a reliable estimate of the variability around the mean it is necessary to refer to the robust standard deviation as estimated according to Stuart and Kendall. The formula gives the asymptotic robust standard deviation where N is the number of observations, IQR is the interquartile interval or the robust estimate of the variability of the data considered (the interquartile interval encompasses exactly 50% of the cases of a given probability distribution). The interquartile interval is calculated by calculating the size of the difference between the 75th and 25th percentile.

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

The percentile is the value $X_{pc}$ characterised by the fact that the probability (P) that the distribution values are less than $X_{pc}$ is less than and equal to a specific hundreth and that simultaneously the probability (P) that the distribution values are less than or equal to $X_{pc}$ is greater than and equal to that specific hundredth. The hundredth indicates the distribution fractile chosen. In the case of the median it is equal to 50/100.

$$Percentile = [P\,(X < X_{pc}) \leq \tfrac{n}{100} \;\wedge\; P\,(X \leq X_{pc}) \geq \tfrac{n}{100}\,]$$

For practical purposes, the percentile is the distribution value corresponding to a specific area subtended from the distribution or density curve. To give an example, the 25th percentile represents the distribution value corresponding to an area equal to 0.25 or 25/100.

**Robust coefficient of variation (%)**

$$CVR = \frac{s^*}{Me} \; 100$$

For practical purposes, the percentile is the distribution value corresponding to a specific area subtended from the distribution or density curve. To give an example, the 25th percentile represents the distribution value corresponding to an area equal to 0.25 or 25/100.

**Confidence intervals of the median at 95%**

The confidence intervals at 95% (value of the error of the first kind equal to 0.05 or 5%) represent the interval within which the value of the median could vary if it were possible to repeat an experiment an infinite number of times. In practice, it indicates the interval of variability of the test in the operating conditions adopted if it were possible to repeat it many times. As with the CV%r, the interval helps to assess the reliability of the test.

$$\text{Upper C.I.} = \quad Me + (Cs^*)$$

$$\text{Lower C.I.} = \quad Me - (Cs^*)$$

Where C = 1.96 for the confidence interval equal to 0.95

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