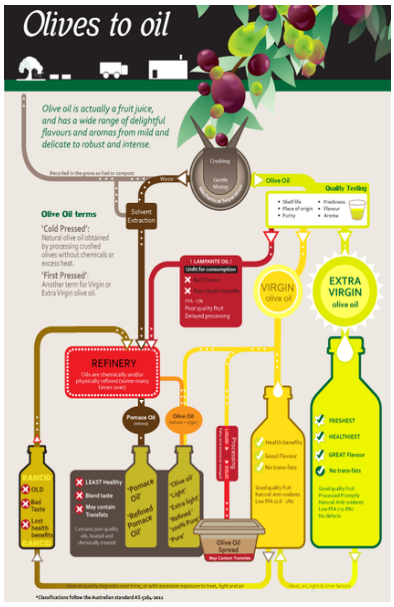
# UNDERSTANDING OLIVE OIL GRADES AND QUALITY PARAMETERS

modern olives

Natalia Ruiz






**Olive oil:** is the oil obtained solely from the fruit of the olive tree (Olea europaea L.) by mechanical or other physical means under conditions that do not lead to alteration in the oil .

**Pomace Oil:** Olivepomace oil is the oil obtained by treating olive pomace with solvents or other physical treatments.

*Extra Virgin Olive Oil is the highest quality of Olive Oil*

modern olives

## EXTRA VIRGIN OLIVE OIL QUALITY PARAMETERS ACCORDING TO DIFFERENT STANDARDS

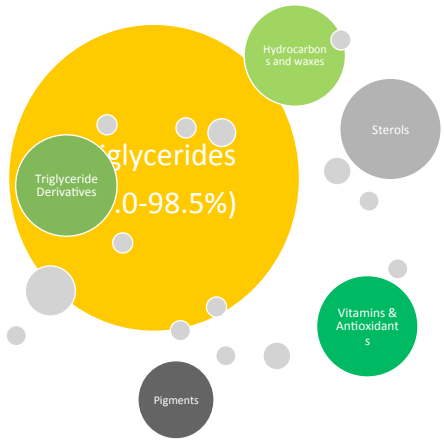
| PARAMETER | | IOC | USDA | CDFA | COOC | AS 5264 |
|---|---|---|---|---|---|---|
| Free Fatty Acid (FFA)(%m/m) | | ≤0.8 | ≤0.8 | ≤0.5 | ≤0.5 | ≤0.8 |
| Peroxide Value (PV)(meq O2/Kg Oil) | | ≤20.0 | ≤20.0 | ≤15.0 | ≤15.0 | ≤20.0 |
| Absorbency in ultraviolet | K232 | ≤2.50 | ≤2.50 | ≤2.40 | ≤2.50 | ≤2.50 |
| | K270 | ≤0.22 | ≤0.22 | ≤0.22 | ≤0.22 | ≤0.22 |
| | Delta K | ≤0.01 | ≤0.01 | ≤/0.01/ | ≤/0.01/ | ≤/0.01/ |
| Moiture and Volatil matter (MOI) (%m/m) | | ≤0.2 | ≤0.2* | ≤0.2 | N/A | ≤0.2 |
| Insoluble Impurities (INI)(%m/m) | | ≤0.1 | ≤0.1* | ≤0.1 | N/A | ≤0.1 |
| Pyropheophytin(PPPs)% | | N/A | N/A | ≤17 | N/A | ≤17 |
| 1,2-Diacylglycerols (DAGs)% | | N/A | N/A | ≤35 | N/A | ≤35 |
| Organoleptic Analysis | Median of Defects(MeD) | =0.0 | =0.0 | =0.0 | N/A | =0.0 |
| | Median of fuitness (MeF) | >0.0 | >0.0 | >0.0 | N/A | >0.0 |

*Optional

modern olives

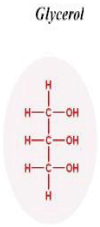


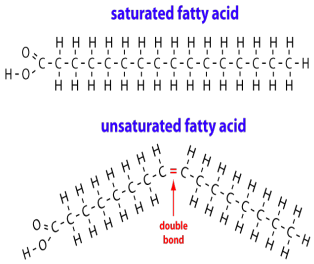
## Extra Virgin Olive Oil Composition

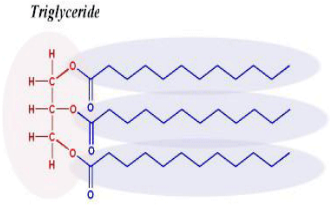



modern olives

# Triglycerides




**Olive Oil**

C 16:0 = Palmitic Acid (7% – 20%)

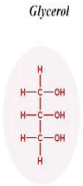
C 18:1 = Oleic Acid (53% – 85%)

C 18:2 = Linoleic Acid (3% - 22%)

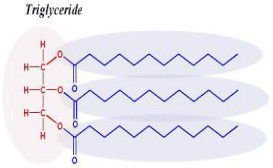
C 18:3 = Linolenic Acid (< 1.5%)



# FREE FATTY ACID (FFA)





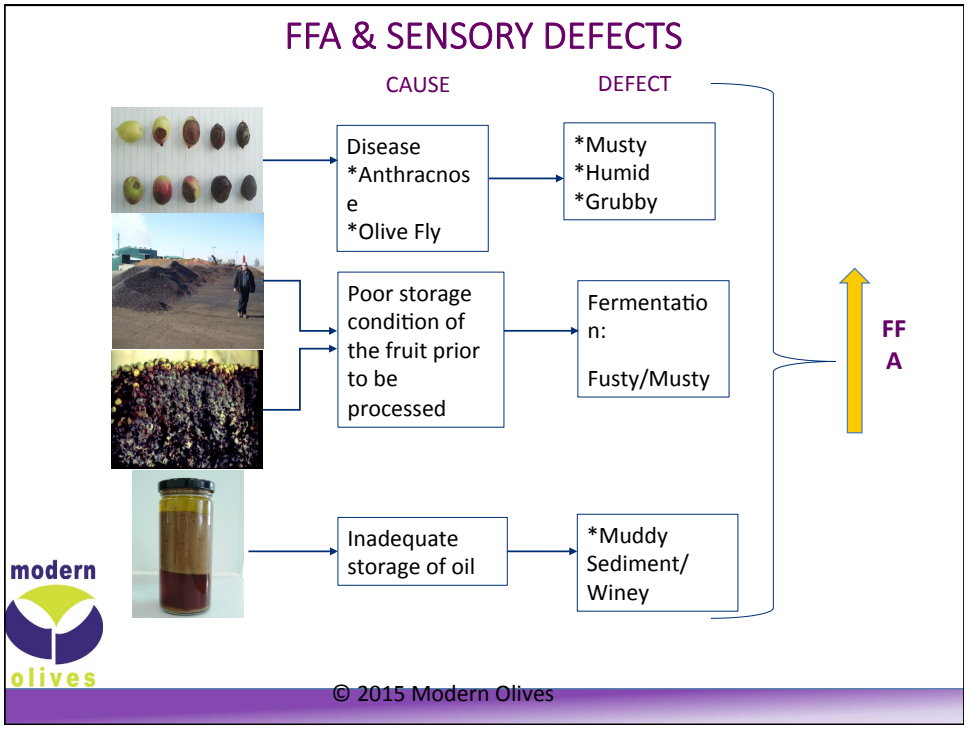


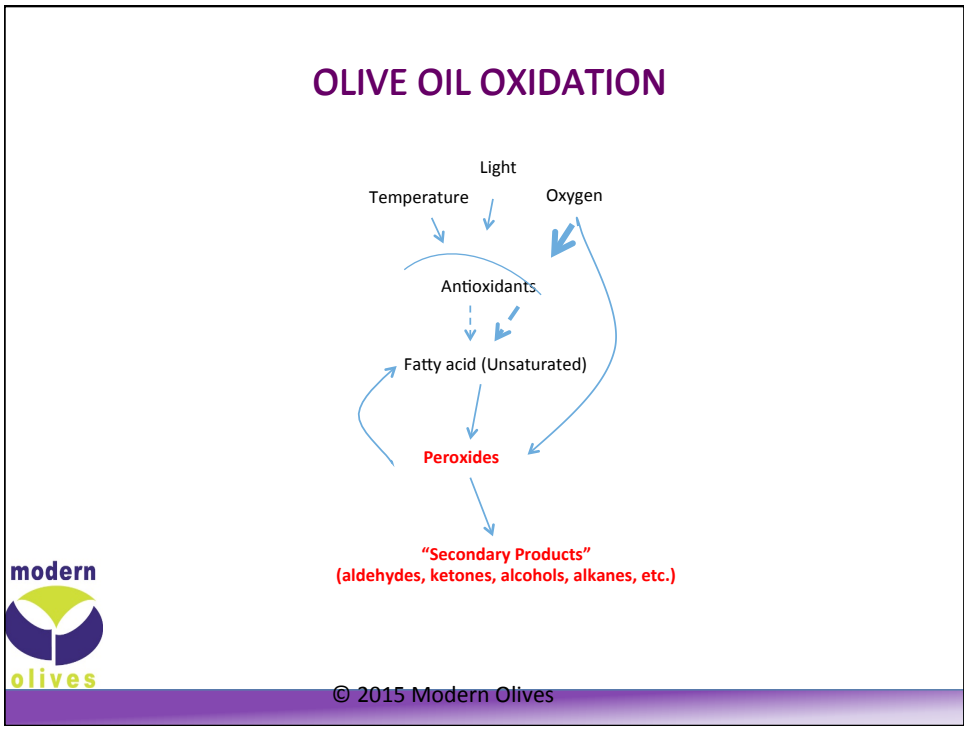

Represents the hydrolytic activities.

Gives a good indication of:

- Fruit Condition before processing
- Time between harvesting and processing
- Storage conditions of the oil (Sediments)

It is expected that sound fruit processed immediately should produce oil with less than 0.4% FFA.


FFA & SENSORY DEFECTS
CAUSE
DEFECT
Disease
*Anthracnose
*Olive Fly
*Musty
*Humid
*Grubby
Poor storage condition of the fruit prior to be processed
Fermentation:
Fusty/Musty
FFA
Inadequate storage of oil
*Muddy Sediment/ Winey
modern olives
© 2015 Modern Olives


OLIVE OIL OXIDATION
Light
Temperature
Oxygen
Antioxidants
Fatty acid (Unsaturated)
Peroxides
"Secondary Products"
(aldehydes, ketones, alcohols, alkanes, etc.)
modern olives
© 2015 Modern Olives

## PEROXIDE VALUE (PV)

Measures the quantity of Hydroperoxides present in the oil formed through oxidation that occurs during the processing and storage of the oil,gives us an idea of oils' freshness, processing conditions and storage conditions.

It is expected that sound fruit processed immediately should produce oil with less than 12 meq/kg.



## PV & SENSORY DEFECTS

CAUSE → DEFECT

Inadequate Malaxing conditions. ↑ Temp/ time → Cooked/fusty

Inadequate Storage conditions (O2, Light, Tempeture, material) → Rancid

PV

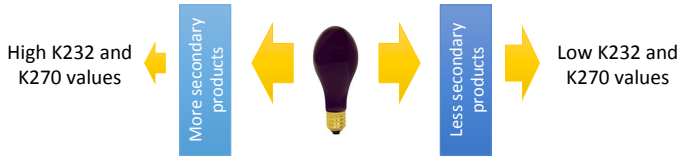
## Frost Damage

- No significant problems with chemical quality parameters up to 2-3 weeks after frost event.
- Chemical parameters significantly affected but within the EV category 4 weeks after frost event.
- Peroxides above EV limits 5 weeks after frost event.
- Acidity above EV limits 6 weeks after frost event.
- Organoleptic issues almost immediate.

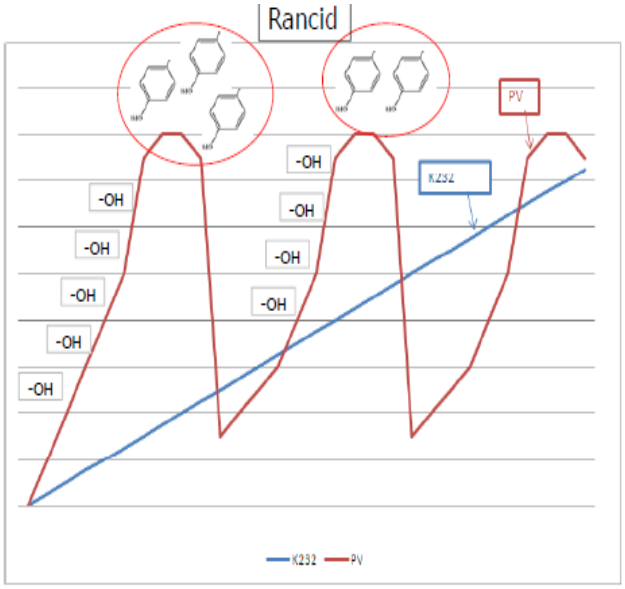


## UV COEFFICIENTS (K232,K270, DK)

- These values are the primary measurements of oils secondary oxidation and they give us an idea of oils' freshness, processing conditions and storage conditions.
- **Extra virgin olive oils must have K232 and K270 values of less than 2.50 and 0.22 respectively.** Nonetheless, it is expected that sound fruit processed immediately should produce oil with K values under 2.00 and 0.18 respectively.



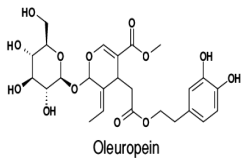

UV light at 232 nm and 270 nm

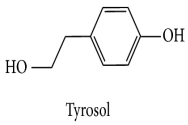


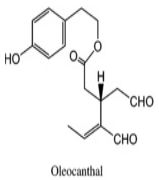



## POLYPHENOLS

*Olive Oil Phenol Fraction: A*re an important class of antioxidants in olive oil. Phenolic Compounds are related to the stability of the oil but also to its biological properties.


Oleuropein

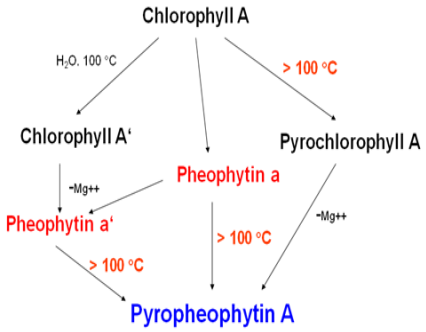

Tyrosol


Oleocanthal

# Pyropheophytins

Measures the dynamics of some chlorophyll pigments: Pyropheophytin a and pheophythins a and a'

**Chlorophyll Degradation Products in Olive Oil** (Lit. K.Aizetmüller. Fett/Lipid 1986)





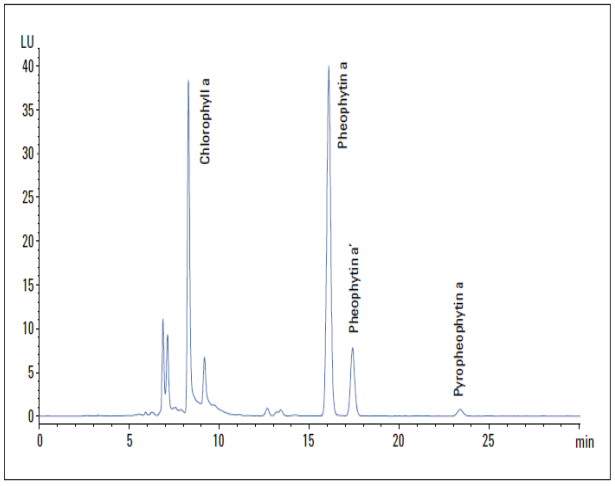



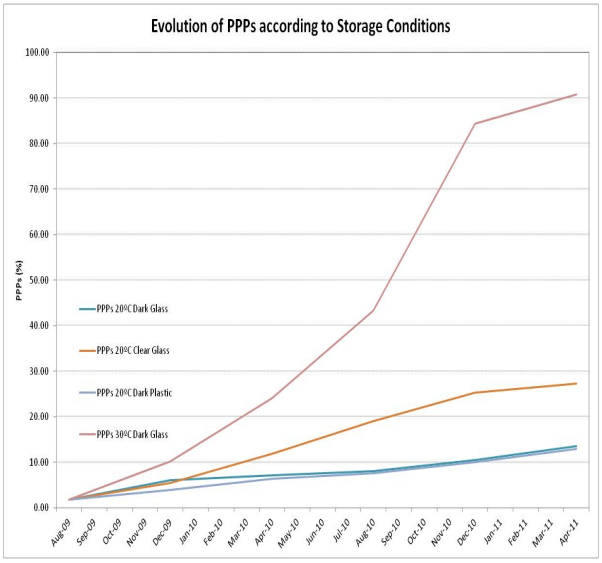

Figure 2
Separation of chlorophyll a and its degradation products.

PPP's are a good indication of:

- Age of the oil

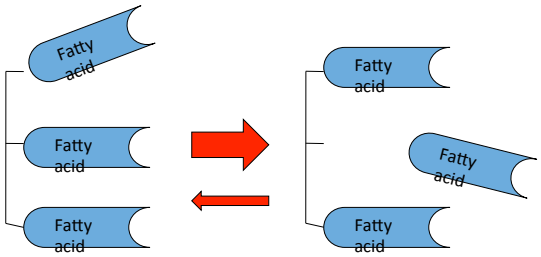
  - A fresh oil will have <1% of PPP's and will increase 6-8% per year under the proper storage conditions
- Storage Condition
- Freshness
- Can highlight the presence of deodorized oils.





## 1,2 Diacylglycerols (DAG's)

DAG's are present in Olive Oil in a range of 1-3% and they are found as 1,2 & 1,3 isomers.




Fermentation - Time

1,2-DAGs 1,3-DAGs

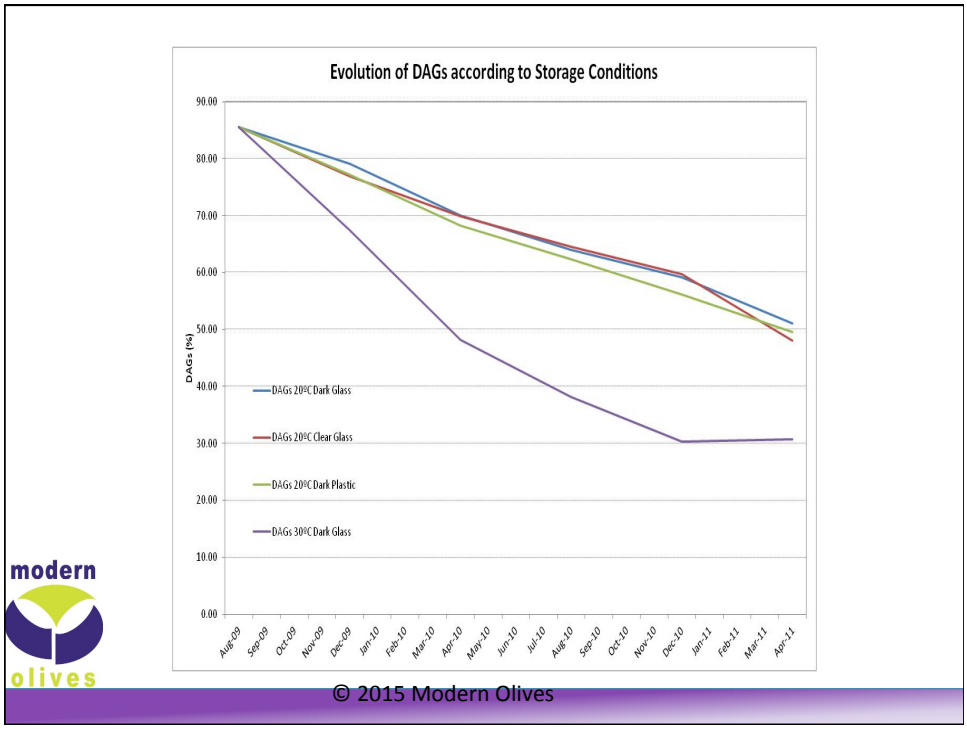


## DAG's are a good indication of:

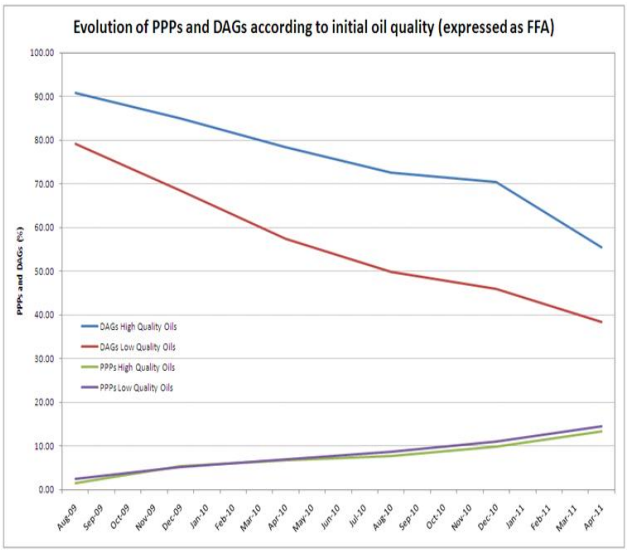
- Initial quality of the oil

  - A fresh oil will have > 90% of DAG's and will decrease 20-25% per year under the proper storage conditions

- Storage Condition
- Freshness

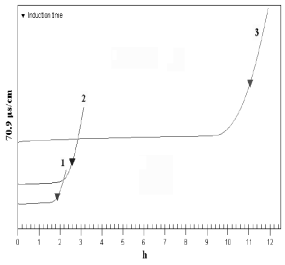




# Determining Shelf Life

Rancimat®






# Determining Shelf Life

- PPP increases 6 – 8 % per year
- DAG decreases 20 – 25 % per year
- IND equals to 1 month/hour at 110ºC

| OIL # 1 | |
|---|---|
| FFA | 0.21 |
| PPP | 0.5 |
| DAG | 94.1 |
| Defect | 0.0 |
| IND | 37.2 |

**BBD: 28 months (24 months labelling requirements)**

| BBD (months) | |
|---|---|
| PPP | 28.3 |
| DAG | 35.5 |

**BBD: 15 months**

| OIL # 2 | |
|---|---|
| FFA | 0.45 |
| PPP | 0.5 |
| DAG | 61.5 |
| Defect | 0.0 |
| IND | 28.8 |

| BBD (months) | |
|---|---|
| PPP | 28.3 |
| DAG | 15.9 |

## WINNING OILS 2013

### 2013

| | FFA | PV | K232 | K270 | DK |
|---|---|---|---|---|---|
| Sample 1 | 0.2 | 6.0 | 2.048 | 0.101 | -0.003 |
| Sample2 | 0.1 | 6.0 | 1.615 | 0.123 | -0.004 |
| sample3 | 0.2 | 2.4 | 1.613 | 0.142 | -0.004 |

### TODAY

| | FFA | PV | K232 | K270 | DK |
|---|---|---|---|---|---|
| Sample 1 | 0.2 | 12.8 | 2.543 | 0.195 | 0.001 |
| Sample2 | 0.3 | 11.2 | 2.532 | 0.223 | -0.001 |
| sample3 | 0.3 | 8.7 | 2.108 | 0.157 | 0.000 |

modern olives