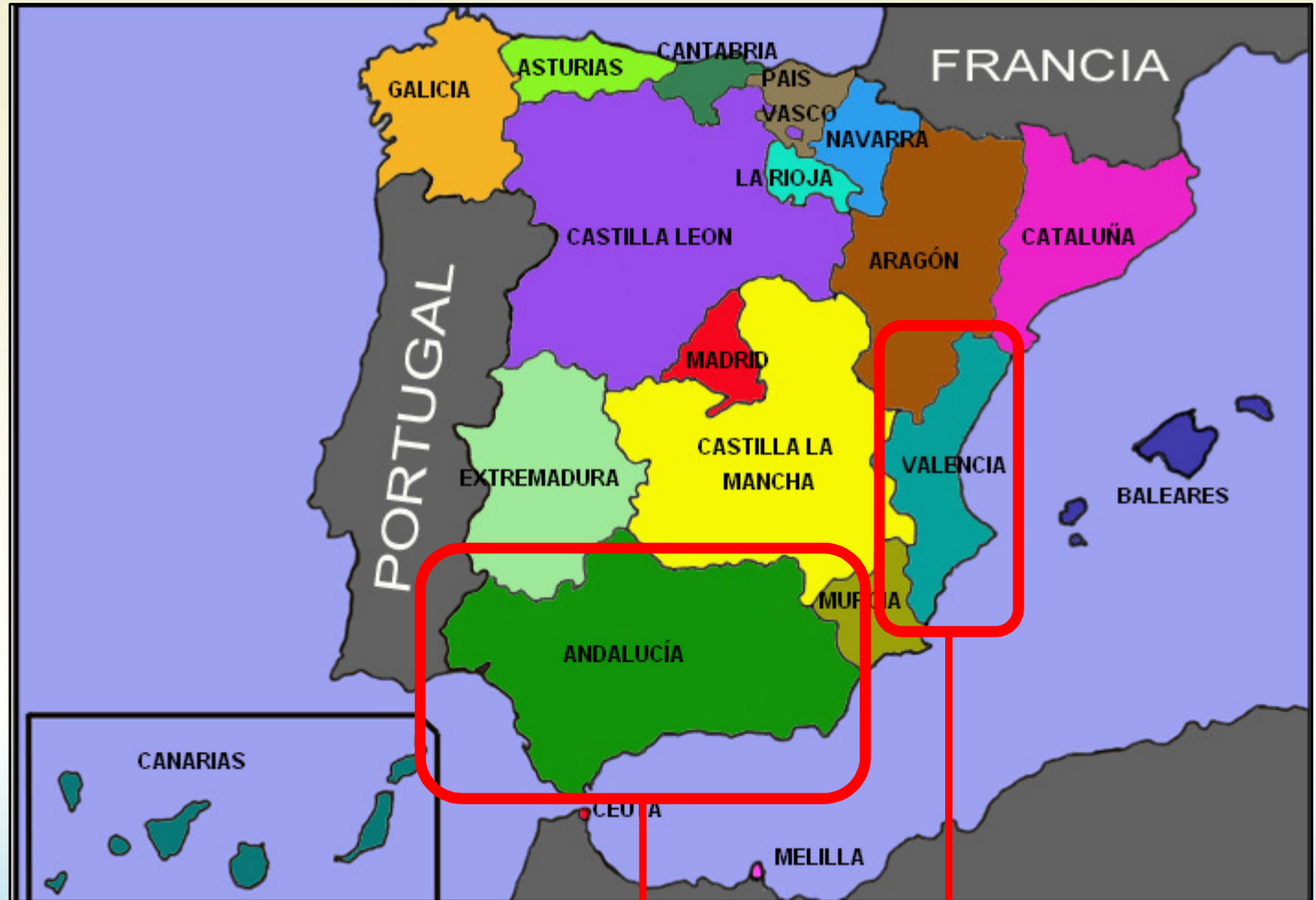


**SEPARATION AND IDENTIFICATION OF
CIS/TRANS β -CAROTENE ISOMERS OF
VIRGIN OLIVE OILS**

**Author: María E. Escuderos
(IFAPA Venta del Llano, Jaén, Spain)**

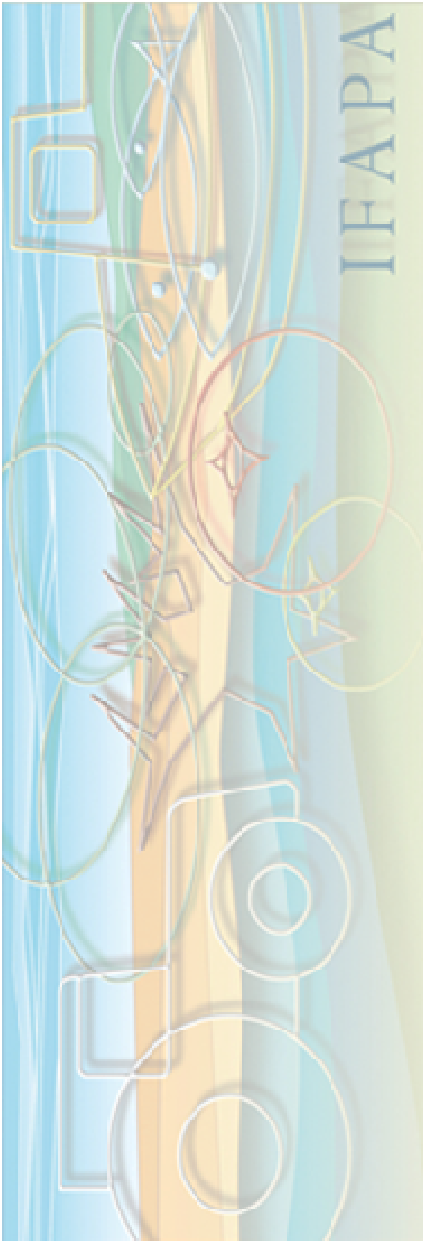


Where is IFAPA?



IFAPA

Euro Global Summit and Expo on
Food & Beverages
June 16-18, 2015 Alicante, Spain



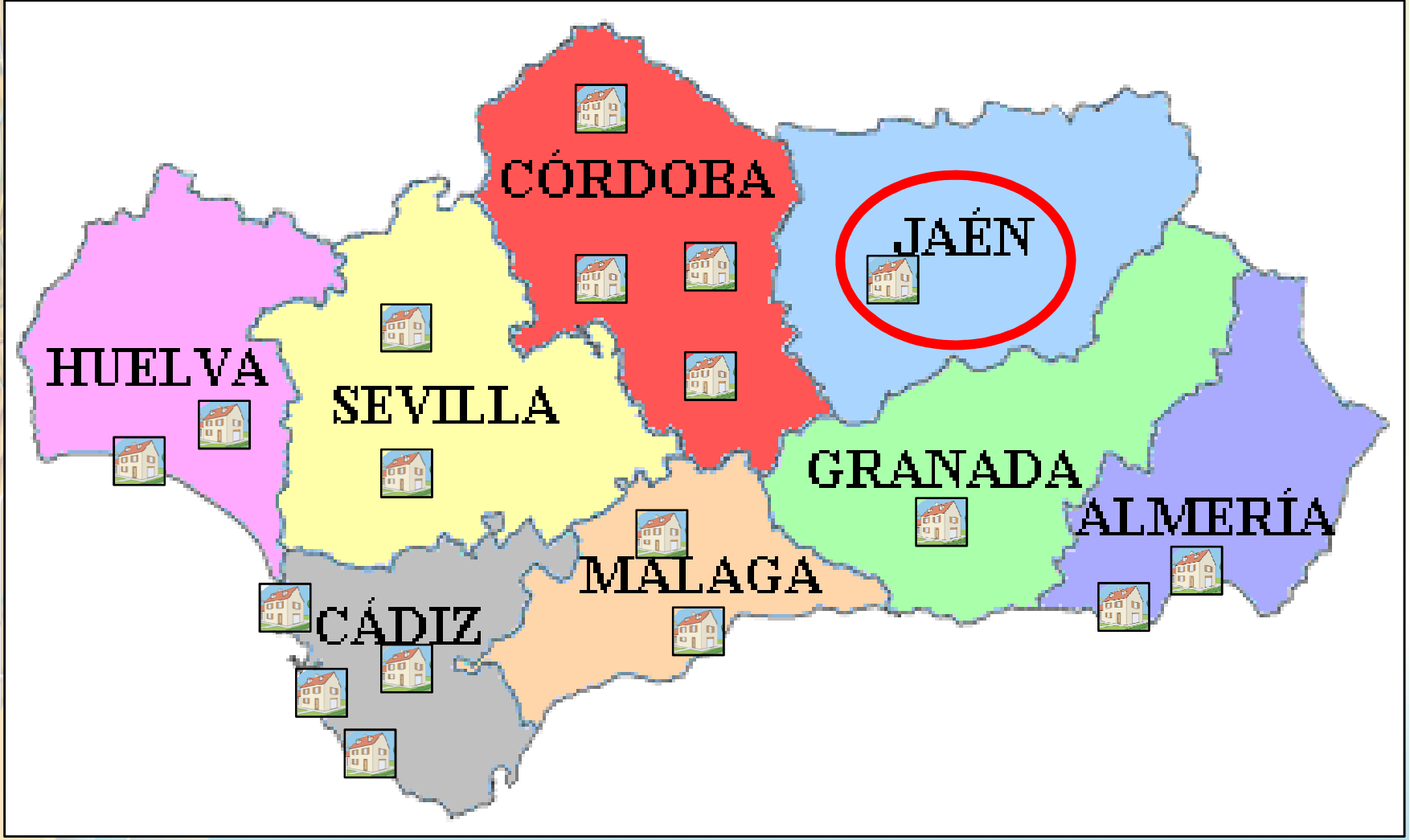
Instituto de Investigación y Formación Agraria y Pesquera
CONSEJERÍA DE AGRICULTURA Y PESCA

The image shows a vertical decorative strip on the left side of the slide. It features the acronym 'IFAPA' in a light blue, sans-serif font at the top. Below the text, there are stylized, overlapping icons in shades of blue and green, including a camera, a microscope, a leaf, and a fish, representing various aspects of agriculture and fisheries. The background of the slide is a light green to yellow gradient.

<http://www.juntadeandalucia.es/agriculturaypesca/ifapa>

- ❑ IFAPA was born **to help the demands** of the Andalusian agricultural, fishing, aquaculture and agri-food sectors.
- ❑ IFAPA programs are the tool to boost the agricultural and fishery sector to **bring the knowledge and innovation** as new ways of work aiming to create wealth, quality employment, and social welfare in Andalusia.

IFAPA NETWORK (18 centres)



<http://www.juntadeandalucia.es/agriculturaypesca/ifapa>

IFAPA VENTA DEL LLANO (JAÉN-SPAIN)



- It was founded in 1902.
- Specialized in:
 - Olive oil technology and industrial process.
 - Quality virgin olive oil.
 - Olive cultivation.

IFAPA VENTA DEL LLANO (JAÉN): Equipments



100 Ha olive farm



Experimental olive oil mill



Classroom



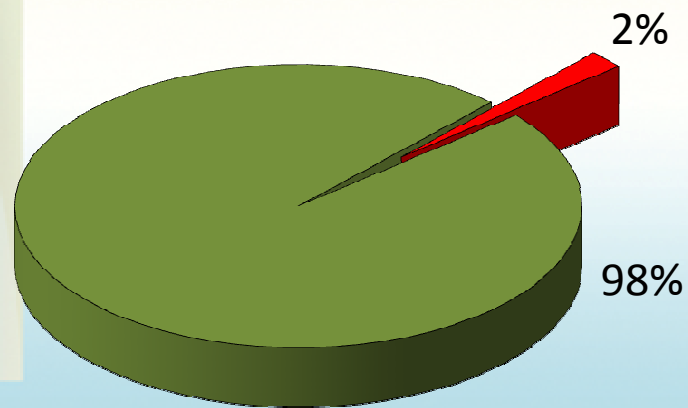
Laboratories

**Olive oil tasting room
(COI T 20 / Doc 15 / Rev 7)**



SEPARATION AND IDENTIFICATION OF *CIS/TRANS* β -CAROTENE ISOMERS OF VIRGIN OLIVE OILS

INTRODUCTION



■ Fatty acid compounds

■ Minor components

β - carotene pigment



- **Cultivars**
- **The degree of ripeness of the olive fruit**
- **Environmental conditions**
- **Processing techniques**
- **Storage conditions**

Commission Implementing Regulation (EU) No 1348/2013

Extra-Virgin Olive Oil
(trans β -carotene)

Bottled
↓
Market

Virgin Olive Oil
(trans β -carotene)

Bottled
↓
Market

Lampante Olive Oil

Refined process ($\uparrow T^a$)

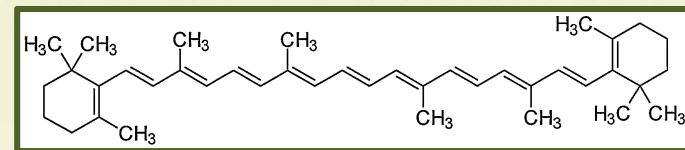
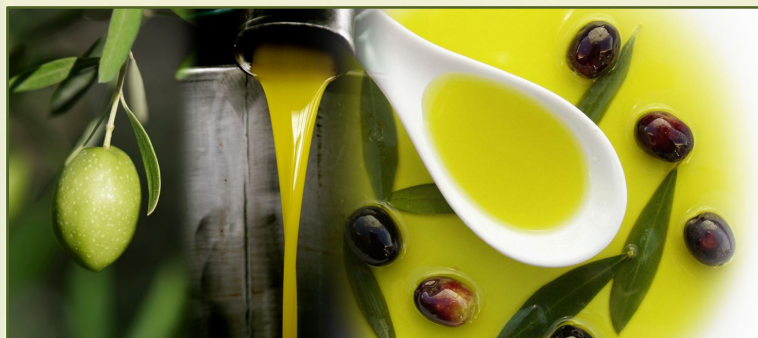
Refined olive oil
(stigmastadienes)

Virgin Olive Oil - - - - ->

Olive Oil
(cis β -carotene)

Bottled
↓
Market

The carotenoid profile of virgin olive oil can be used as a *parameter of quality and authenticity* for this product



Actually, chromatographic methods disadvantages:

1. β -carotene extract contains others components that can interfere in the subsequent identification and separation.
2. The oil amount used is very low, so some *cis* isomers are not detected.

A new, rapid and precise analytical method was developed for the quality and quantity determination of *trans*- β -carotene and *cis*-isomers to detect olive oils subjected to soft temperature process.

MATERIALS

Olives cv.
Picual



Abencor
system

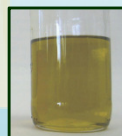


Extra-Virgin Olive Oil cv. Picual



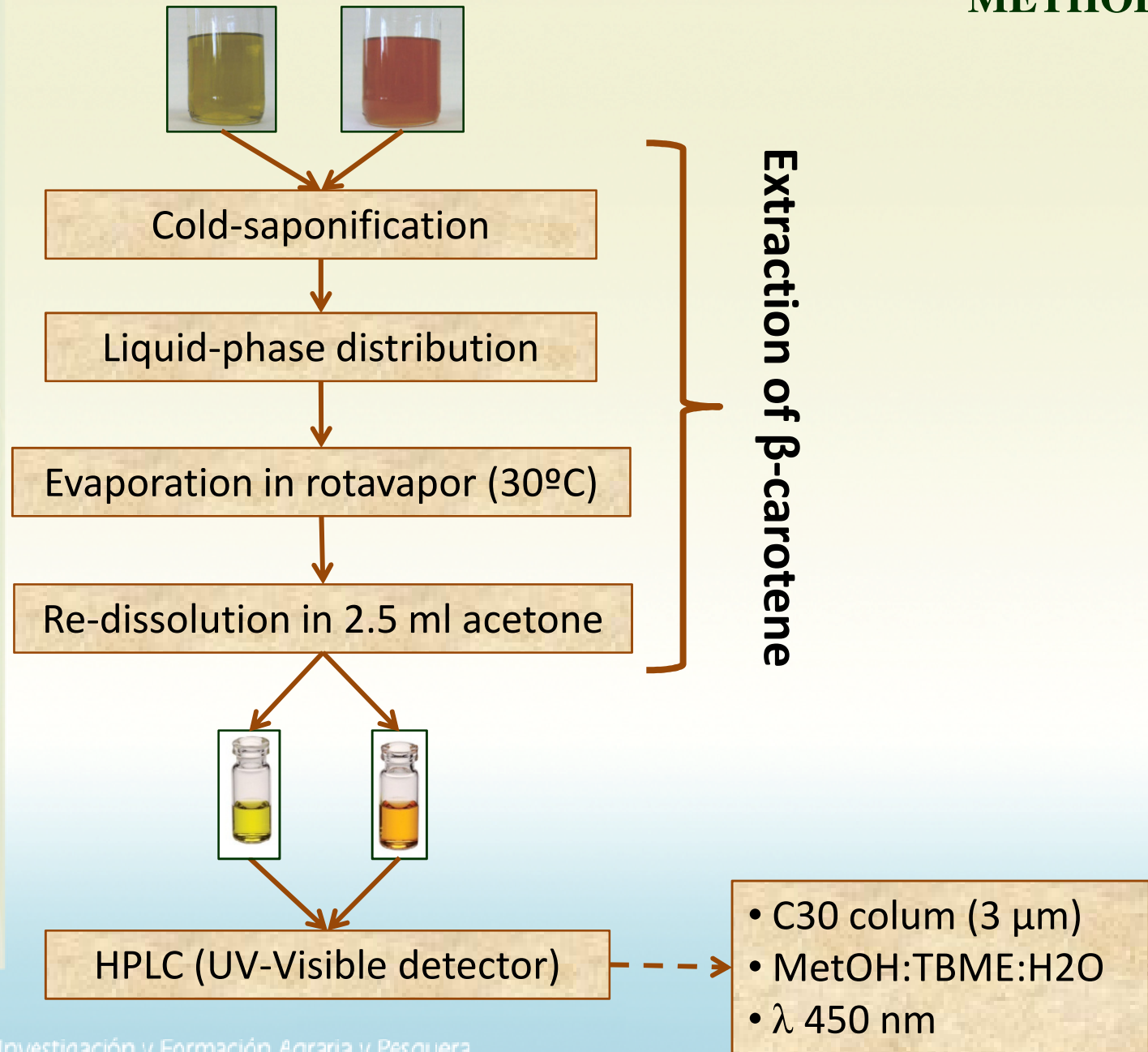
β - carotene
standard

Extra-Virgin Olive Oil
(blank sample)

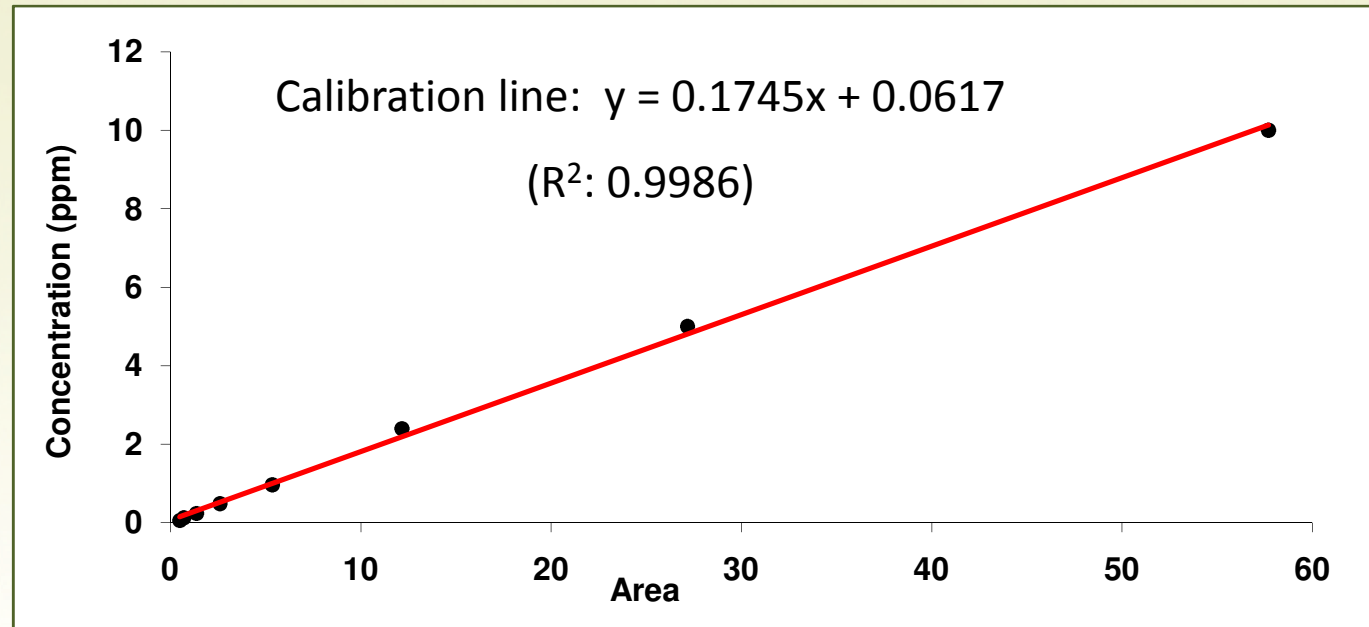


Fortified Extra-Virgin
Olive Oil





Linearity and detection limit

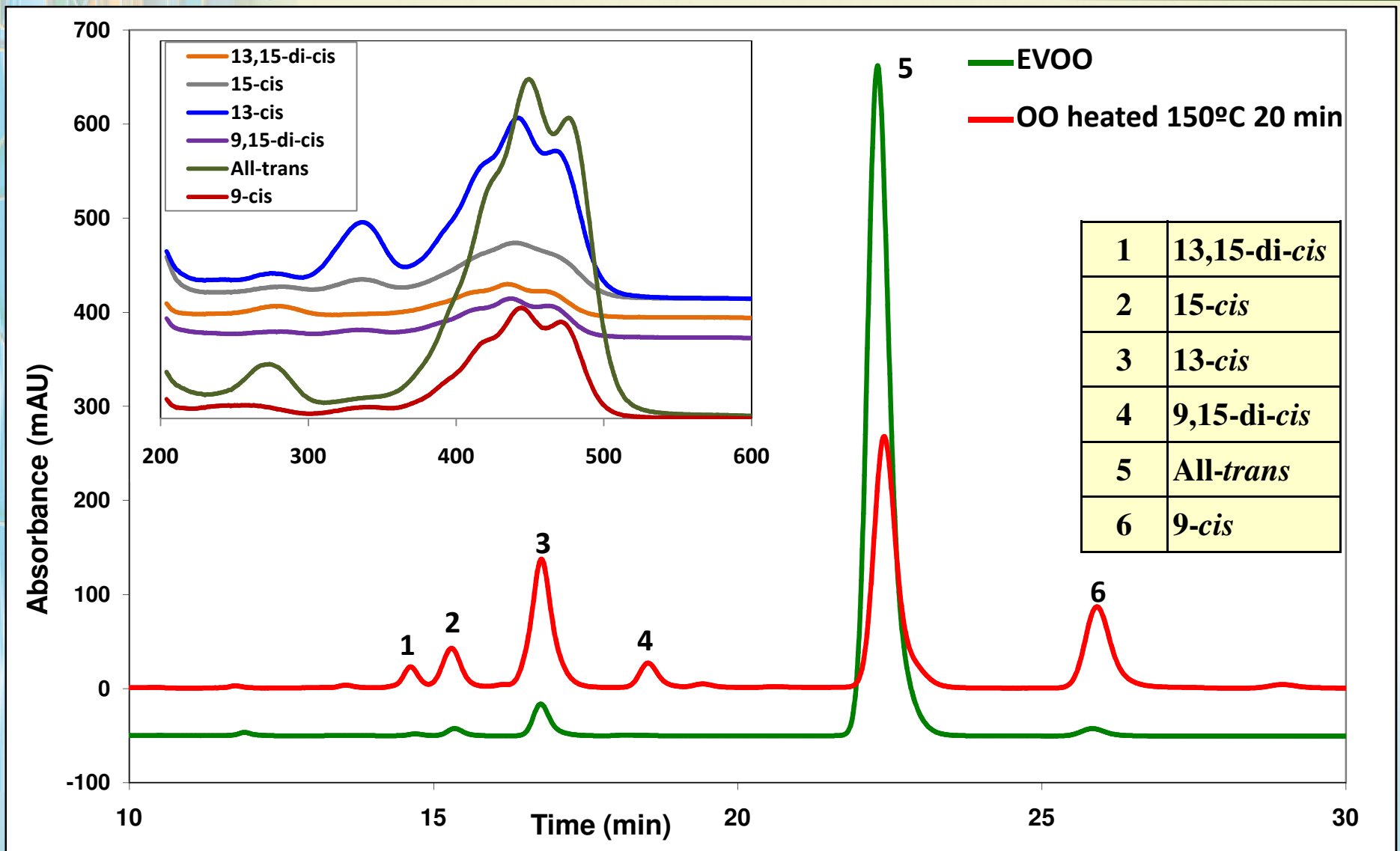


Concentration range ($\mu\text{g}/\text{mL}$)	LOD ($\mu\text{g}/\text{mL}$)	LOQ ($\mu\text{g}/\text{mL}$)	Repeatability (%)	Recovery (%)
0.050 – 10.000	0.18	0.62	3.18	79.57

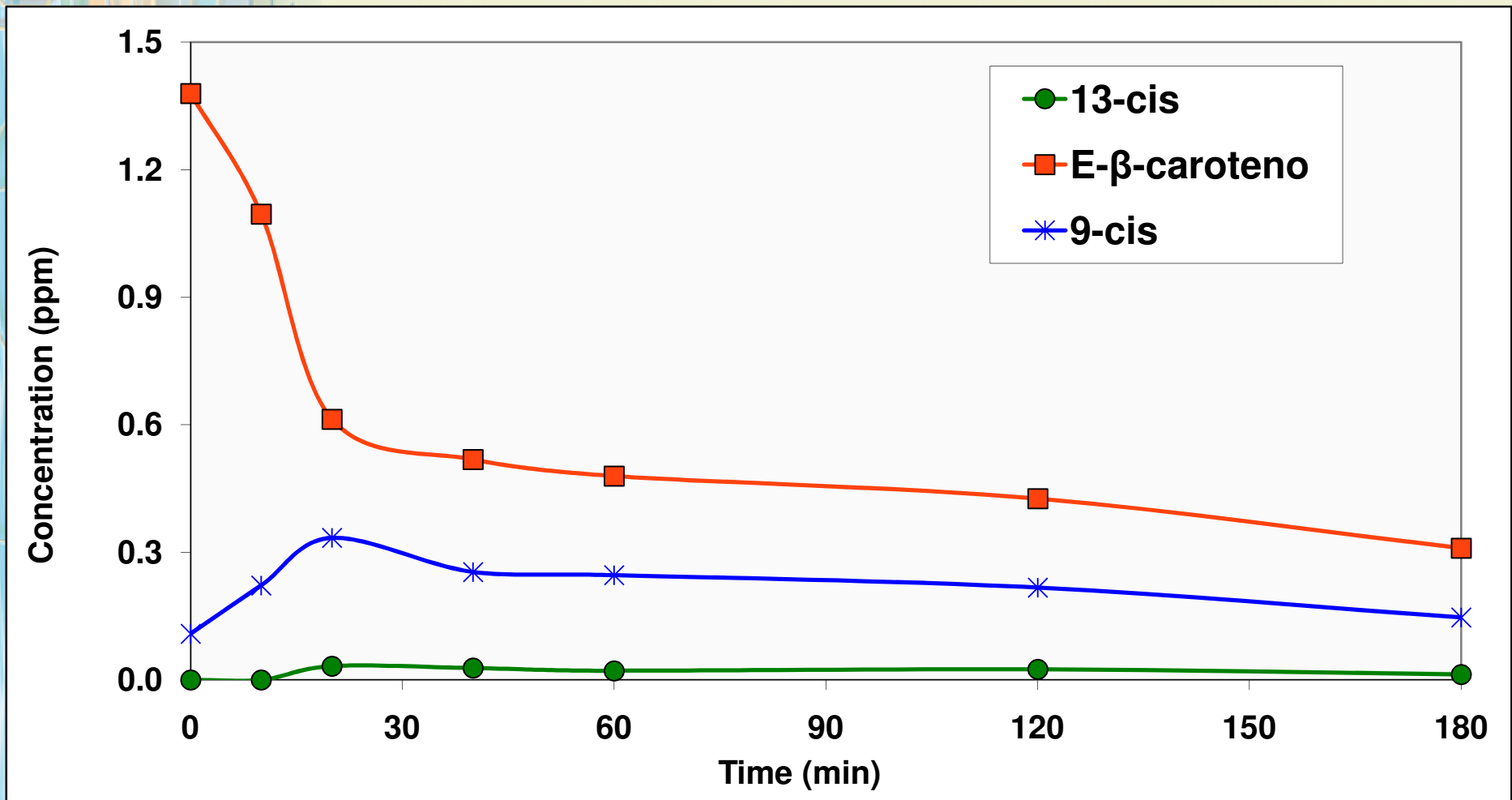
LOD: $3 \times$ standard deviation of low concen/slope of the calibration line.

LOQ: $10 \times$ standard deviation of low concen/slope of the calibration line

Identification of β -carotene isomers (150°C heating)



Changes (ppm) in the carotenoid profile in virgin olive oils (150°C)

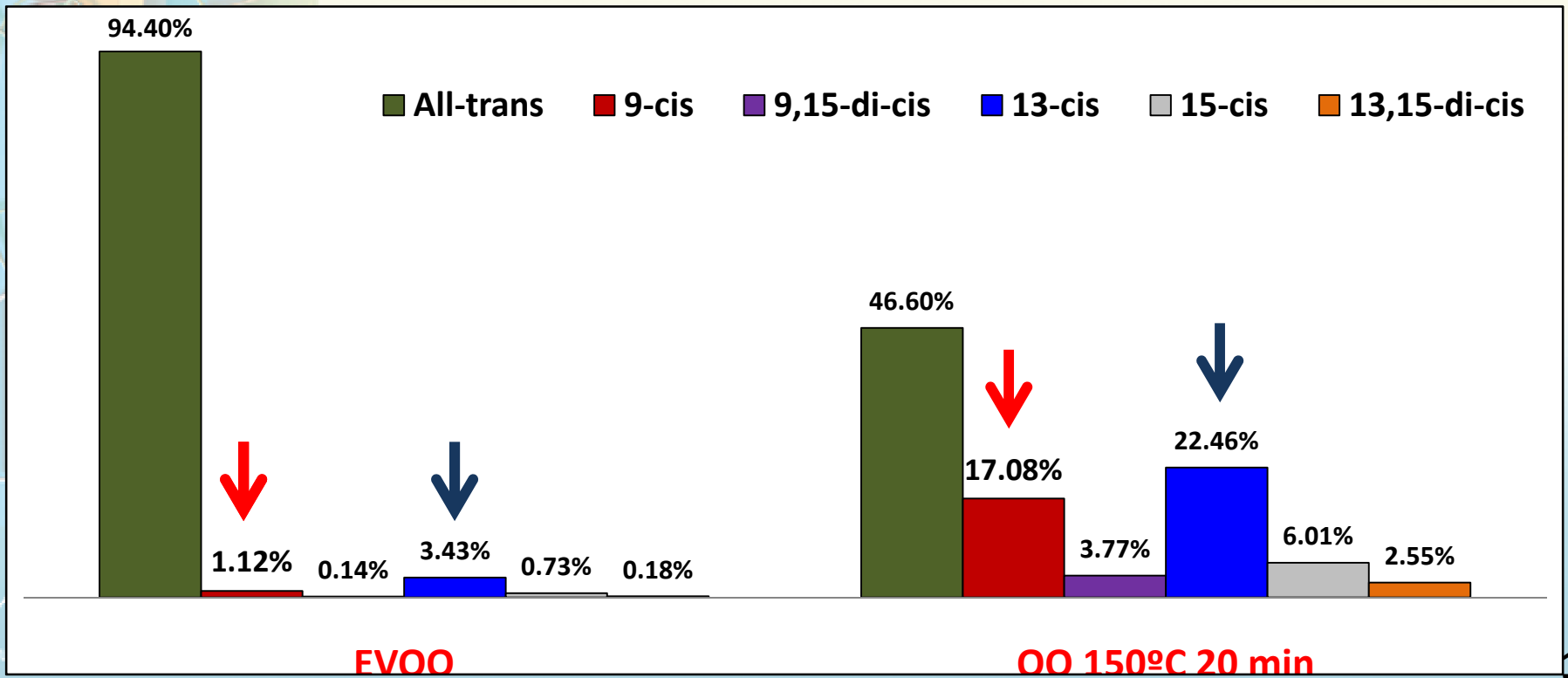
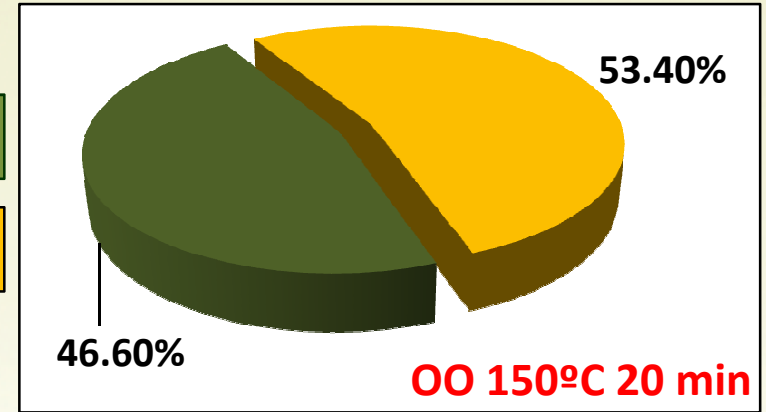
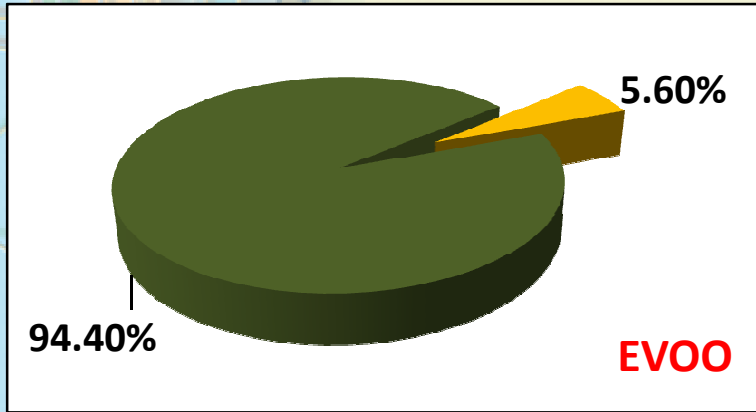


*Mean of three replicates

Bibliography: Chen et al., 1994;
Achir et al., 2010; Qui et al., 2012.

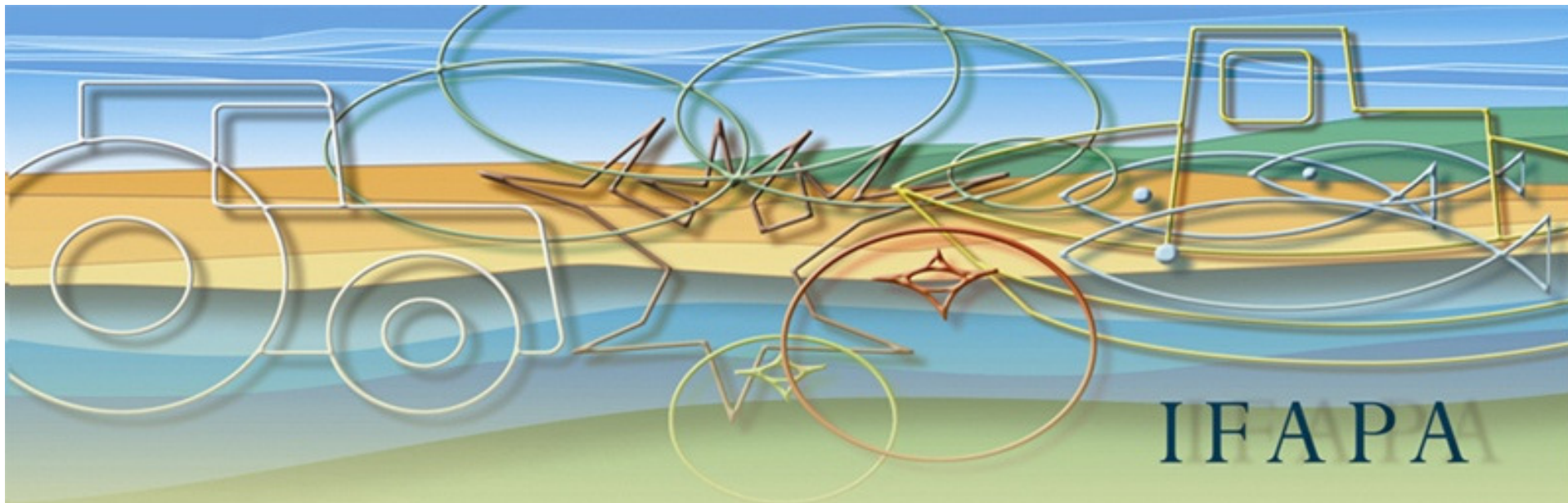
RESULTS AND DISCUSSION

Changes (%) in the carotenoid profile in virgin olive oils (150°C)



Conclusions

1. Carotenoids naturally exist in the all-trans forms in VOO.
2. Carotenoid profile of an olive oil can be used as parameter of quality and authenticity for this product \Rightarrow soft temperature process causes the isomerization of all-trans to cis forms.
3. The developed method, based on cold-saponification and liquid-phase extraction, is suitable for the isolation of β -carotene isomers in olive oils.
4. The use of C30 of 3 μ m column with HPLC technique for the separation of carotenoids leads to a good separation and short analysis times and results in sharp peaks which facilitate good detector response.



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