MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

CSIC
Consejo Superior de Investigaciones Científicas

Consejo Superior de Investigaciones Científicas
Instituto de la Grasa

XXXVI Asamblea de Miembros
del Instituto de la Grasa (CSIC)

Soluciones avanzadas para asegurar la calidad del aceite de oliva

Diego L. García González
Instituto de la Grasa (CSIC)

DEFINIENDO LA CALIDAD

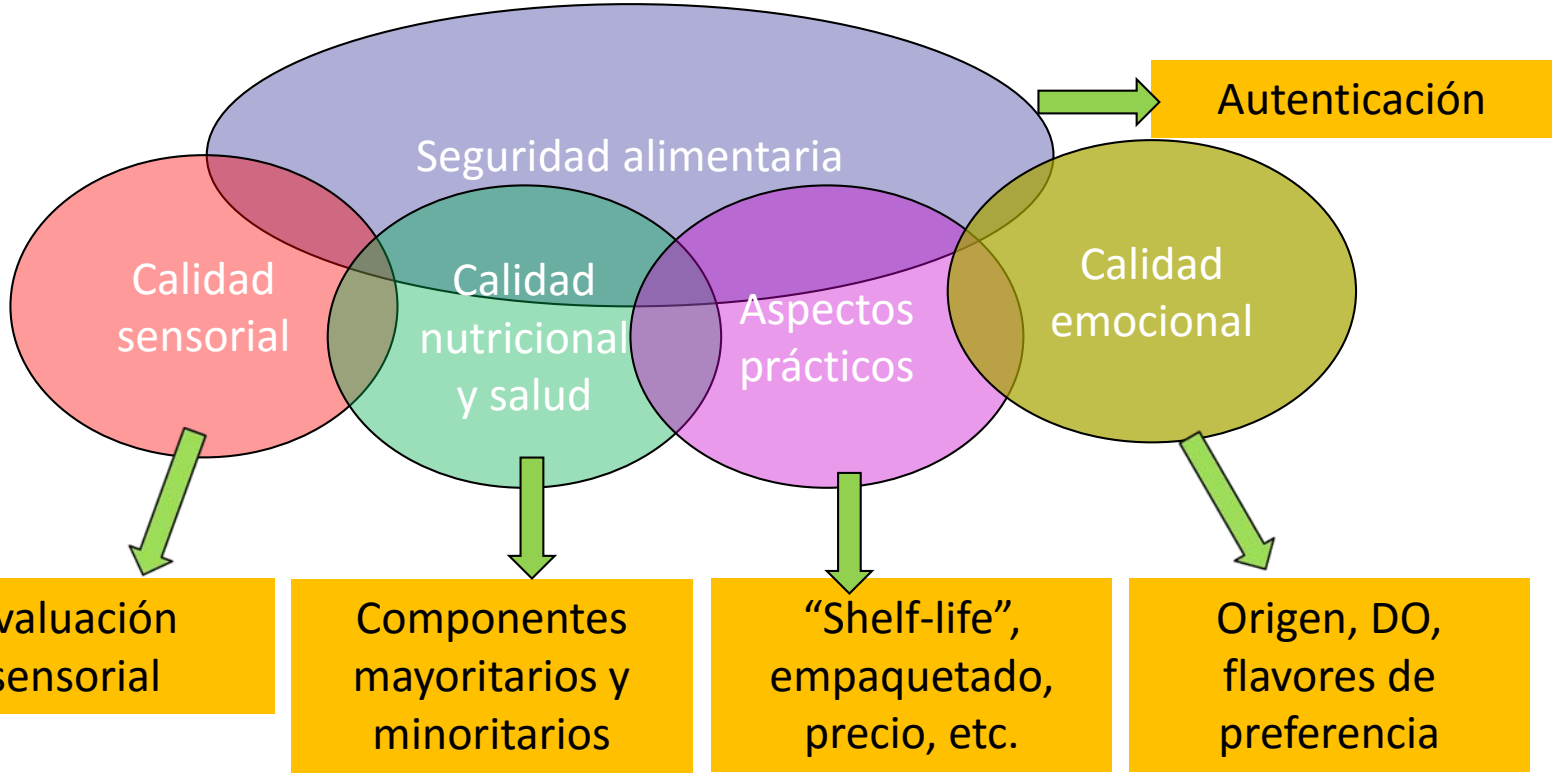
¿Qué es la calidad y cómo la percibe un consumidor?

CALIDAD COMO UN TÉRMINO MULTIDISCIPLINAR, JERÁRQUICO Y DIFUSO.

Nivel

1º

2º



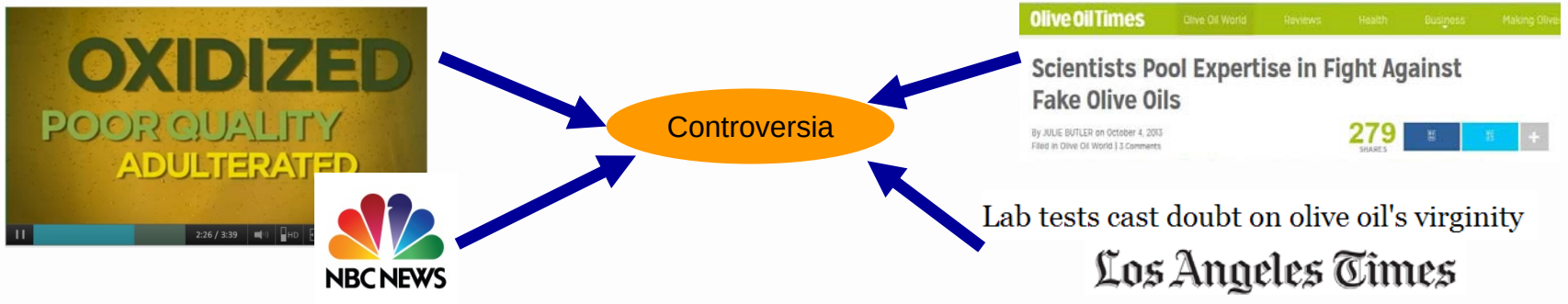
Foros de discusión sobre CALIDAD del aceite de oliva

Consejo Oleícola Internacional

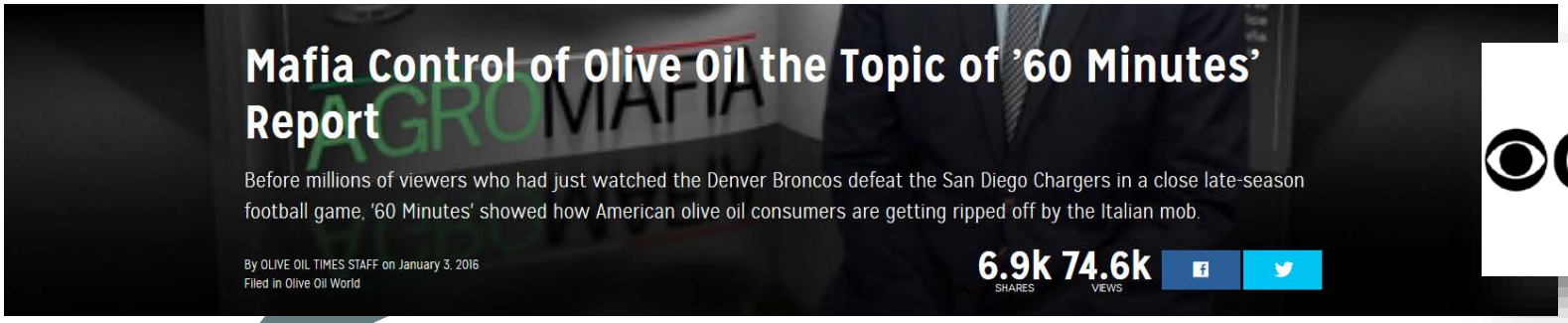
Comisión Europea — EU, DG Agri, Sub-group Olive Oil

AOCS, American Oils Chemists' Society

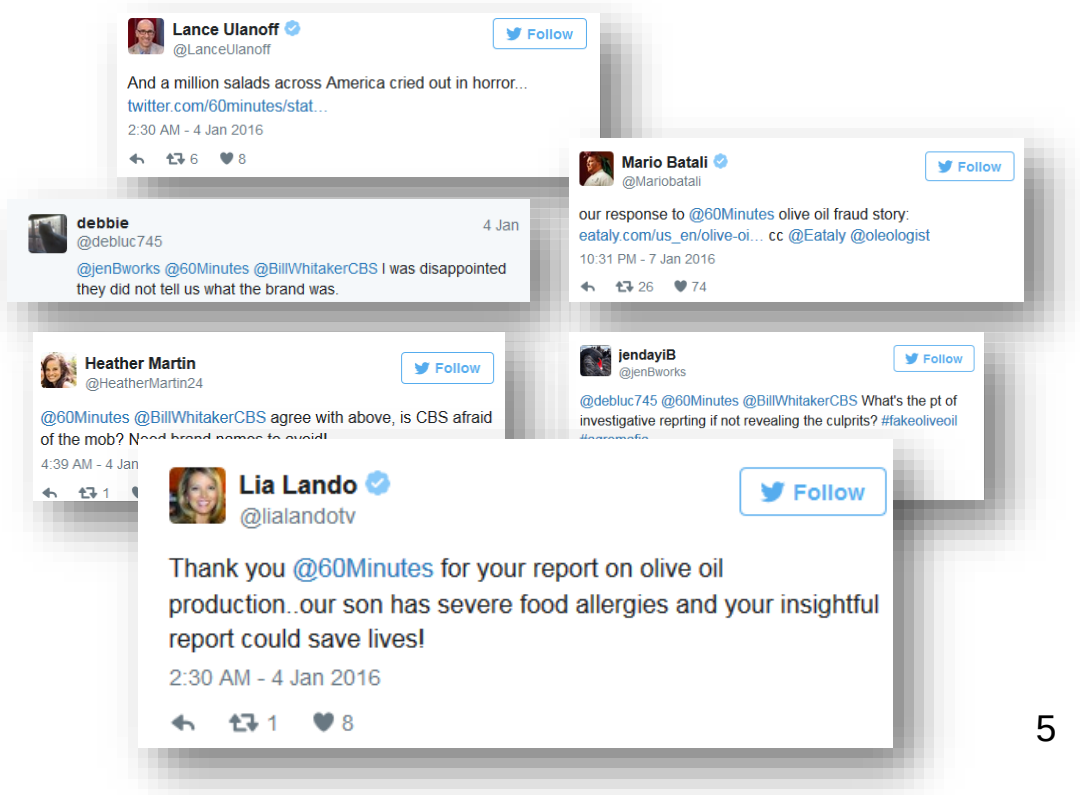
Grupo de Trabajo "Olive Oil Authencity"
US Pharmacopeia



Método oficial del panel de cata



Reacción en el consumidor

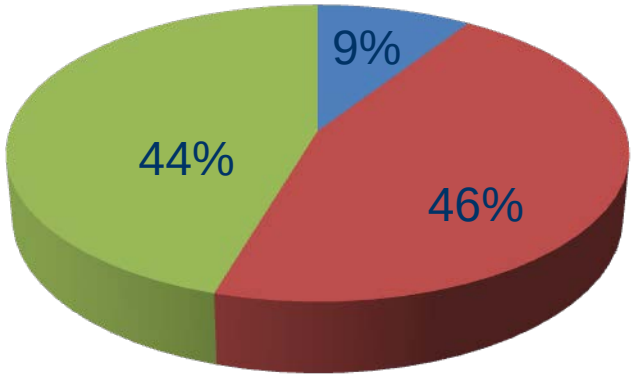


Enero, 2016

FOODINTEGRITY PROJECT: CUESTIONARIO EN ACEITE DE OLIVA.

Would you remove the Panel Test from the current regulations/trade standards?

Information from:
- Producers
- Retailers
- Exporters
- Analysts
- Regulatory bodies



"Mais il faut assoir la crédibilité des analyses sensorielles sur une analyse chimique d'accompagnement"

Serie de compuestos químicos en aceite de oliva

ÁCIDOS GRASOS

- Palmitic
- Palmitoleic
- Margaric
- Margaroleic
- Stearic
- Oleic
- Linoleic
- Linolenic
- Arachidic
- Gadoleic
- Behenic

FENOLES

- Hydroxityrosol
- Tyrosol
- Hty acetate
- 1st derivative Hty
- 1st derivative Ty
- Pinoresinol
- 2nd derivative Hty
- 2nd derivative Ty
- Luteolin
- Apigenin

Etc

ALCOHOLES

- Phytol
- Erythrodiol
- Docosanol
- Tetracosanol
- Pentacosanol
- Hexacosanol
- Octacosanol
- Taraxerol
- Dammaradienol
- β-Amirine
- Butyrospermol
- Cycloarthenol
- 24-Methylencycloarthenol

Etc.

HIDROCARBUROS

- Copaene
- Valencene
- Muurolene
- Tridecene
- Tetracosane
- Pentacosane
- Hexacosane
- Heptacosane

Etc.

VOLÁTILES

- Hexanal
- (E)-2-Hexenal
- Hexanol
- Acetic acid
- Hexyl acetate
- (Z)-3-Hexenol
- Nonanal

Etc

METALES

- Fe
- Cu

Etc.

TOCOFEROLES

- α-tocopherol
- β-tocopherol

TRIGLICÉRIDOS

- LLL
- OLLn
- OOLn
- OLL
- OOO+PoPP
- PoOO
- POP
- LOO+LnPP

Etc.

- ECN42
- ECN44
- ECN 46

Etc.

CERAS

- C36
- C38
- C40
- C42

Etc

PIGMENTOS

- Chlorophylls
- Pheophytins
- Pyropheophytins

METIL-ESTEROLES

- Grammisterol
- Cycloeucalenol
- 24-Ethyllophenol
- Citrostadienol
- Obtusifoliol

CAROTENOIDES

- β-Carotene
- Lutein
- Neoxanthin
- Antheraxanthin
- Mutatoxanthin
- Violaxanthin
- Luteoxanthin

Etc.

ESTEROLES

- Campesterol
- Stigmasterol
- β-Sitosterol
- Δ^5-Avenasterol
- Δ^7-Stigmastenol

Etc.

DIACILGLICEROLES

- 1,2 DAG
- 1,3 DAG

Etc.

ALQUIL ÉSTERES

- Methyl esters
- Ethyl esters

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Etc.

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Etc.

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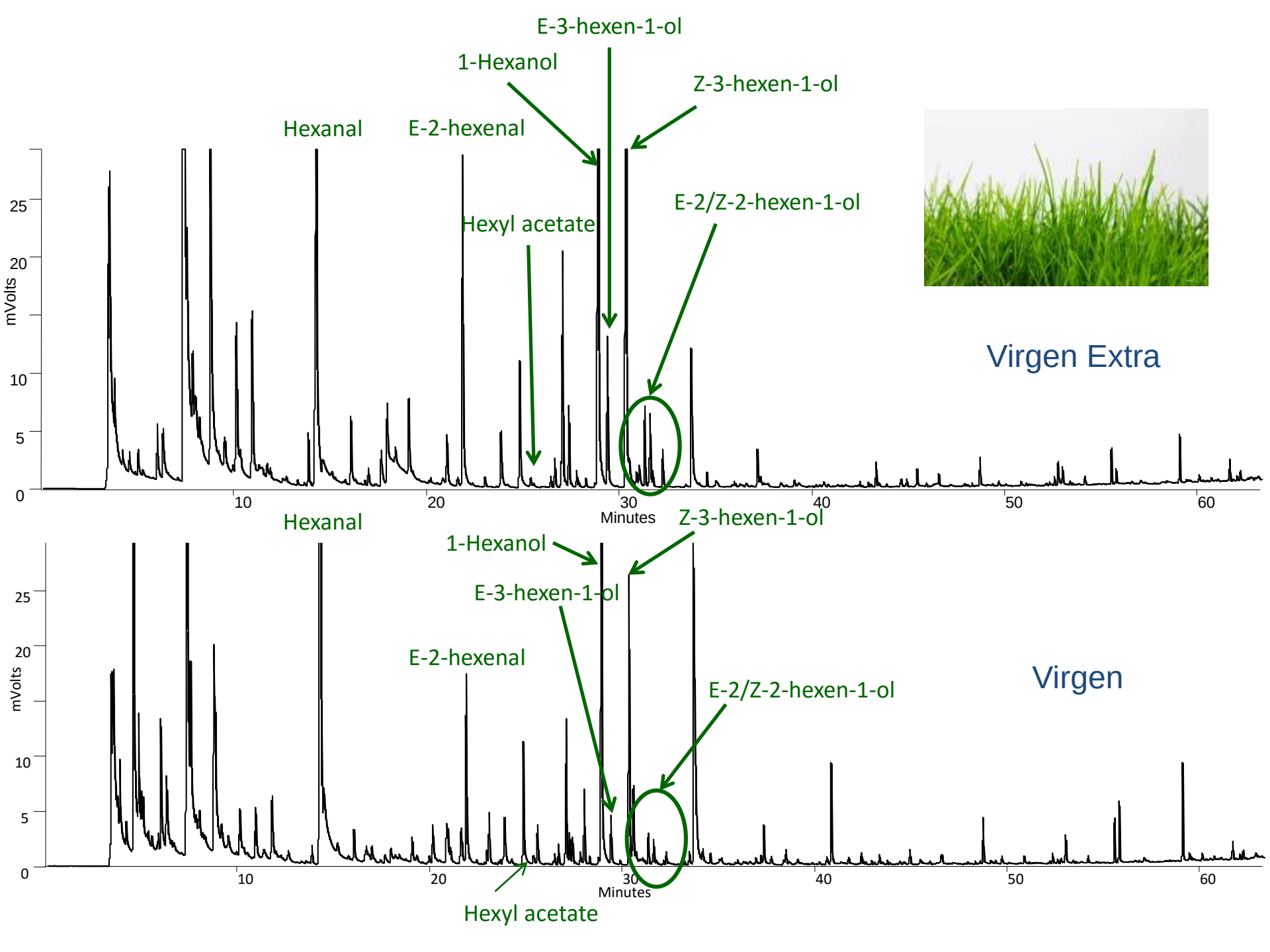
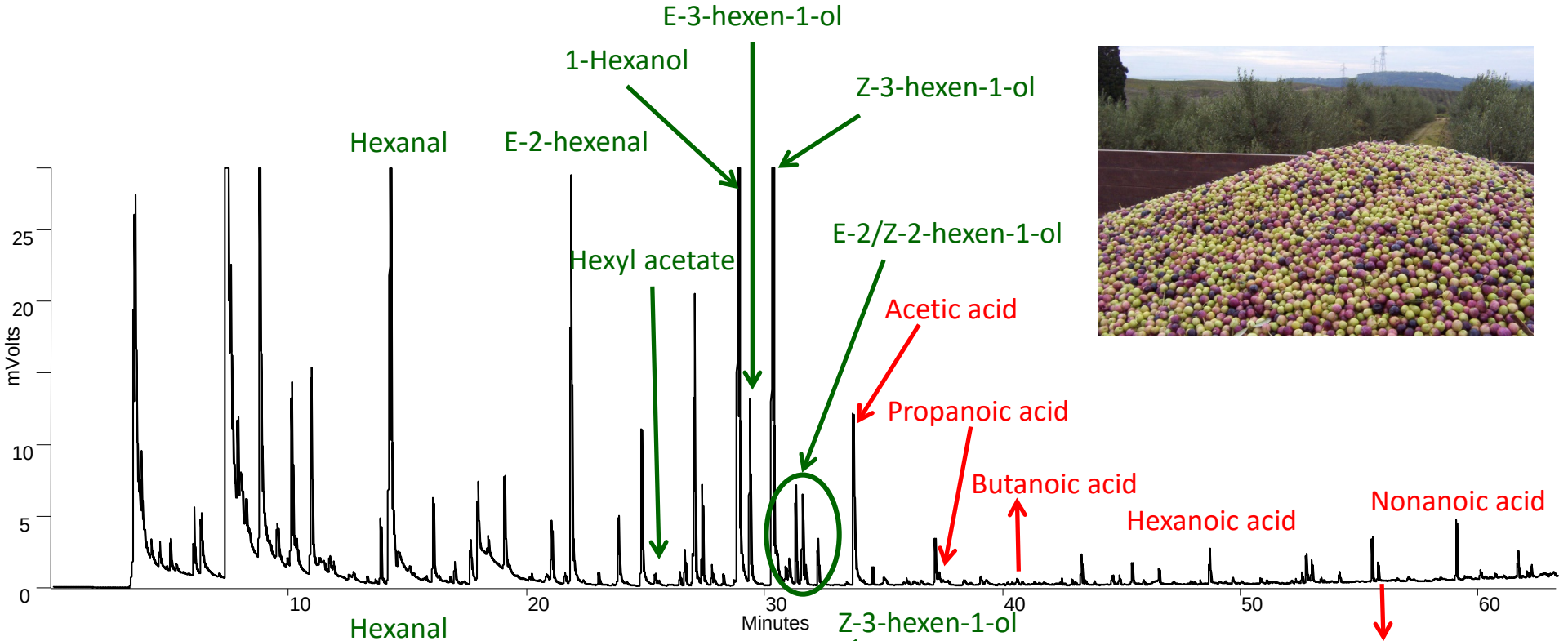
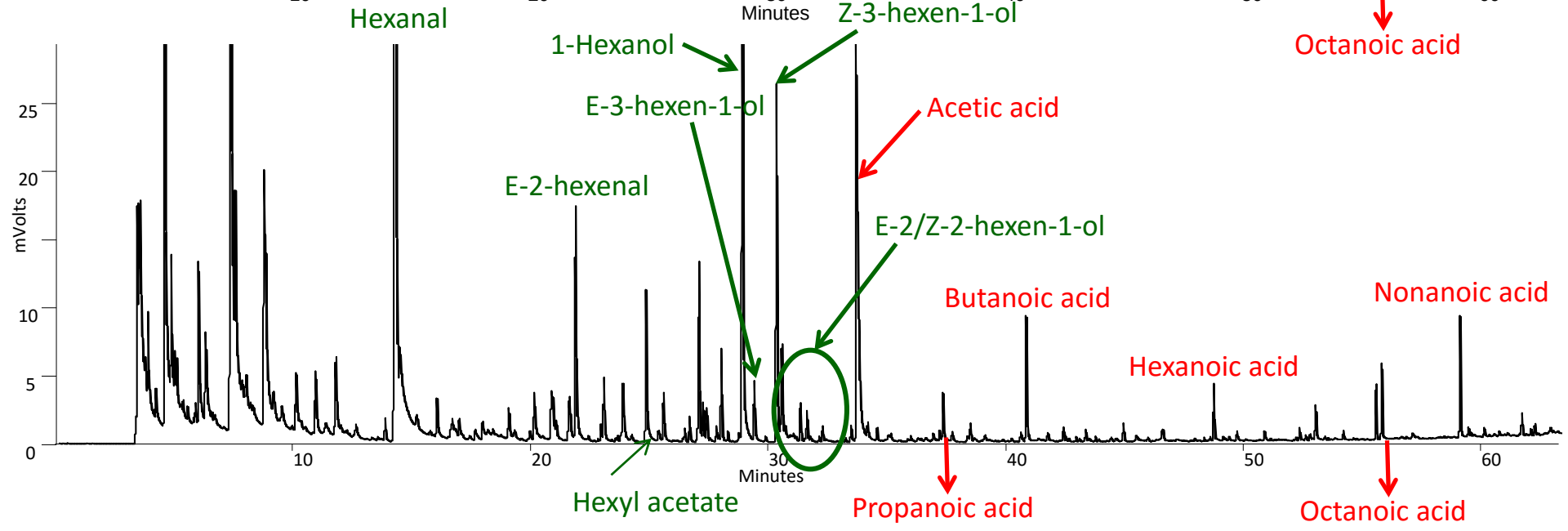

E-3-hexen-1-ol
1-Hexanol
Z-3-hexen-1-ol
Hexanal
E-2-hexenal
E-2/Z-2-hexen-1-ol
Hexyl acetate
mVolts
25
20
10
5
0
10
20
30
40
50
60
Minutes
Virgen Extra
Hexanal
Z-3-hexen-1-ol
1-Hexanol
E-3-hexen-1-ol
E-2-hexenal
E-2/Z-2-hexen-1-ol
Virgen
mVolts
25
20
10
5
0
10
20
30
40
50
60
Minutes
Hexyl acetate


E-3-hexen-1-ol
1-Hexanol
Z-3-hexen-1-ol
Hexanal
E-2-hexenal
E-2/Z-2-hexen-1-ol
Hexyl acetate
Acetic acid
Propanoic acid
Butanoic acid
Hexanoic acid
Nonanoic acid
Octanoic acid
mVolts
Minutes


Hexanal
Z-3-hexen-1-ol
1-Hexanol
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Acetic acid
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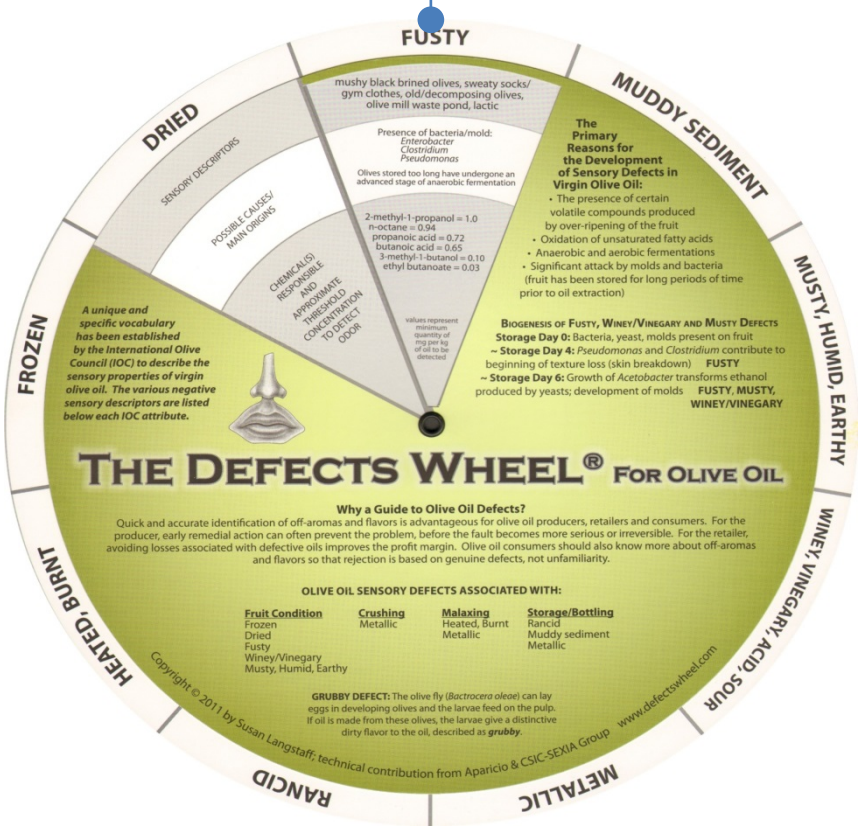
E-2/Z-2-hexen-1-ol
Butanoic acid
Nonanoic acid
Hexanoic acid
Hexyl acetate
Propanoic acid
Octanoic acid
mVolts
Minutes

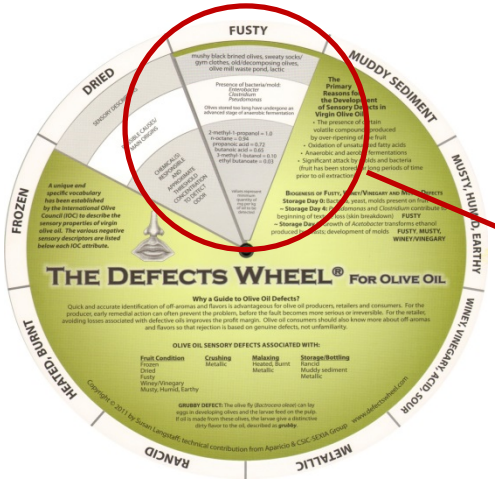
SENSORY WHEEL FOR SENSORY DEFECTS

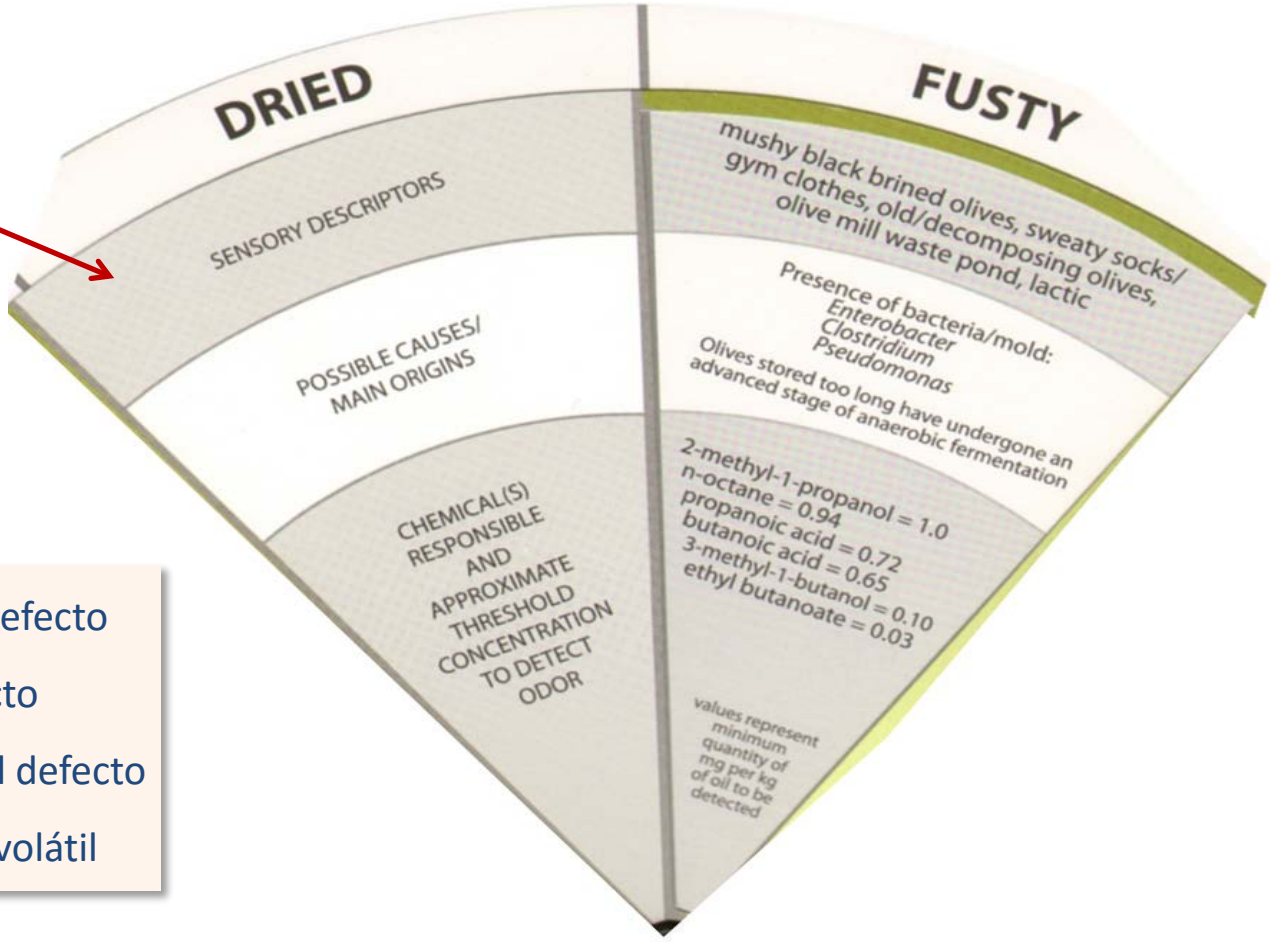
Information for:
- Researchers,
- Producers,
- Retailers
- Consumers,
- Regulatory bodies



SEXIA-CSIC Group
Applied Sensory, LLC

SENSORY WHEEL FOR SENSORY DEFECTS



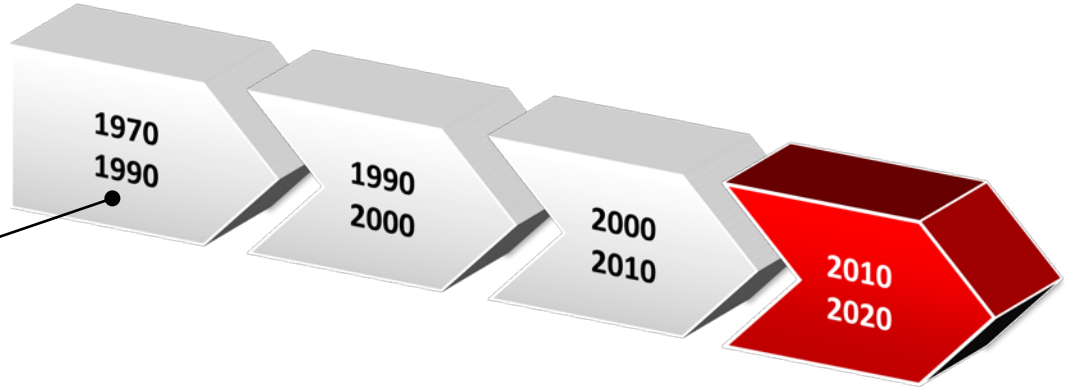


- Descriptor sensorial del defecto
- Origen principal del defecto
- Volátiles responsables del defecto
- Umbral de detección del volátil

SEXIA-CSIC Group
Applied Sensory, LLC

COMPUESTOS VOLÁTILES: RETROSPECTIVA

Identificando los volátiles del AOV con técnicas analíticas



Aroma components of olive oil

Robert A. Flath, Ralph R. Forrey, Dante G. Guadagni

J. Agric. Food Chem., **1973**, *21* (6), pp 948–952
DOI: 10.1021/jf60190a030

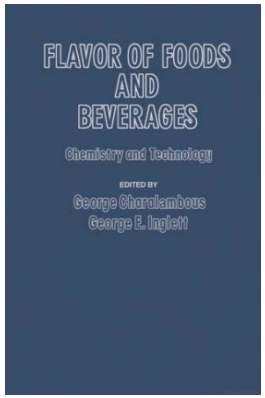
Los métodos organolépticos y cromatográficos en la valoración de las características aromáticas del aceite de oliva virgen.

Por R. Gutiérrez González-Quijano, J. M. Olías Jiménez, F. Gutiérrez Rosales, J. Cabrera Martín y A. del Barrio Pérez-Cerezal.

Instituto de la Grasa y sus Derivados.—Sevilla.

Aroma Analysis of Virgin Olive Oil by Head Space (Volatiles) and Extraction (Polyphenols) Techniques

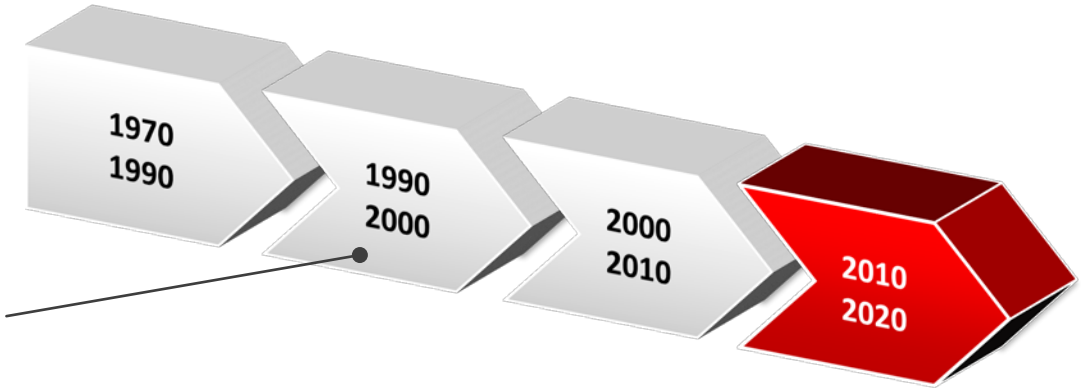
G. Montedoro, M. Bertuccioli, and F. Anichini

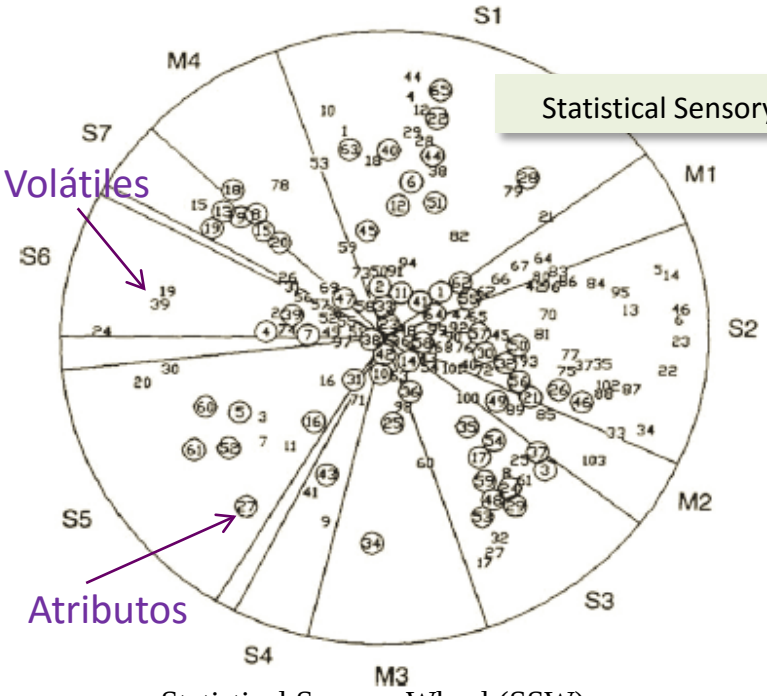


Instituto de la Grasa
Laboratorio volátiles

COMPUESTOS VOLÁTILES: RETROSPECTIVA

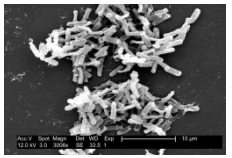
Relacionando volátiles con variedad, tecnología y calidad del AOV, mediante Matemáticas





Statistical Sensory Wheel (SSW)

Causa biológica/química



Origen tecnológico

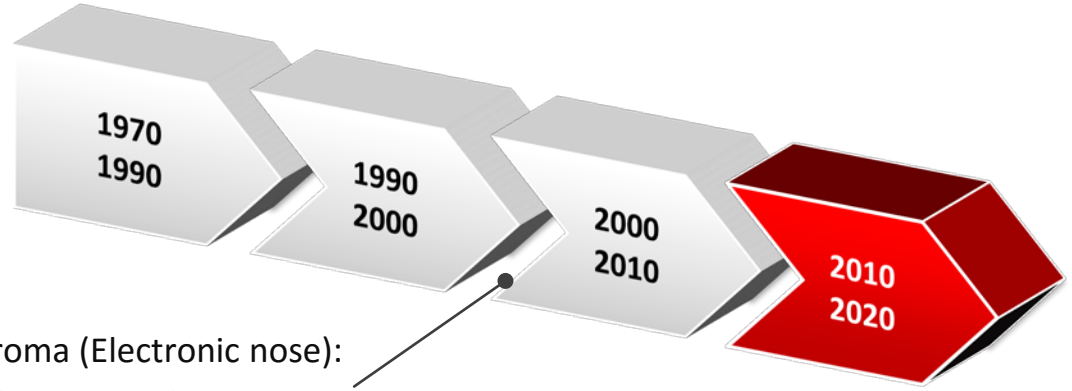
Marcador volátil

Defecto (descriptor)

Statistical Sensory Wheel (SSW)
J. Sci. Food Agric. 67:247-257 (1995)
European Project FLAIR CT91-0046

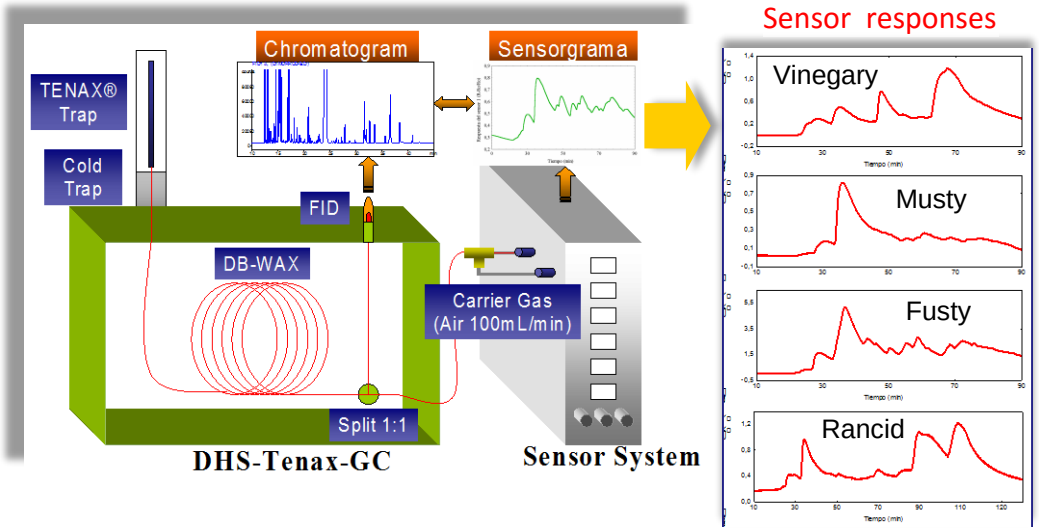
Backward-tracing: Explaining origin of VOO defects by Olive Oil Aroma Markers
Handbook of Olive Oil: Analysis and Properties 2nd edition. Springer. 2013

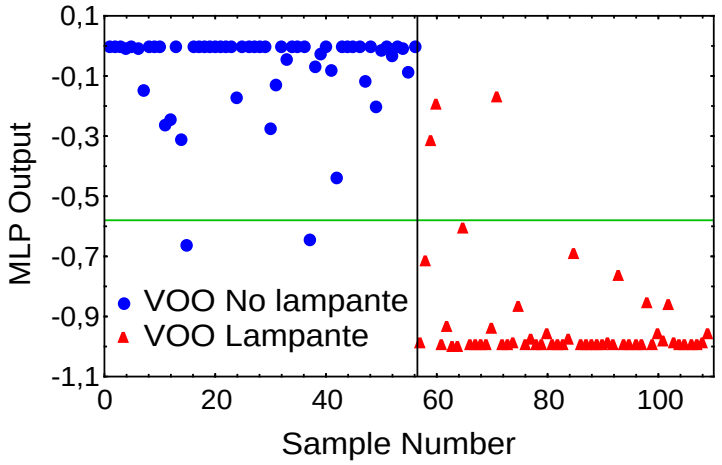
COMPUESTOS VOLÁTILES: RETROSPECTIVA



Sensores de aroma (Electronic nose):

técnicas bio-inspiradas no separativas

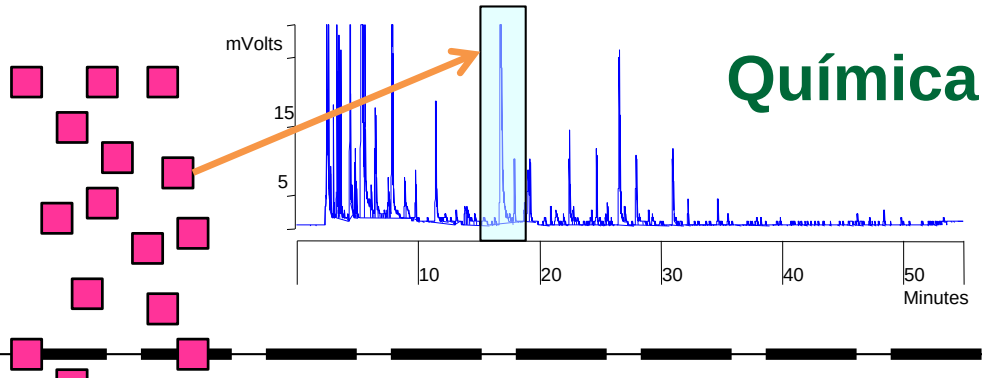




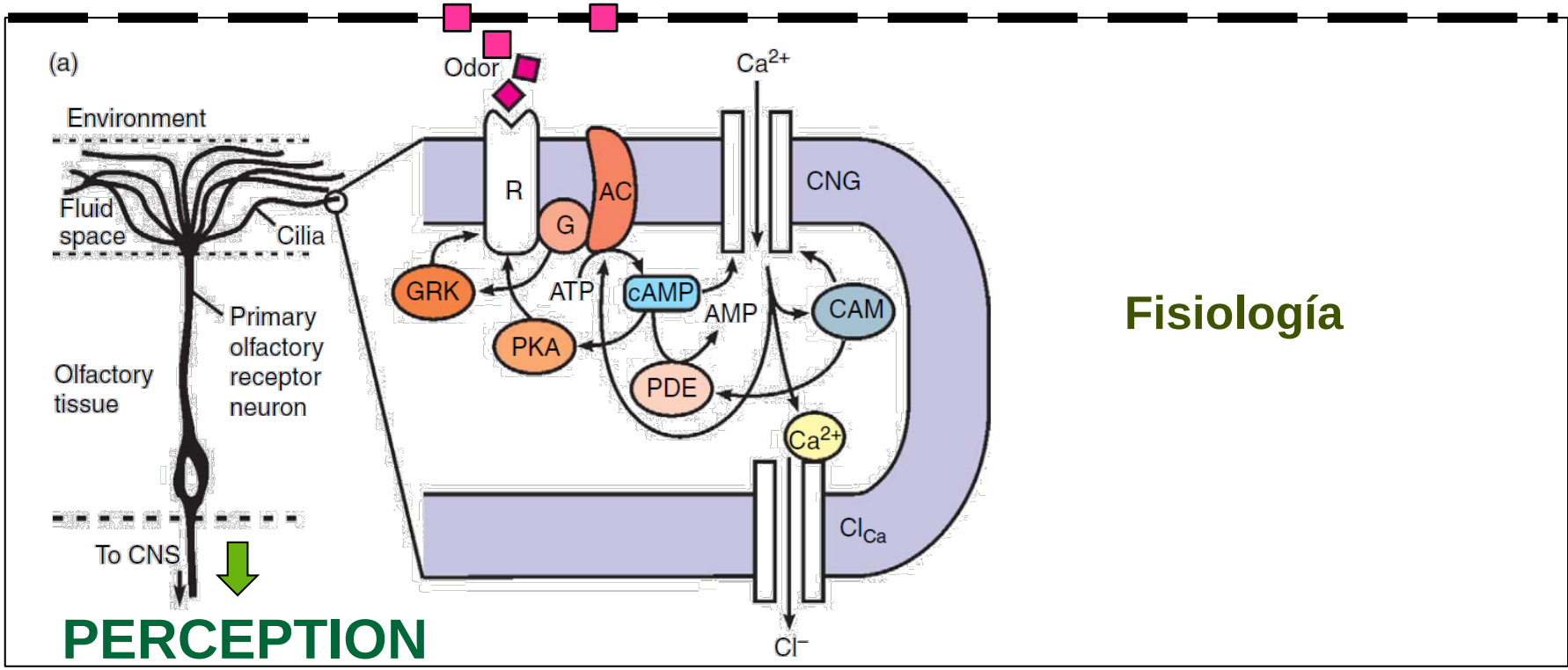
Explaining VOO sensory defects with in-tandem GC-MOS sensors

J. Agric Food Chem 48853-860 (2000); Food Chem. 120:572-579 (2010)

DESDE LA QUÍMICA A LA PERCEPCIÓN



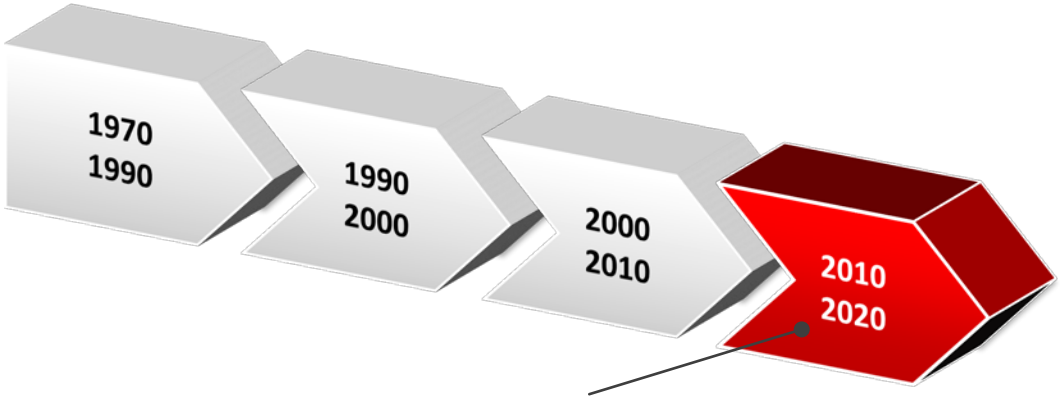
Química



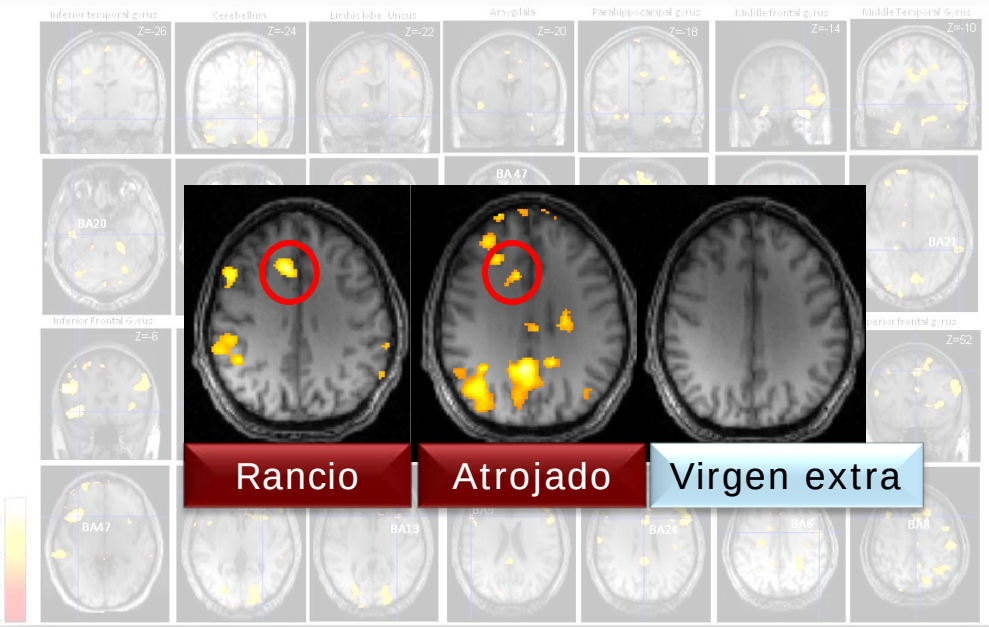
Fisiología

PERCEPTION

COMPUESTOS VOLÁTILES: RETROSPECTIVA

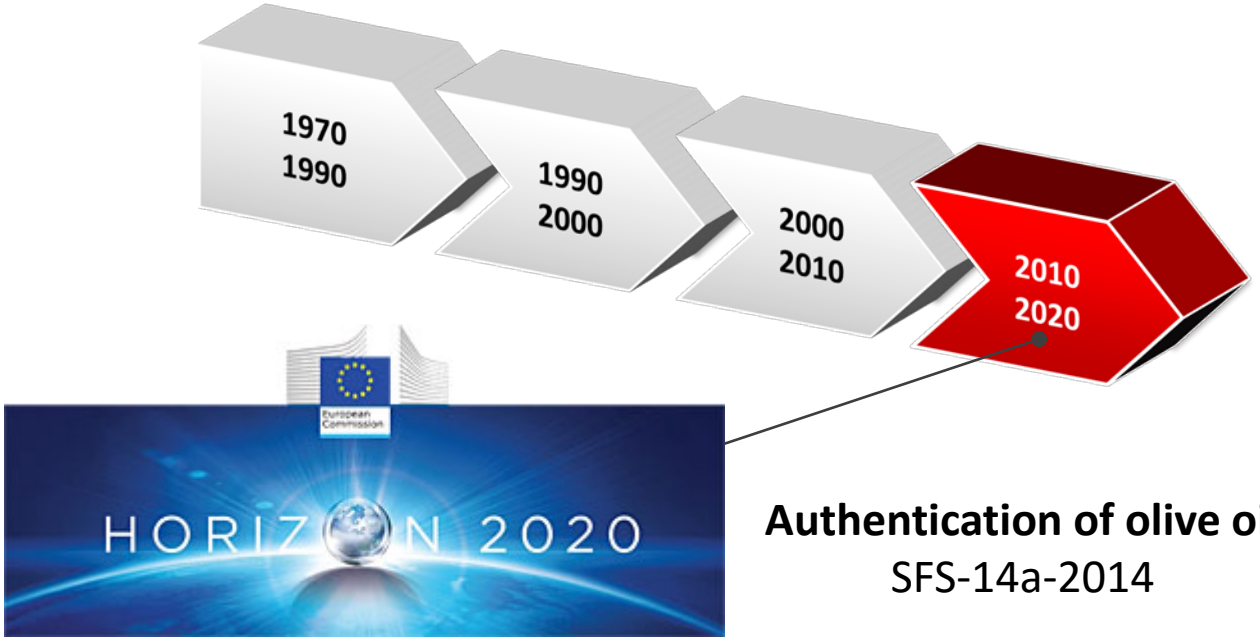


Estudios Post-Receptores (fMRI)



J. Agric. Food Chem. 59: 10200–10210 (2011)

COMPUESTOS VOLÁTILES: PRESENTE



Authentication of olive oil
SFS-14a-2014

"Method for the assessment of the **organoleptic characteristics** based on"

- The existing methods,
- Reference materials
- Already performed research and development work

CONSIDERACIONES

- MÉTODOS EXISTENTES: Se requiere analizar las ventajas e inconvenientes de cada método.

Thermal desorption cold trap injector

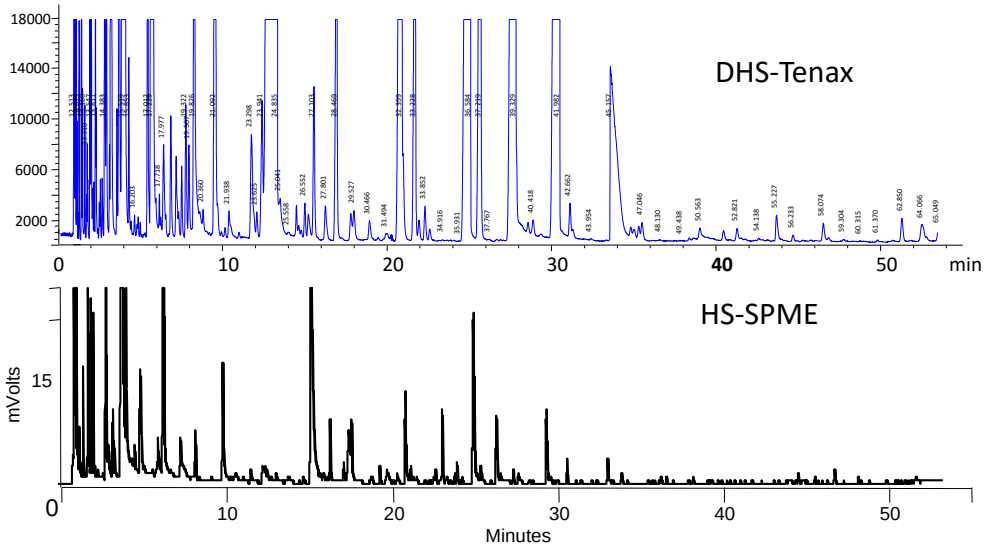
SPME-GC with automatic sampler

DHS (Tenax TA) TD-CTI Chrompack GCMS

SPME-GCMS

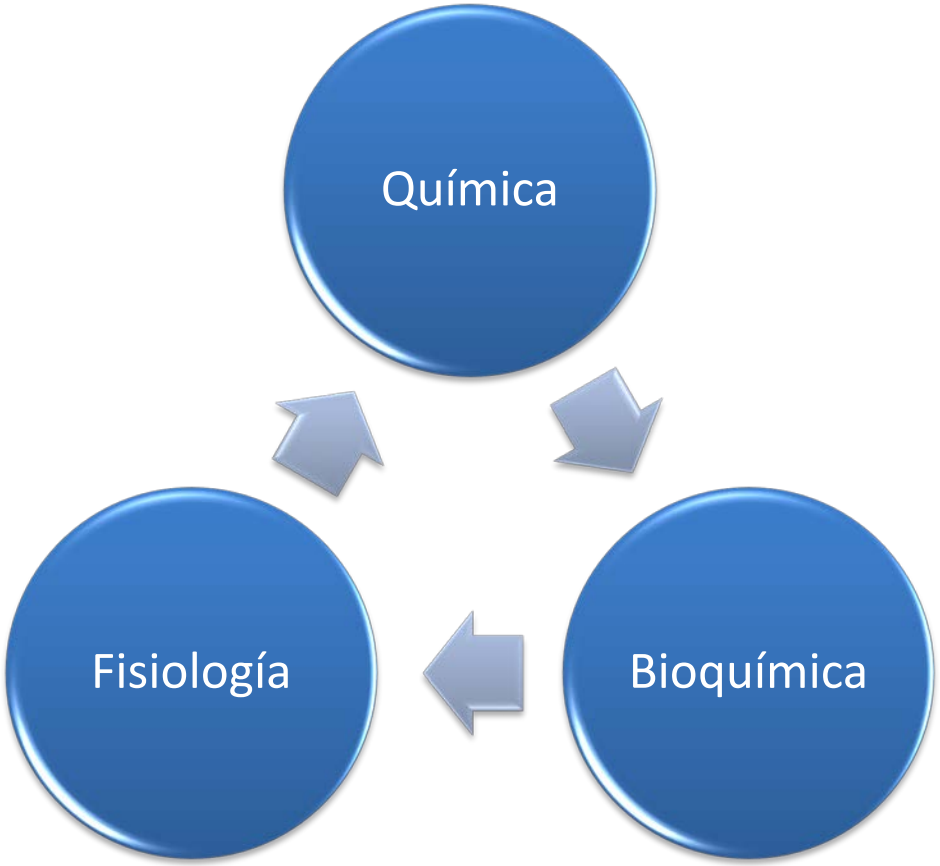
Teledyne-Tekmar technology

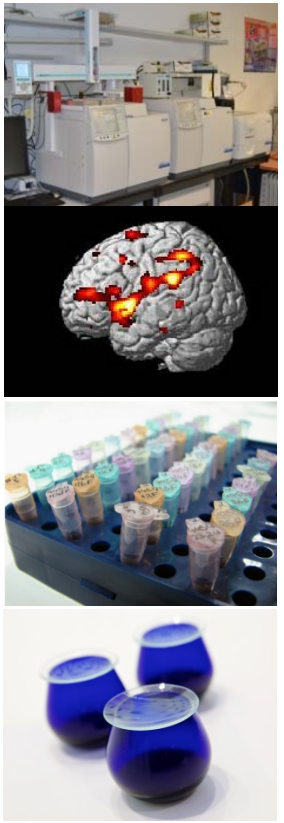
SPME-GCxGCMS with automatic sampler



CONSIDERACIONES

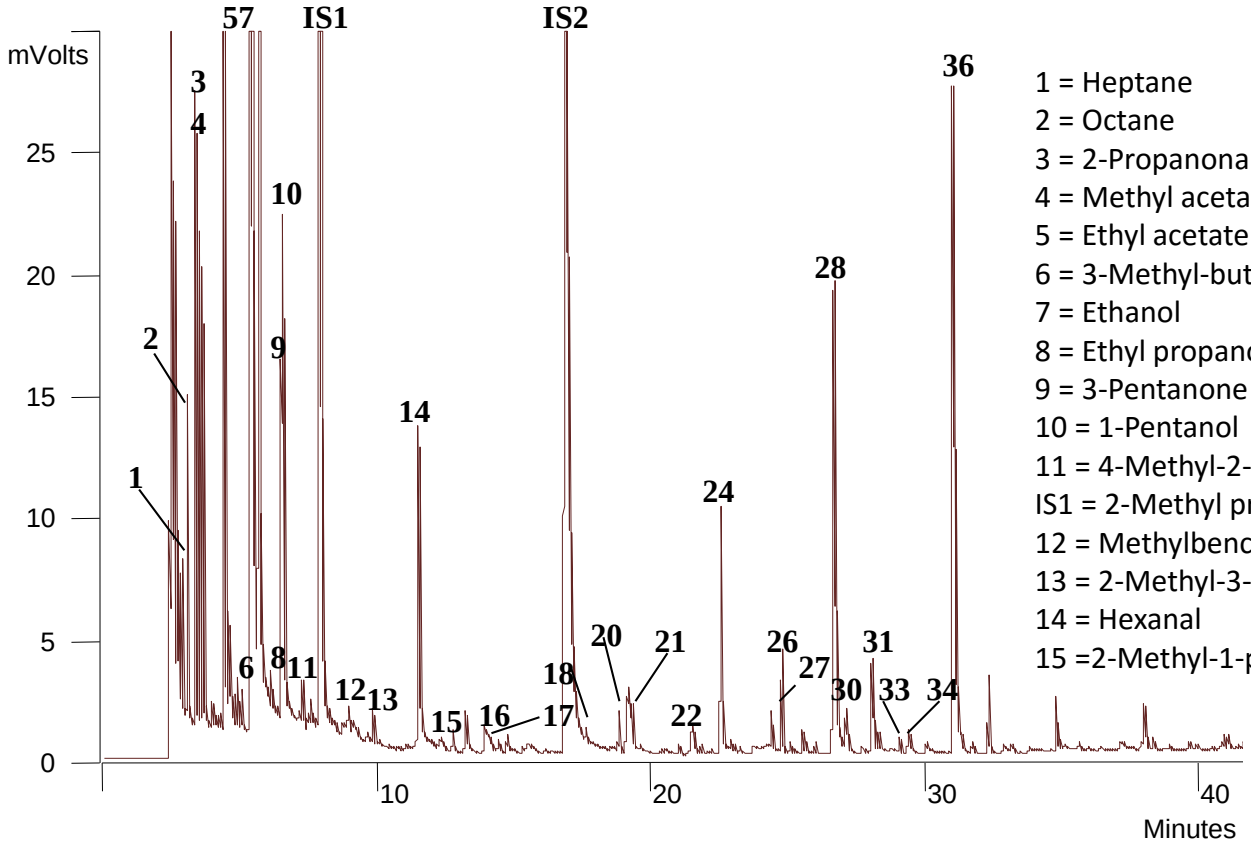
- NO PARTIMOS DE CERO: Se debe tener en cuenta los conocimientos científicos que existen.





CONSIDERACIONES

- PROCEDIMIENTO EN QUÍMICA DEL FLAVOR: más allá de la concentración.



1 = Heptane
2 = Octane
3 = 2-Propanona
4 = Methyl acetate
5 = Ethyl acetate
6 = 3-Methyl-butanal
7 = Ethanol
8 = Ethyl propanoate
9 = 3-Pentanone
10 = 1-Pentanol
11 = 4-Methyl-2-pentanone
IS1 = 2-Methyl propylethanoate
12 = Methylbencene
13 = 2-Methyl-3-buten-2-ol
14 = Hexanal
15 =2-Methyl-1-propanol
16 = Ethylbencene
17 = 2 Methylbutyl Acetate
IS2 = 4-Methyl-2-pentanol
18 = 2-Heptanone
20 = 3-Methyl-1-butanol
21 = E-2-Hexenal
22 = 1-Pentanol
24 = Hexyl acetate
26 = Z-3-Hexenyl acetate
27 = Z-2-Pentenol
28 = 6-Methyl-5-hepten-2-one
30 = E-3-Hexen-1-ol
31 = Z-3-Hexen-1-ol
33 = E-2-Hexen-1-ol
34 = Z-2-Hexen-1-ol
36 = 1-Octen-3-ol

CONSIDERACIONES

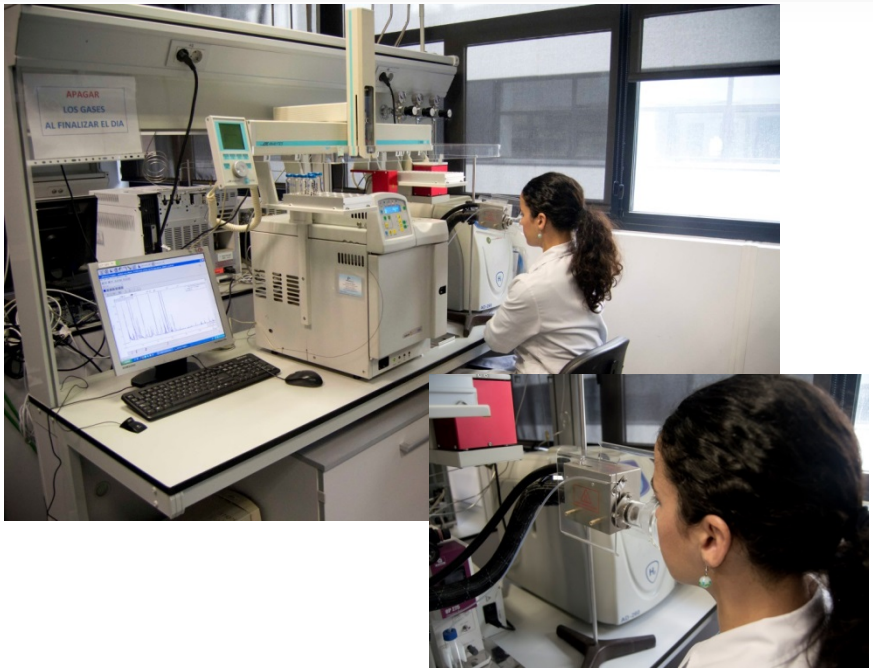
- PROCEDIMIENTO EN QUÍMICA DEL FLAVOR: más allá de la concentración.

Highlight Article

Eur. J. Lipid Sci. Technol. 2012, 114, 1114–1125

Towards new analyses of aroma and volatiles to understand sensory perception of olive oil

Ramón Aparicio[1], María T. Morales[2] and Diego L. García-González[1]



Selection of the **pre-concentration** procedure

↓

Identification of compounds by MS and validation by standards

↓

Identification of odour **impact zones** *(GC-Olfactometry)*

↓

Pre-selection of markers *(uni- and multi-variate statistical procedures)*

↓

Study of **response factor**, **linearity**, **LOD** and **LOQ** (effect of the food matrix)

↓

Determination of the **Odour Activity Value** *(OAV)*

↓

Selection of markers with high OAV *(good repeatabilty and sensory significance)*

↓

Validation of selected markers and methodology *(multivariate statistical procedures, blind samples in ring tests)*

↓

Perfecting analytical resolution by GC×GC, if necessary → Beginning

Design the **consensus plot** adapted to project objectives → End

CONSIDERACIONES

- Estudiar los defectos de forma independiente.
- Debería ser un método fácil y barato de implementar.
- Método robusto y con sólida base científica (clara relación compuesto volátil-respuesta-atributo).
- Aplicaciones:
  - Dudas entre categorías/dirimentes
  - Materiales de referencia (entrenamiento/puesta a punto de técnicas)
  - Mejor definición química de defectos (ej. Helada)

WP3: PARTNERS

WP3

Oleum Project

CSIC

Consejo Superior de Investigaciones Científicas

OLEUM

eurofins

ARISTOTLE UNIVERSITY OF THESSALONIKI

SMART ASSAYS

ITERG

Expertise Corps Gras

UNIVERSITAT DE BARCELONA

fera

MEDRI

MEDICINSKI FAKULTET SVEUČILIŠTA U RIJECI

JRC

EUROPEAN COMMISSION

NESTEC Inc.

Environmental Products for Industrial Solutions

UZZK

CONICET

Muchas Gracias

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