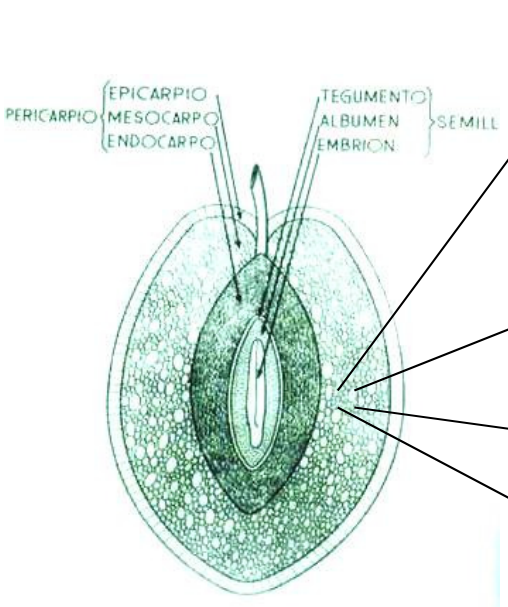
Understanding Olive Oil quality and interpreting test results

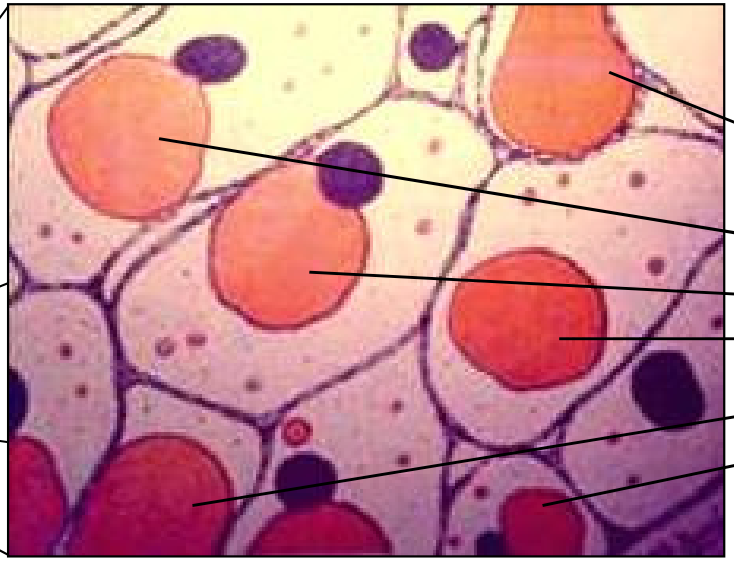
Claudia Guillaume

What is olive oil?

Olive oil is the oil obtained solely from the fruit of the olive tree (Olea europaea L.), to the exclusion of oils obtained using solvents or re-esterification processes and of any mixture with oils of other kinds.



Transversal view of an olive

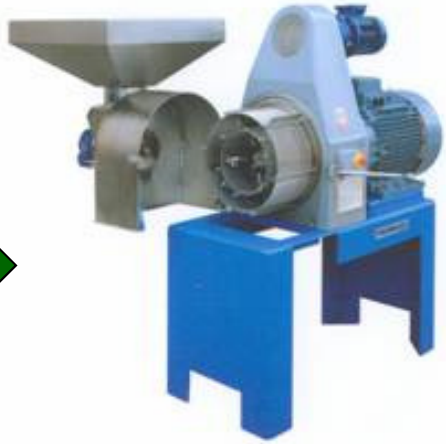


Detail of cells in the olive flesh

How is olive oil made?

Collecting the fruits

Double grid hammer crusher



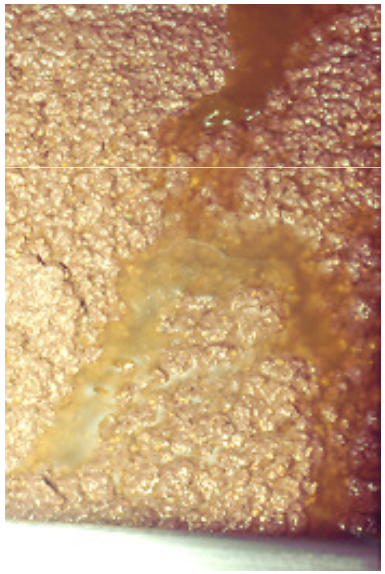
Fruits in the washing equipment

Olive paste in first malaxer

How is olive oil made?

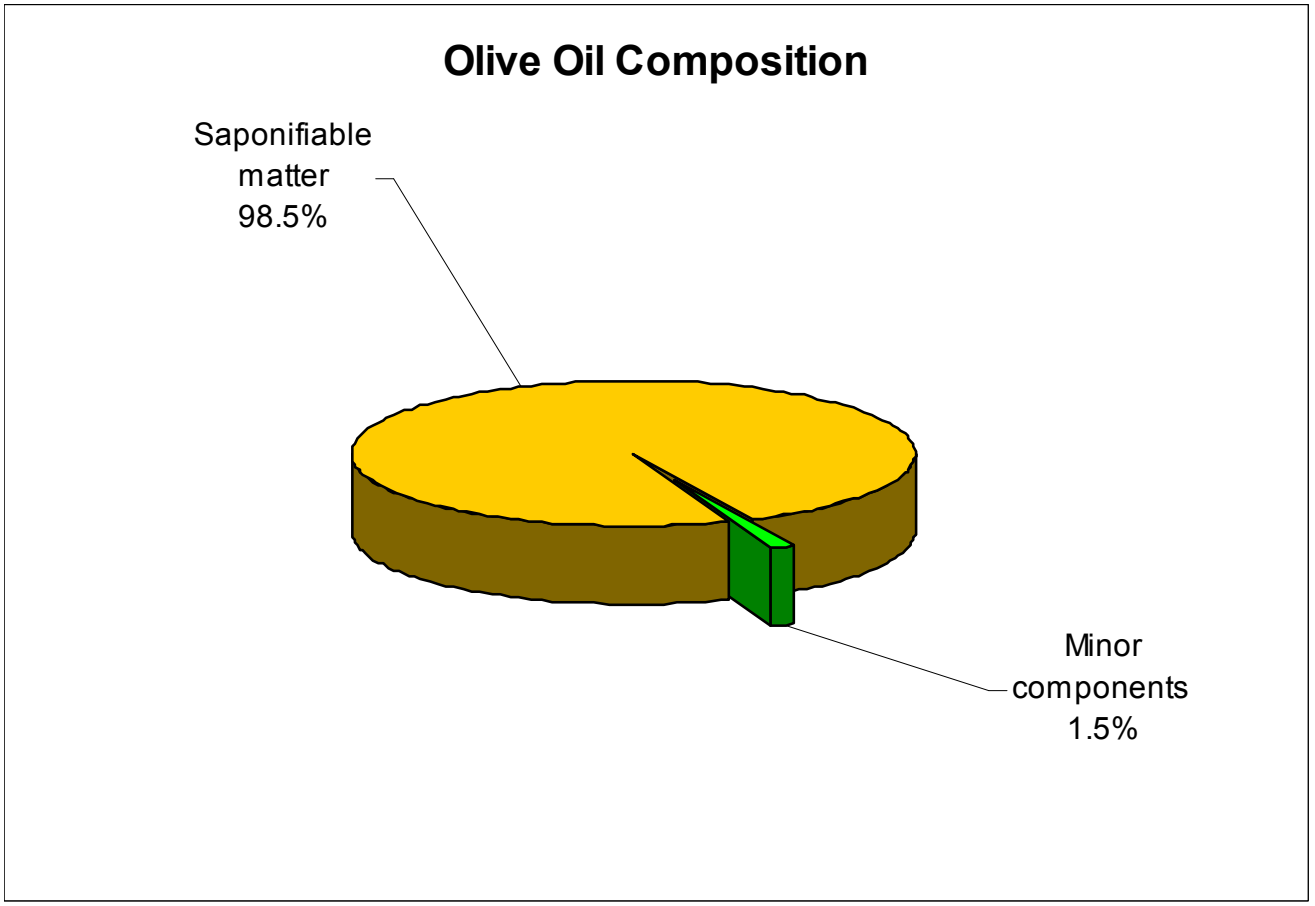
Decanter separating olive oil from paste

Olive oil storage



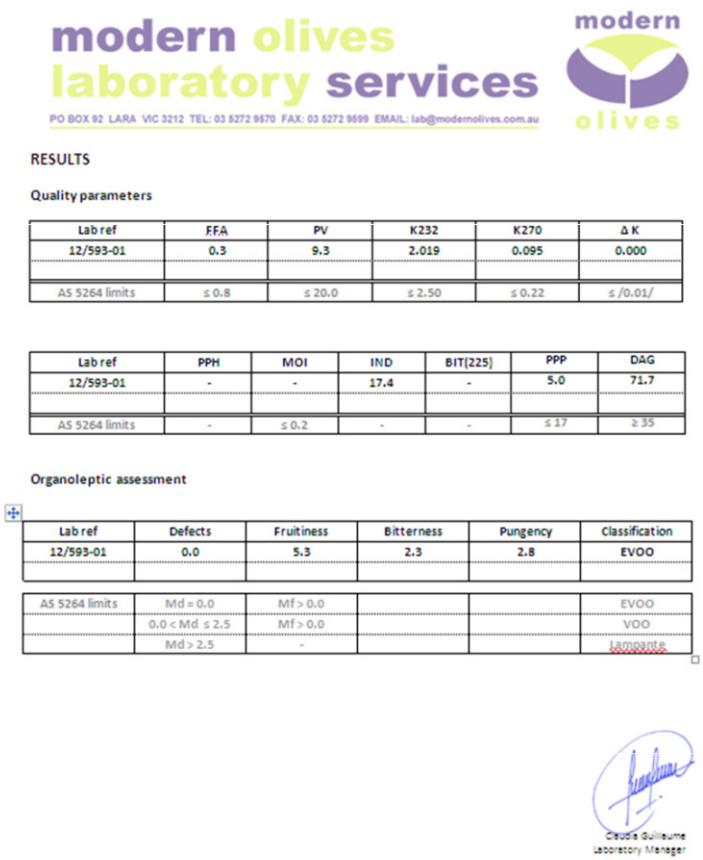
Vertical separators clarifying the oil

What is olive oil?



Modern Olives Laboratory Services

- Free Fatty Acid
- Peroxide Value
- UV coefficients
- Induction Time
- Pyropheophytins a
- 1,2 Diacylglycerides
- Best Before Date



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RESULTS

Quality parameters

Lab ref	FFA	PV	K232	K270	Δ K
12/593-01	0.3	9.3	2.019	0.095	0.000
AS 5264 limits	≤ 0.8	≤ 20.0	≤ 2.50	≤ 0.22	≤ /0.01/

Lab ref	PPH	MOI	IND	BIT(225)	PPP	DAG
12/593-01	-	-	17.4	-	5.0	71.7
AS 5264 limits	-	≤ 0.2	-	-	≤ 17	≥ 35

Organoleptic assessment

Lab ref	Defects	Fruitiness	Bitterness	Pungency	Classification
12/593-01	0.0	5.3	2.3	2.8	EVOO

AS 5264 limits	Md = 0.0	Mf > 0.0			EVOO
	0.0 < Md ≤ 2.5	Mf > 0.0			VOO
	Md > 2.5	-			Lampante

Claudia Guillaume
Laboratory Manager

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Free Fatty Acids

- Provides a good indication of:
    - the fruit condition before crushing it,
    - the time between harvesting and crushing and
    - the storage conditions of the oil (sediments).

- It is an important parameter in the trade classification of olive oil.

- **Extra virgin olive oils must have a free acidity level under 0.8%.** Nonetheless, it is expected that sound fruit processed immediately should produce oil with less than 0.4 g% FFA.

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Free Fatty Acids & Sensory defects

- Inadequate storage of olive fruits before crushing

→ FERMENTATION

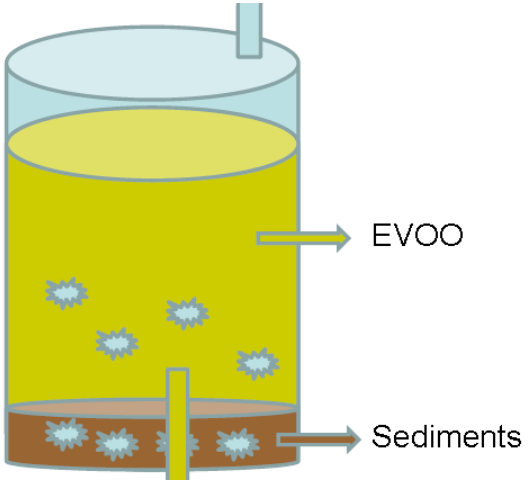
↙ High FFA

↘ Fusty / Musty

- Diseases (i.e. anthracnose, olive fly)

→ High FFA

→ Musty/Humid/ Grubby



- Inadequate storage of the oil (no separation of the solid and water sediments)

→ High FFA

→ Muddy Sediment / Winey

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Peroxide Value

- Peroxides Value is the quantity of hydro peroxides present in the oil that have formed through oxidation during its processing and/or storage.
- It is the primary measurement of oils rancidity and it gives an idea of oils' freshness and storage conditions.
- Peroxides value will increase during the first part of the life of oils and it will then decrease in more advanced stages of oxidation when more oxidized substances are produced.
- **Extra virgin olive oils must show a peroxides value under 20**. It is expected that fresh and well processed oils should show peroxides value under 12.

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Peroxide Value & Sensory defects

- Inadequate malaxing conditions (time, temperature)

→ High PV

→ Fusty / Cooked

- Enviromental conditions (i.e. Frost damage)

→ High PV

→ Stewed Fruit / Wet hay

- Inadequate storage conditions (temp., level of O_2, type of container)

→ High PV

→ Rancid

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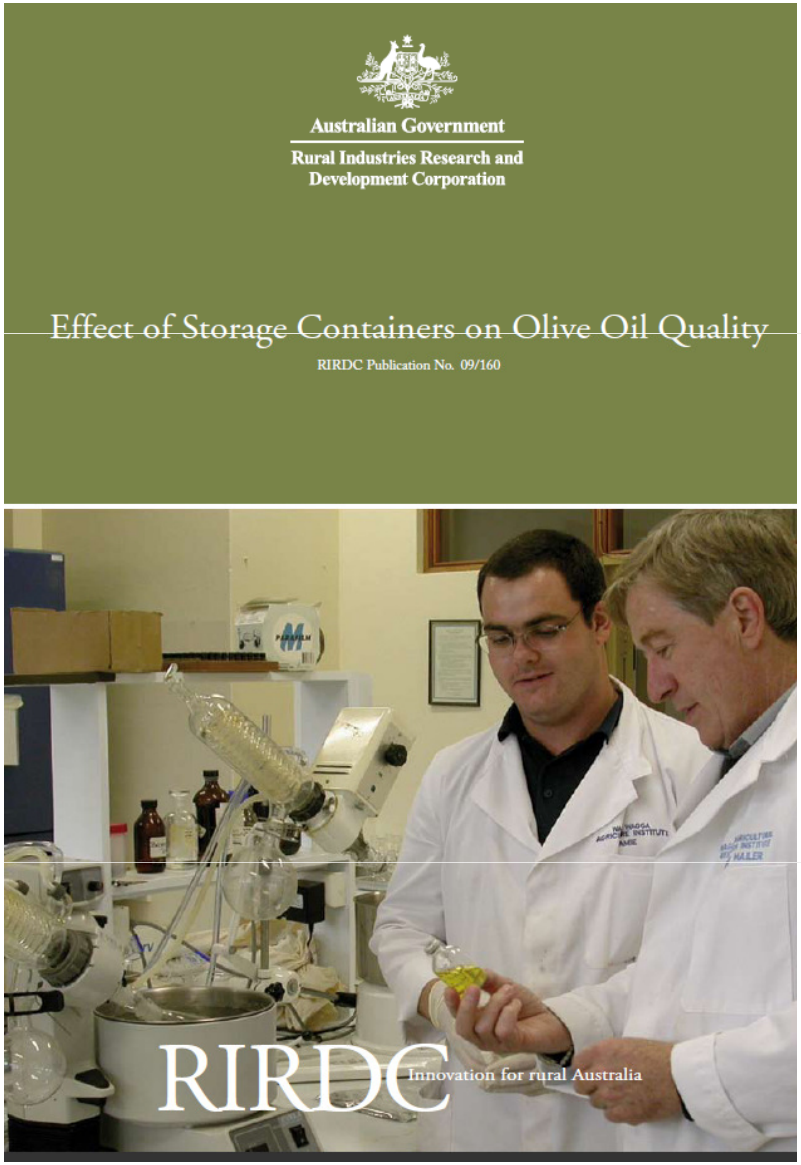
Researches

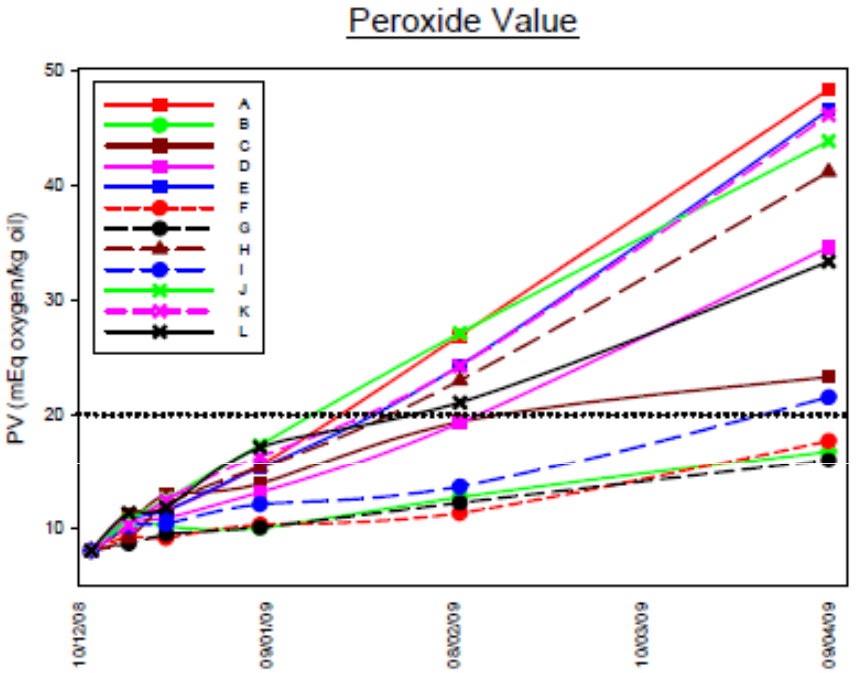

Australian Government
Rural Industries Research and Development Corporation
Effect of Storage Containers on Olive Oil Quality
RIRDC Publication No. 09/160
RIRDC
Innovation for rural Australia

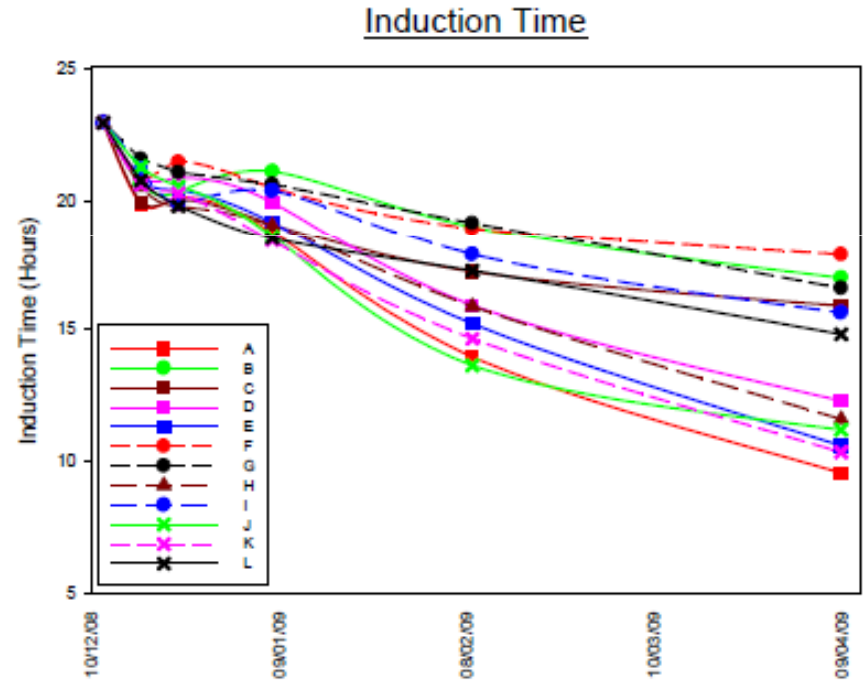
Researches

10. Appendices

Table 10.1 Comparison of peroxide value, polyphenol content, induction time and α tocopherols of oil stored in 12 containers for 4 months.

Sample	PV		Polyphenols		Induction Time		α Tocopherol	
	mEq oxygen/kg oil		mg/kg of caffeic acid		Hours		mg/kg	
	0 months	4 months	0 months	4 months	0 months	4 months	0 months	4 months
A	8	48	271	148	22.94	9.56	245	152
B	8	17	271	206	22.94	16.96	245	244
C	8	24	271	198	22.94	15.90	245	181
D	8	34	271	174	22.94	12.29	245	209
E	8	46	271	173	22.94	10.59	245	175
F	8	18	271	219	22.94	17.85	245	254
G	8	16	271	217	22.94	16.57	245	252
H	8	41	271	175	22.94	11.59	245	182
I	8	21	271	199	22.94	15.63	245	253
J	8	43	271	175	22.94	11.19	245	165
K	8	46	271	177	22.94	10.34	245	175
L	8	33	271	194	22.94	14.82	245	160





UV coefficients (K232, K270)

- The determination of the Extinction Coefficient (conventionally indicated by K) in ultraviolet at **232** nm provides a measurement of the state of oxidation of the oils (secondary oxidation) and storage conditions, while the **K270** and **ΔK** values indicate whether or not the oil has been heat treated and/or treated with absorbent earth.

- **Extra virgin olive oils should have a K 232 below 2.50 and K 270 below 0.22 and the ΔK value within the +/- 0.01 range.** It is expected that fresh and well processed oils should show K232 values under 2.00 and K270 values under 0.18.

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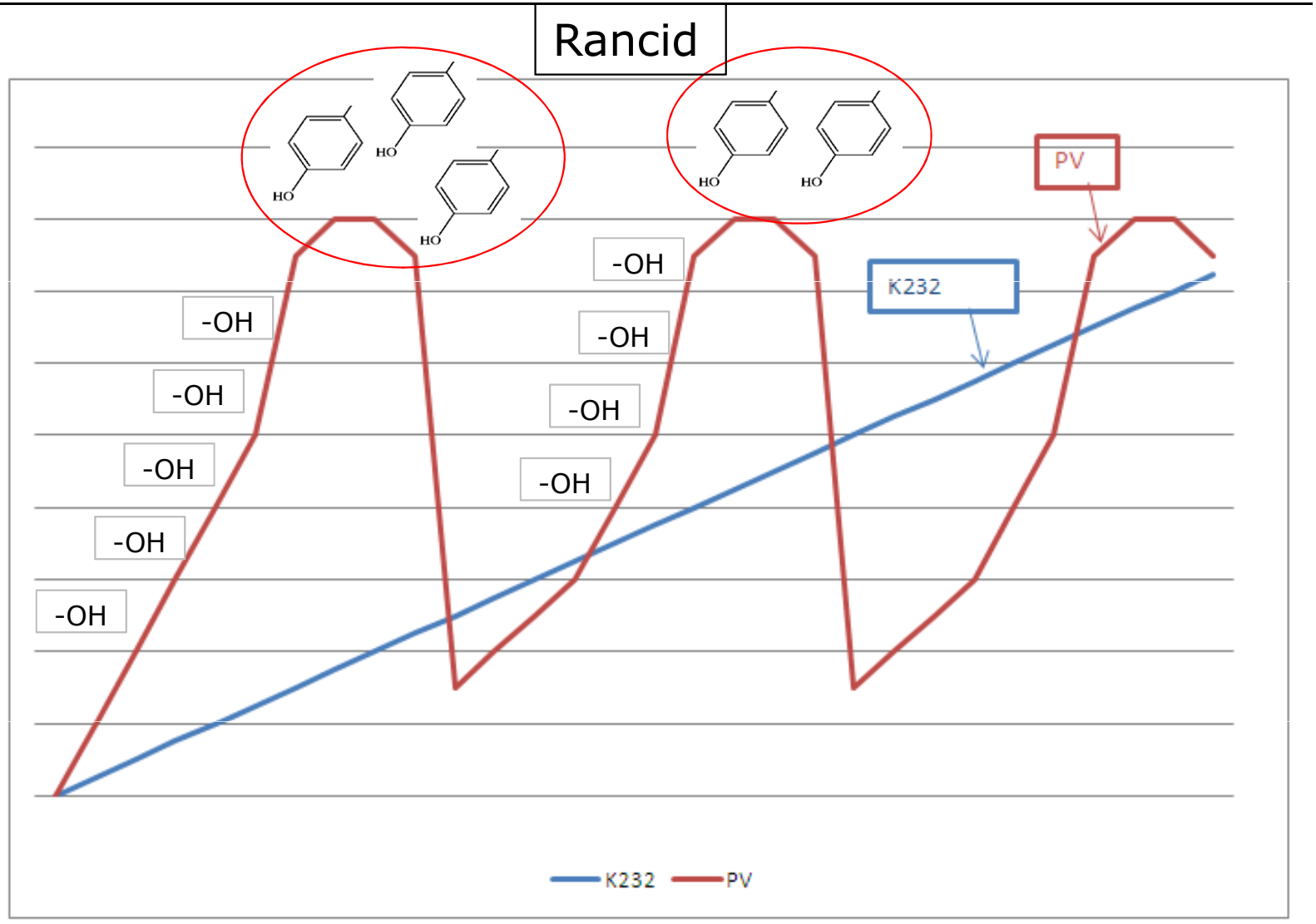
Evolution of oxidation



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Induction Time (Rancimat®)

• This determination speeds up the oxidation process in the oil (under heat and air current), which enables the oils' stability and shelf life properties to be evaluated by monitoring volatile substances associated with rancidity.

• This analysis gives an indication of the potential shelf life of your oil only based on its fatty acid profile and polyphenol content.

• The oils can be treated at different temperatures ranging from 90ºC to 130ºC. Our laboratory works at 110ºC because this temperature provides more precise values, particularly with low shelf life oils.

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Pyropheophytins a (PPP)

- PPPs is a good indicator of:
  - Age of the oil
  - Storage conditions of the oil
  - Freshness

- PPPs has been demonstrated to be a very good indicator to detect deodorized olive oils.

- This analysis gives an indication of the potential shelf life of your oil based on age and storage conditions of the oil.

- **Extra virgin olive oils should have PPPs value below 17 %.** A fresh oil will have < 1 % of PPPs and will increase 6 – 8 % per year, under proper storage conditions.

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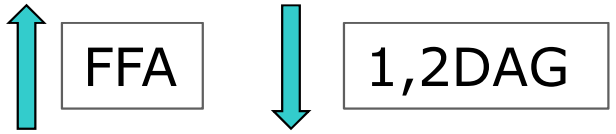
1,2 Diacylglycerides (DAG)

- 1,2DAGs is a good indicator of:
  - Initial quality of the oil
  - Storage conditions of the oil
  - Freshness



- This analysis gives an indication of the potential shelf life of your oil based on initial quality and storage conditions of the oil.

- **Extra virgin olive oils should have 1,2DAGs value greater than 35%.** A fresh good quality oil will have around 90 % of 1,2DAGs and will decrease 20 - 25 % per year, under proper storage conditions.

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Best Before Date (BBD)

AS 5264-2011®

- Mandatory
- Max. 2 years

- IND ⟶ composition of the oil (FAP, PPH)
- PPP a ⟶ age and storage conditions
  - increases 6 – 8 % per year
- 1,2DAG ⟶ initial quality of the oil and storage conditions
  - decreases 20 -25% per year

MOLS index = min (IND, PPP, DAG)

	Results	BBD (months)
IND	17.4	17.4
PPP	5.0	20.6
DAG	71.7	22.0

BBD = 17.4 months

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SAMPLING

When sending the sample:

- ✓ Take a proper sample
  - Open the tap and leave it running for 10 – 20 sec. Then place the sampling bottle and collect the sample.
  - Use a new dark glass bottle
- ✓ Take a representative sample or Send the final product
- ✓ Identify it properly
- ✓ Fill all the paperwork with your tests request
- ✓ Make sure the ‘postage’ conditions are adequate
- ✓ Send the sample as soon as possible

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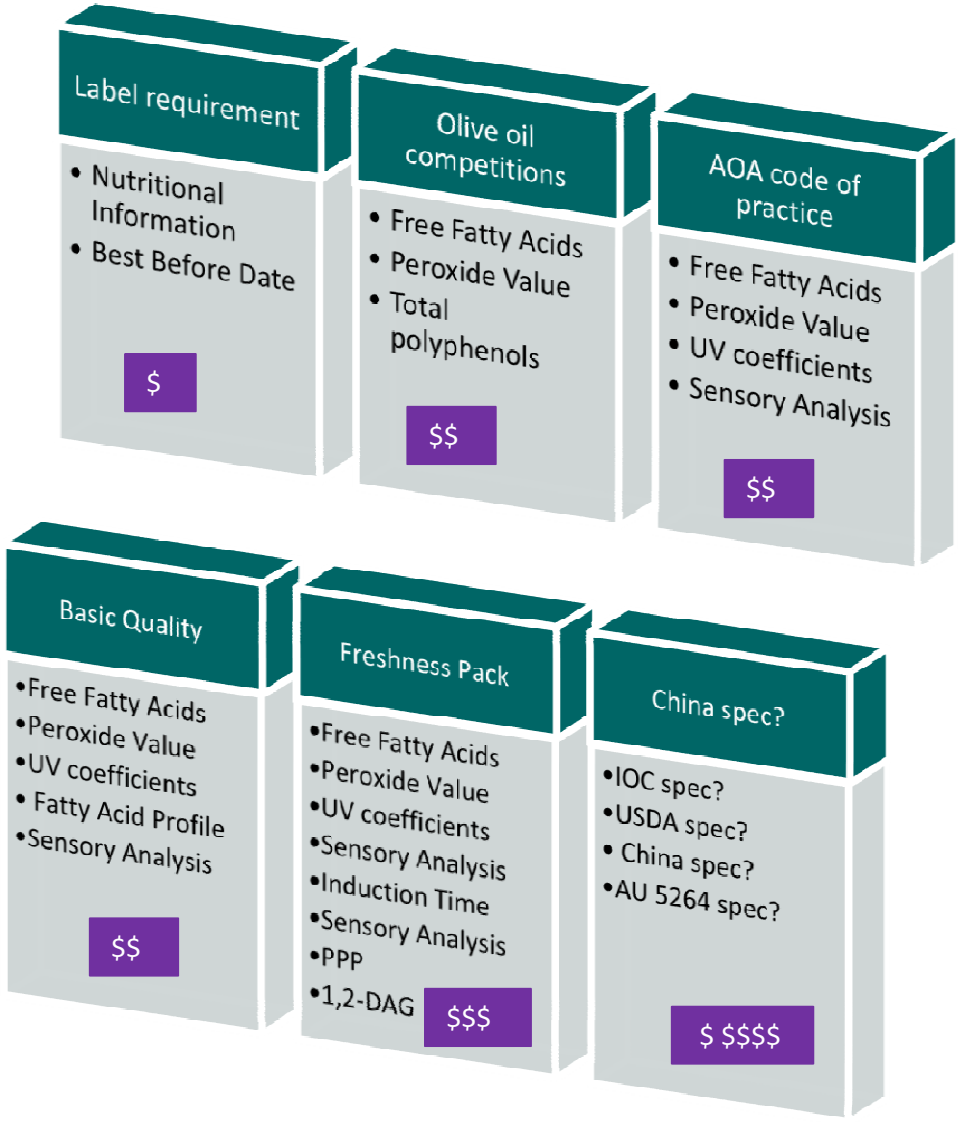
When testing olive oil …

- What is the purpose of the testing?

- Why do I want to test my oil?

-What do I need it for?



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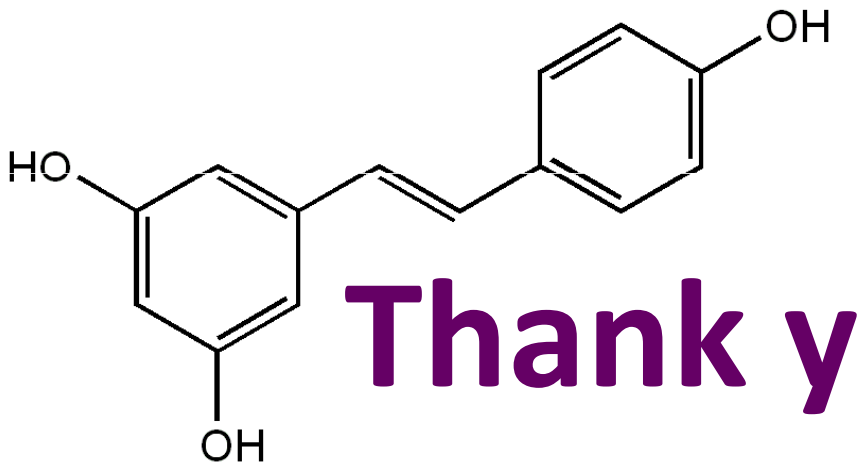

Thank you

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