



Taste it, enjoy it. it's olive oil.

| 24

MADRID, SPAIN
26-28 JUNE 2024

**Spanish National
Research Council (CSIC)**



Organiza:



Colaboradores institucionales:



CSIC
Consejo Superior de Investigaciones Científicas



ICEX

#alimentosdespaña

EL PAÍS
MÁS RICO DEL
MUNDO



GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA, PESCA
Y ALIMENTACIÓN



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QUALITY AND AUTHENTICITY OF OLIVE OILS

Kamel Ben Ammar OFFICE NATIONAL DE L'HUILE
TUNISIE

**Director of Standardisation
and Quality Control Department** Website:
www.onh.com.tn

**Head of International Training Center
on olive and olive oil** Website:
www.onh-ooc.tn
ONH-OOC Tunisia



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OLIVE AND OLIVE OIL IN THE WORLD

SOME DATA

Area



9 Million ha
1500 Million trees
≈2000 Varieties

Production



3,3 Million tons
(2017/2018 – 2021/2022)
94 % by IOC members
**91 % in Mediterranean
area**

Consumption



≈3 Million tons
50 % in EU
13 % in USA
37 % in Other countries



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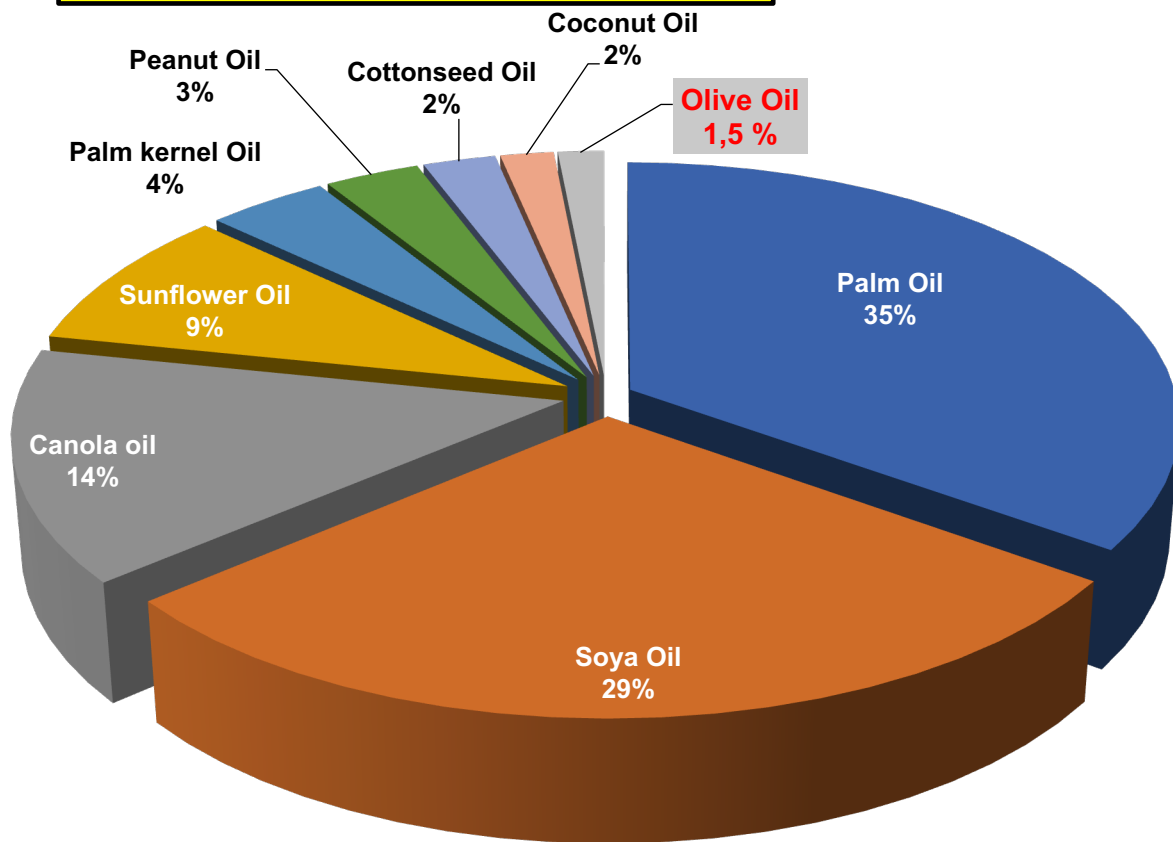


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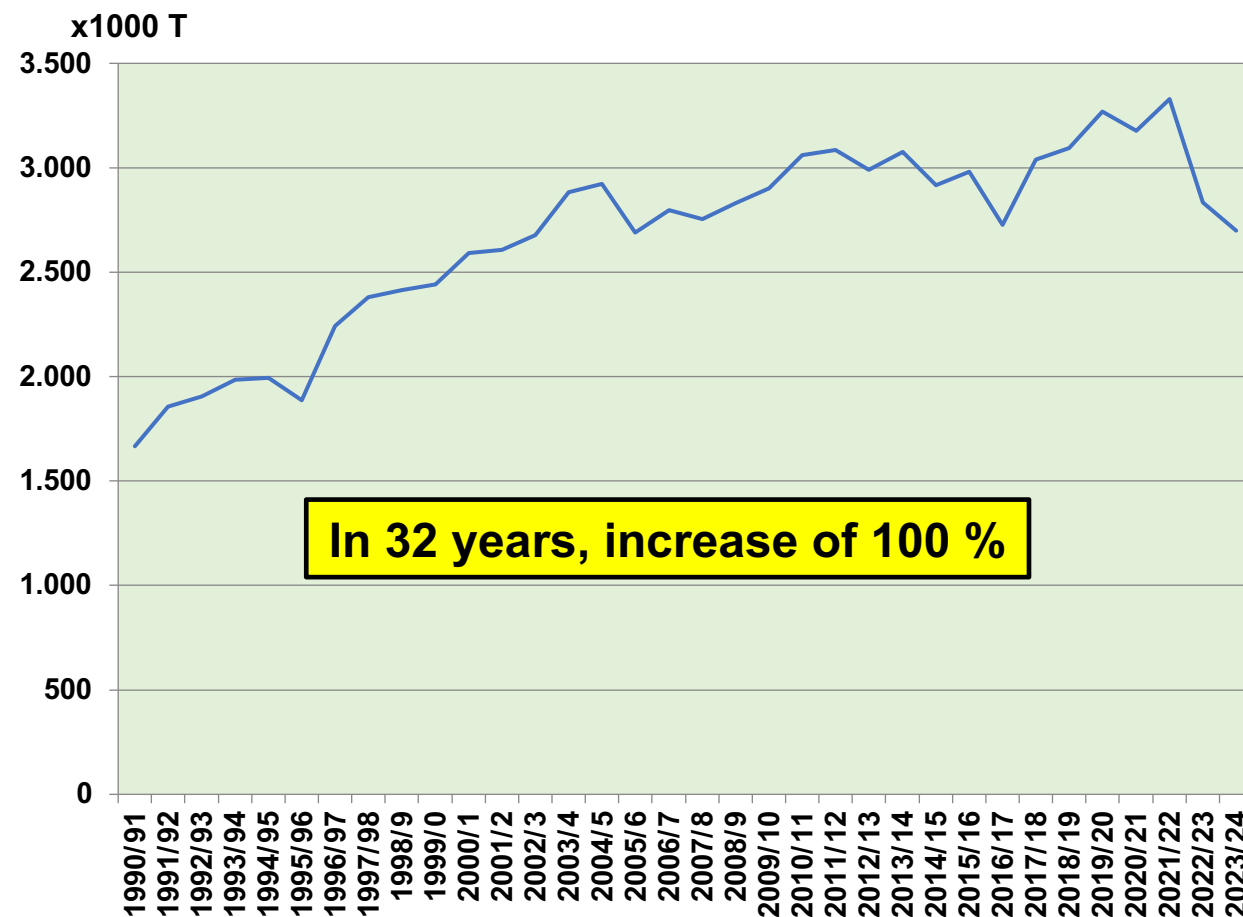


CONSUMPTION OF OLIVE OILS

204 million tons of edible oils
in 2021



Source: Statista



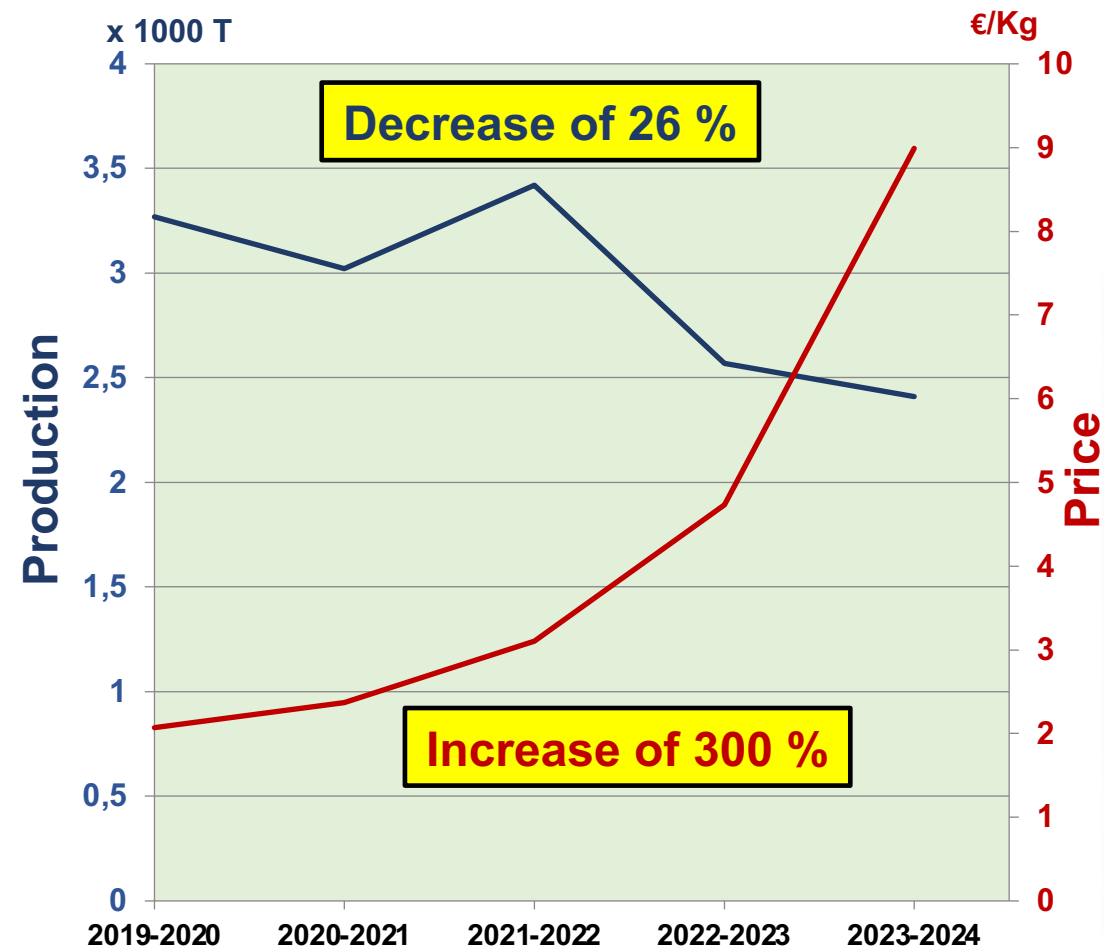


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PRODUCTION AND PRICE



Source: Statista , IOC

HOW TO CHOOSE OLIVE OIL ?

HIGH PRICE = HIGH QUALITY



The consumer wants to be reassured about the quality of the olive oil and that this oil must comply with the standard



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Olive oil is the most regulated food product



Codex Alimentarius

Standard for olive oils and olive pomace oils
CODEX STAN 33-1981.
Adopted in 1981.



International Olive Council

Trade standard for Olive oils and Olive Pomace Oils COI/T.20 Doc. n° 15

National standards



United States Standards for grades of olive oil and olive-pomace oil.

CALIFORNIA



State of California. Department of food and agriculture. Grade and Labeling Standards for Olive Oil, Refined Olive Oil and Olive-Pomace Oil.

AUSTRALIA



Australian standard. Olive oils and olive-pomace oils.

SOUF AFRICA

SABS

South African Bureau of Standards

South African national standard. Olive oils and olive-pomace oils. SANS 1377

JAPAN



Japanese Agricultural Standards JAS



European Union

European Commission, Reg. (CEE) 2568/91
European Communities Official Journal L 248 5.9.1991 and further amendments

The aim of all these standards is to safeguard olive oil and protect consumer



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CHEMICAL AND SENSORY ANALYSIS LABORATORIES

165

**Chemical analysis
laboratories**

- Public sector {

Research

Of. Control
- Private sector
- Professional sector

*The majority of
laboratorises are
recognized by IOC*



139

**Sensory analysis
laboratories**

1251

**olive oil tasters
in the world**

*The majority of
laboratorises are
recognized by IOC*



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Conformity of olive oil to the applied standard

To seek conformity of the oil, we must control the quality and purity parameters in accordance with a national or international standard

Quality parameters

Free Acidity, K232, K270, DK, PV, Sensory assessment, Volatile matter, Impurities, FAEE,

Methods

It is recommended to use standardized methods (ISO, IOC, etc....)

Limits

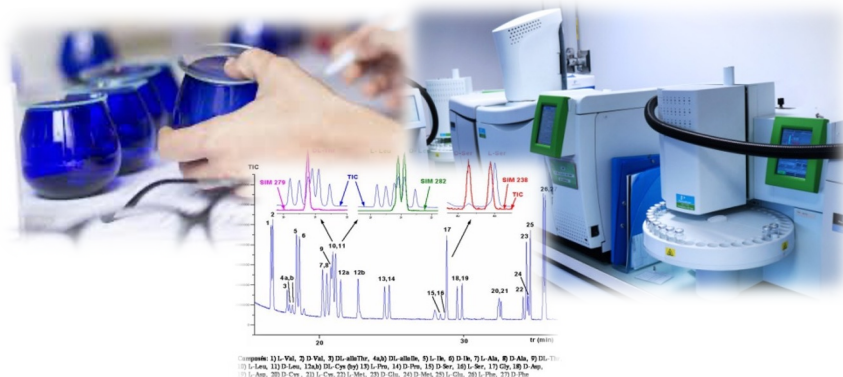
The limits depend on the standard. The uncertainty of the method must be taken into account

Analytical equipment and chemical solvents have become very expensive, so we must try to find less expensive and more efficient methods

There are some differences in the limits and this situation causes problems and difficulties in commercial transactions.

Purity parameters

Fatty acid composition, Sterol and triterpene dialcohol composition, Wax content, DECN42, Stigmastadiene content, 2-glycerol monopalmitate, Unsaponifiable matter,



Sensory evaluation of VOO

- Method created forty years ago, to determine the sensory value of virgin olive oil based on the positive and negative attributes of the oil
- It has undergone several revision since its creation with the aim to improve its performance and reduce the deviations between panels
- Also the specificities of the different varieties around the world and their aromatic profiles sometimes increase the deviations between panels

Checking OO quality

To control quality, several parameters are used, one still causes some problems

These difficulties can be reduced by :

- **Continuing the training of tasters**, especially on oils of different varieties and origins with particular specificities.
- **The panel harmonization workshops** organized by IOC are a good way to improve the competence of the panels, however, the method must continue to be revised if necessary.
- **Volatile compounds** can be considered as relevant quality markers. Now, volatile compounds cannot in any way replace sensory analysis, but it could support it, particularly in the “limit zones”, as between EVOO and VOO.



The storage time of olive oil depends on the type of packaging and storage conditions.

It is suitable to indicate the date of manufacture of the oil and not just the date of packaging.

Checking OO quality

Shelf life of OO

The shelf life of OO is a very important problem not only for the consumer but also for the producer. It can be described as the period of time during which, no flavors or defects appear and all quality parameters remain within the limit established for its category. There are many studies describing the effects of some environmental factors affecting OO quality, but it seems that no studies are available to address the information that can be used by companies to predict shelf life.



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Checking OO authenticity

One of the most worrying fraudulent techniques is the addition of lower-quality oil or soft deodorized oil in EVOO.

How detect blends of EVOOs with soft-deodorized OOs ?

Ethyl Esters can give an idea of the freshness of the oil, nowadays, it seems that we have not found more reliable analytical approaches for the detection of deodorized oils.

Other parameters have been proposed such as diacylglycerols (DAG) and pyropheophytin (PPP), but none are used because they change during the aging of oils. So, high PPP or DAG could mean the oil has been deodorized or is old or improperly stored.



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Checking OO authenticity

Adding seed oils to virgin olive oil

Fraud case

Development of analytical techniques has contributed significantly to the detection of added seed oils with a good margin of precision. However, difficulties still persist with the addition of some seed oils as avocado oil or when authentic olive oil has out-of-range parameters.



Case of mixture

Mixing olive oil with other seed oils is not considered to be a fraud. Practically all legislation tolerates this addition. However, the percentage of OO in the mixture must be clearly mentioned on the label. There is no analytical protocol to guarantee the percentage of OO present in the blend.

contaminants

The presence of contaminants in olive oil is one of the consumer's concerns

PHTHALATES

Due to their widespread use phthalates are ubiquitous environmental contaminants

Mainly high molecular weight phthalates: DEHP, DINP, DnOP, DBP

Low molecular weight phthalates: DIBP, DBP, DEP, BBP

Oil has a major influence on the exposure to DIBP, DBP and DEHP

Attention: Secondary contamination

MOH

Mineral oil hydrocarbons

MOSH

Mineral oil saturated hydrocarbons

MOAH

Mineral oil aromatic hydrocarbons

HEAVY METALS

The heavy metals of contamination are:

- Lead
- Chromium
- Nickel
- Arsenic
- Cadmium
- Mercury

Iron and copper are also analyzed

PESTICIDES

The most common pesticides are:

- 3 MCPD and its esters
- Chlorpyrifos
- Deltamethrin
- Endosulfan sulfate

Several analysis methods used:

GC/MS, GC/MS-MS, LC/MS, LC/MS-MS

General comment

Much progress has been made in the analysis of contaminants

The risk of contamination in production areas and the high cost of analyzes prevent achieving “**zero contamination**”.

PAHs

Composed of 2 to 6 aromatic rings

The three most toxic compounds are (BaP), (BaA), (DBaA).

The difficulties of analysis :

- the difficulty of extracting, isolating and purifying PAHs which are very lipophilic,
- the very low concentration level of each PAH to be quantified (µg/kg)



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Some difficulties

LEGISLATIVE AND REGULATORY CAUSES

- Different standards
(Various parameters and limits, ...)

ANALYTICAL

- Lack of standardized methods
- Expensive and sometimes complicated methods

FRAUDS

- Fraudulent techniques increasingly « developed »

Despite the fact that the OO sector is highly regulated, Extra Virgin and Virgin olive oils, suffer from several phenomena of fraud and falsification.

This situation does not help the olive oil sector to progress, but it creates more problems especially in the marketing of the oil and prevents laboratories from developing, because arriving at a robust methodology to prove quality and authenticity of olive oil, requires a lot of time and costs.



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Conclusion

Climate change is yet another problem that increases the difficulties encountered in the OO authenticity control. Indeed, quality and especially purity parameters are directly affected by changes in climatic conditions and could affect the composition of the oil. In the coming years, we may encounter OOs with compositions outside the currently standardized limits. Then, a question arises : **Are these limits exceeded due to attempts at fraud or to a modification in the oil composition due to climate change?** The answer is not obvious and easy, because it requires a lot of research works.



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Thank You

