



Applicazione degli ultrasuoni e ottimizzazione della qualità organolettica e nutraceutica dell'olio extra vergine di oliva

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[https://www.regione.toscana.it/piramide-alimentare-toscana/i-livelli-della-piramide/.](https://www.regione.toscana.it/piramide-alimentare-toscana/i-livelli-della-piramide/)

Firenze 1427....al tempo dei Medici

1 Kg di Olio d'oliva = 5 L di vino

1 Kg di Olio d'oliva = 4 Kg di grano





Article

Implementation of the Sono-Heat-Exchanger in the Extra Virgin Olive Oil Extraction Process: End-User Validation and Analytical Evaluation

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LE ANALISI EFFETTUATE

- Visual determination of the maturity index (MI)
- Oil yield evaluation
- Oil production and End-User Validation protocol
- Evaluation of the European legal quality of the virgin olive oils
 - acidity (% oleic acid)
 - peroxide value ($\text{meq}_{\text{O}_2}/\text{kg}$)
 - spectroscopic indices
 - organoleptic evaluation (panel test)

HPLC-DAD analysis of the phenolic compounds before and after acidic hydrolysis

HS-SPME-GC-MS analysis of volatile organic compounds (VOCs)





PERCHÈ I COMPOSTI FENOLICI E LA FRAZIONE VOLATILE (VOCS) ?

Sono i principali responsabili delle proprietà organolettiche e delle caratteristiche sensoriali di un olio extra vergine di oliva (EVOO)

I fenoli sono riconosciuti come determinanti per gli effetti protettivi dell'olio

EVOO, un Nutraceutico Naturale





n°	Sample	Cultivar	Olive Mill	Crusher	MI	% of fruit oil content on the fresh matter
1	OM-N	Coratina	Mimì	Hammer Crusher	1	19.6 ± 0.6
2	OM-U	Coratina	Mimì	Hammer Crusher	1	19.6 ± 0.6
3	1N	Peranzana	Graco	De-stoner	3	24.8 ± 0.4
4	3N	Peranzana				
5	5N	Peranzana				
6	9N	Peranzana				
7	10N	Peranzana				
8	12N	Peranzana				
9	2U	Peranzana	Graco	De-stoner	3	24.8 ± 0.4
10	4U	Peranzana				
11	6U	Peranzana				
12	7U	Peranzana				
13	8U	Peranzana				
14	11U	Peranzana				
15	P5N	Coratina/Ogliarola	Frantolio	Hammer Crusher	4	21.0 ± 0.4
16	P6N	Coratina/Ogliarola				
17	P3U	Coratina/Ogliarola				
18	P4U	Coratina/Ogliarola				
19	P7U	Coratina/Ogliarola				
20	C4N	Cellina di Nardò	Frantolio	Hammer Crusher	6	14.8 ± 0.3
21	C3U	Cellina di Nardò	Frantolio	Hammer Crusher	6	14.8 ± 0.3
22	C5U	Cellina di Nardò				
23	C6U	Cellina di Nardò				



METODI: composti fenolici

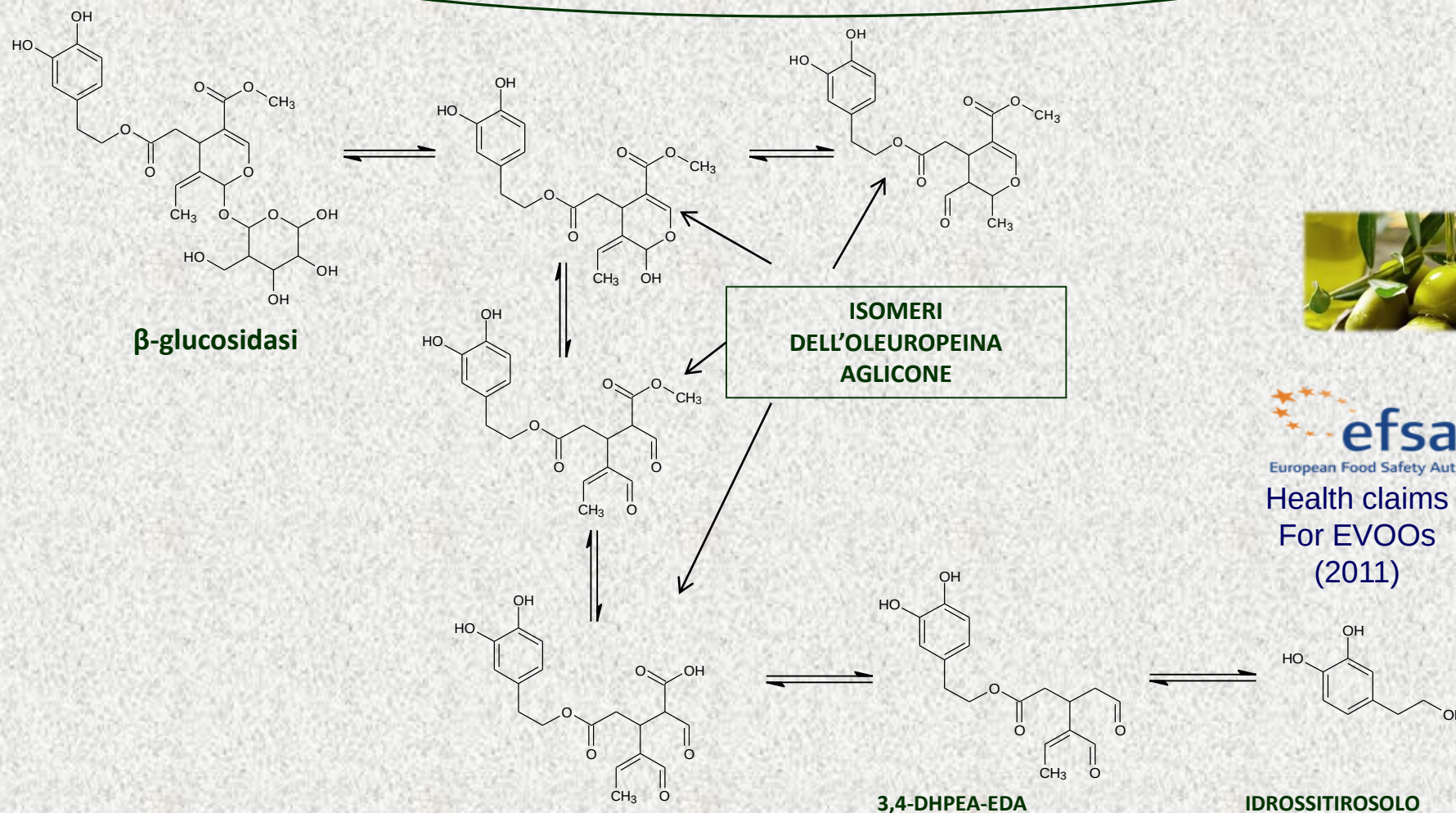
- 1- estrazione in accordo con metodo indicato dal IOC [1]
- 2- Idrolisi acida con metodo validato
- 3- Determinazione mediante HPLC-DAD prima e dopo idrolisi acida

[1] IOC/T.20/Doc No. 29, Official method of analysis. Determination of biophenols in olive oil by HPLC.

International Olive Council, Madrid (2009).

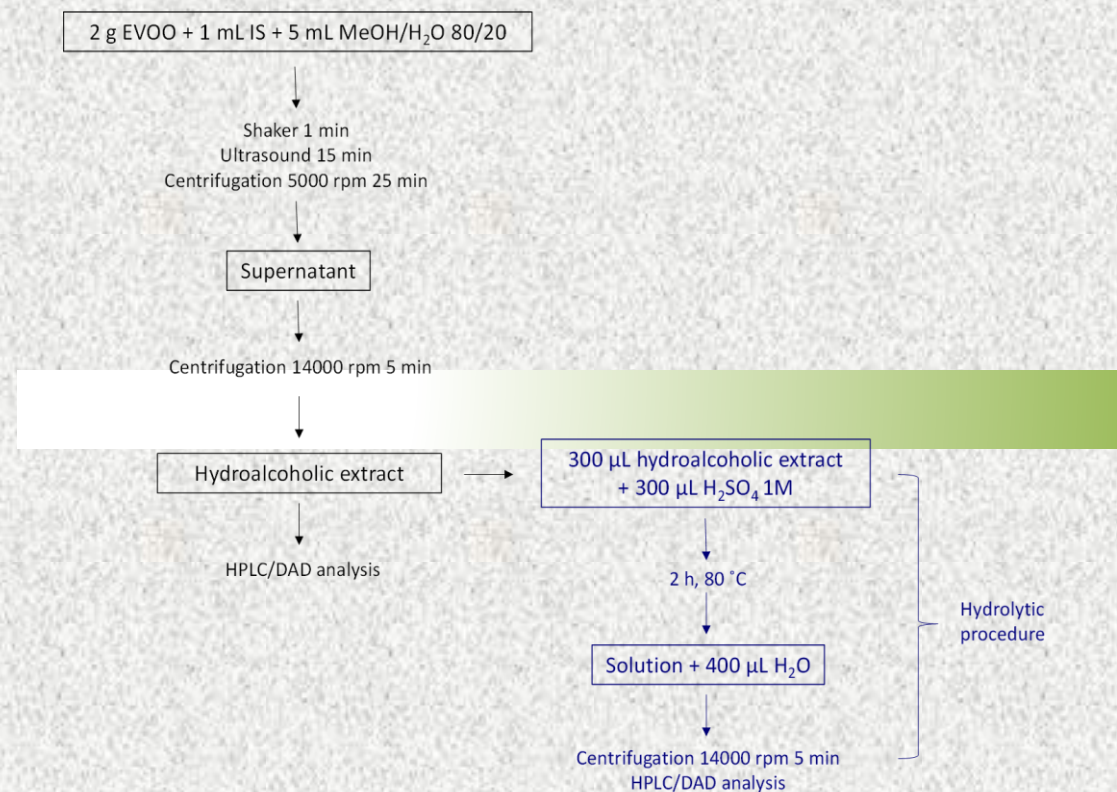


L'oleuropeina durante la frangitura



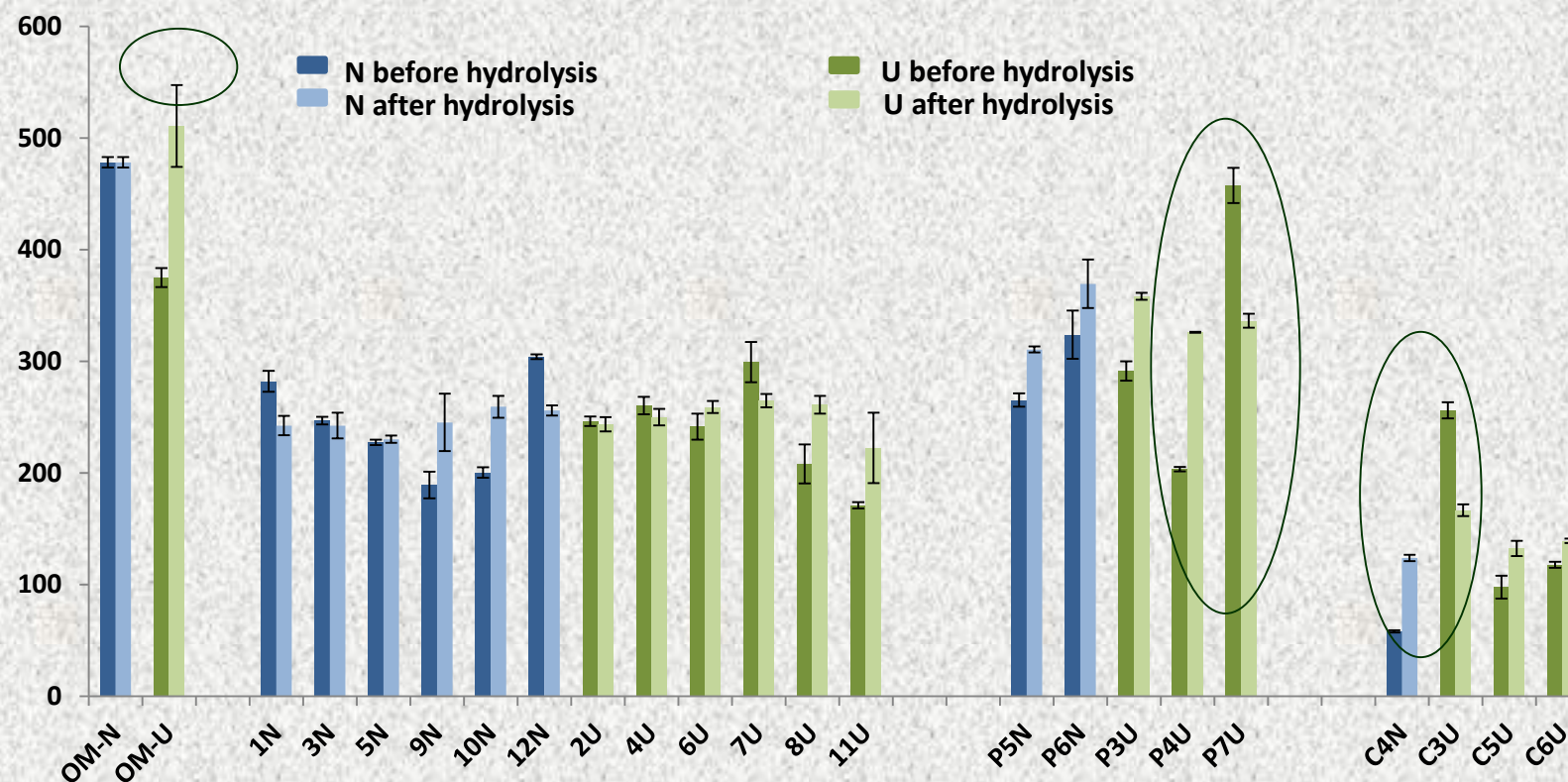


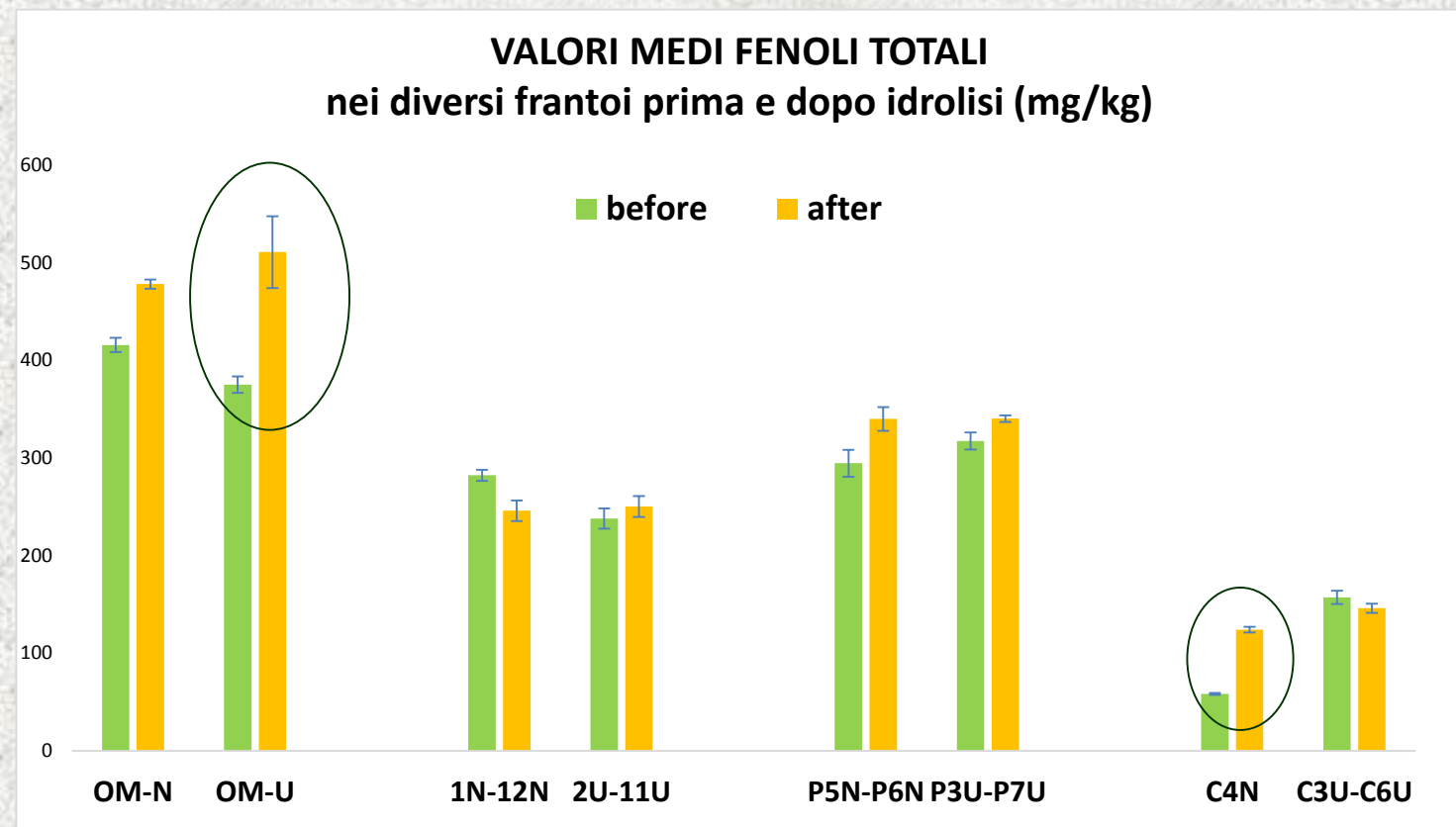
I FENOLI NELL'OLIO: 0,300-0,6 g/kg





FENOLI TOTALI: prima e dopo idrolisi (mg/kg)

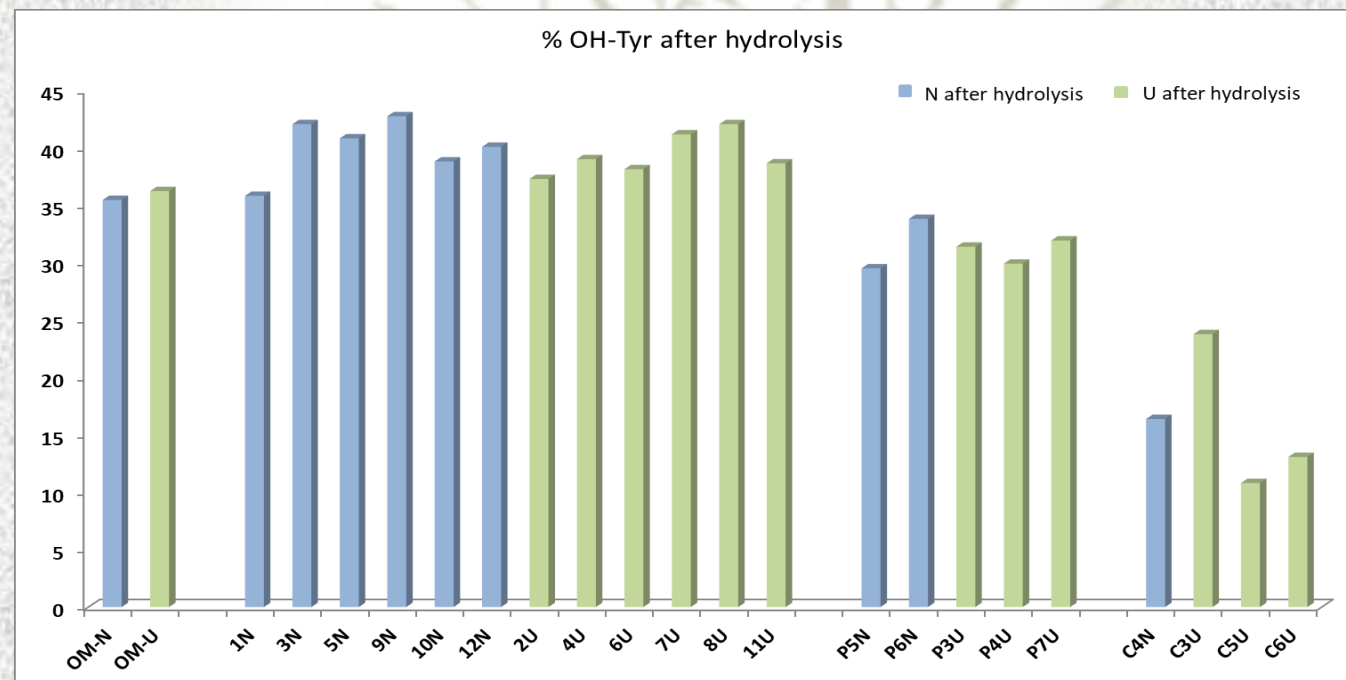






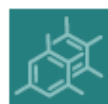
CLAIMS EFSA e IDROSSITIROSOLO TOTALE

..Olive oil polyphenols contribute to the protection of blood lipids from oxidative stress.



..at least 5 mg of Total Hydroxytyrosol per 20 g of olive oil.





molecules



Article

The EFSA Health Claim on Olive Oil Polyphenols: Acid Hydrolysis Validation and Total Hydroxytyrosol and Tyrosol Determination in Italian Virgin Olive Oils

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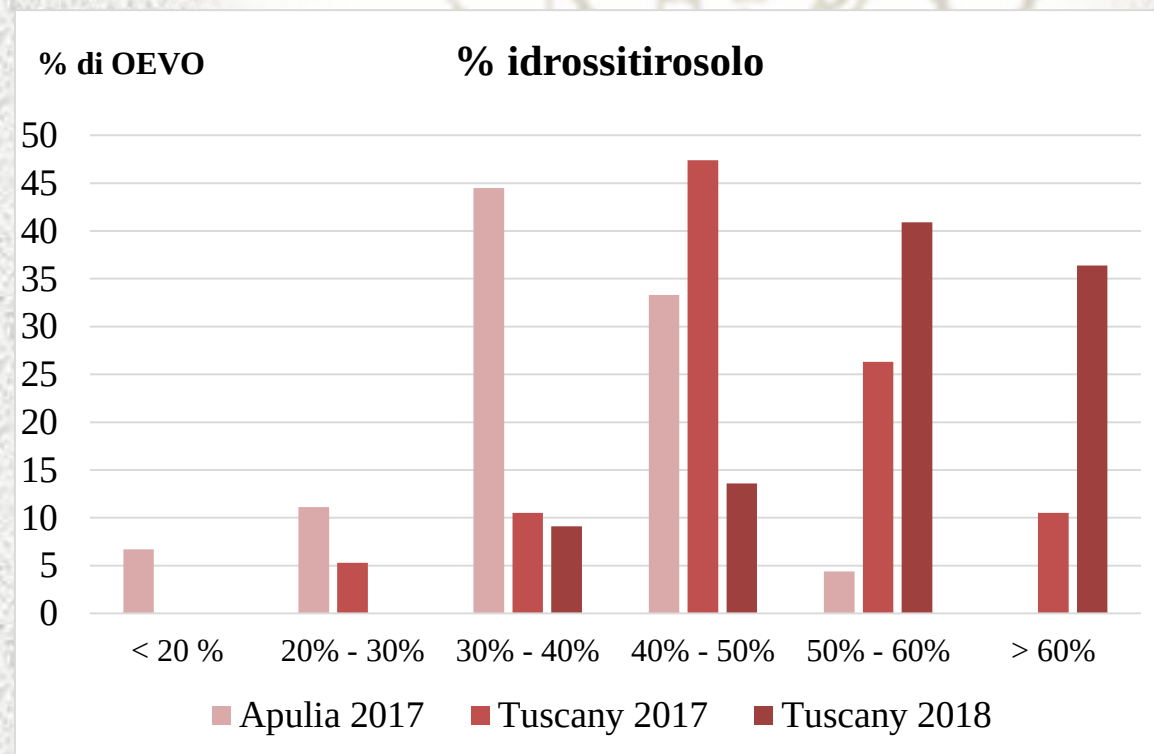
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Dati ottenuti da oltre 100 OEVO



Dati ottenuti dopo idrolisi (% di idrossitirosolo su somma di tirosolo e idrossitirosolo)





EFSA approved health claim on olive oil polyphenols (Commission Regulation (EU) 432/2012):

Olive oil polyphenols contribute to the protection of blood lipids from oxidative stress. The claim may be used only for olive oil, containing at least 5 mg of hydroxytyrosol and its derivatives (e.g. oleuropein complex and tyrosol) per 20 g of olive oil. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 20 g of olive oil.

Olive oil comprises mainly of the monounsaturated fatty acid oleic acid (C18:1). There is also a EFSA approved health claim on the unsaturated fatty acids (Commission Regulation (EU) 432/2012):

Replacing saturated fats in the diet with unsaturated fats contributes to the maintenance of normal blood cholesterol levels. The claim may be used only for food which is high in unsaturated fatty acids, as referred to in the claim

HIGH UNSATURATED FAT as listed in the Annex to Regulation (EC) No 1924/2006.





Quanto olio di olivanegli anni

25 g/giorno

per 1 anno = 9,13 Kg

35 g/die

per 1 anno = 12,8 Kg

A 40 anni abbiamo ingerito 512 Kg

A 60 anni..... 768 kg

A 80 anni1024 kg !!





**Body Worlds. La plastinazione
in mostra a Firenze (2016)**

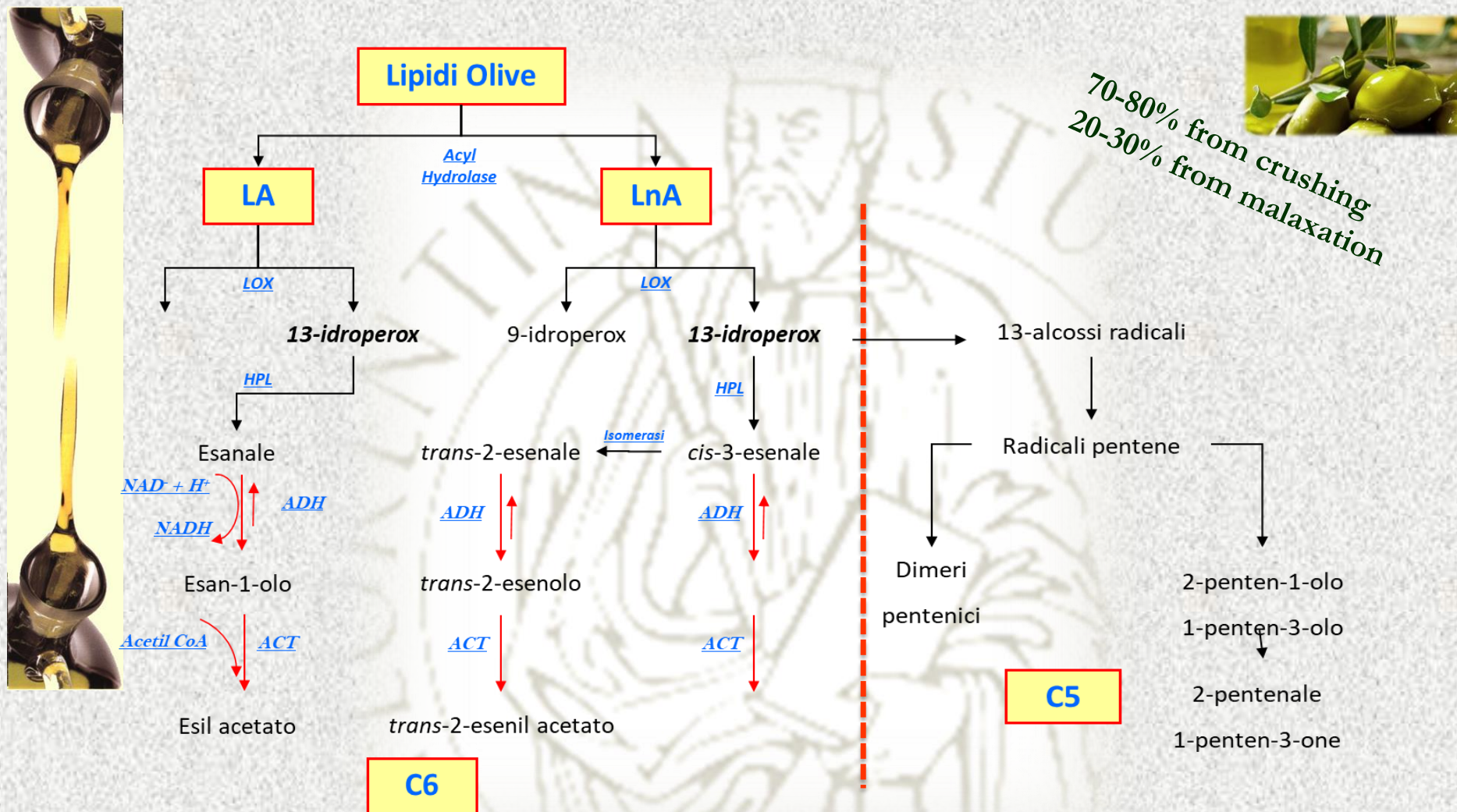




I composti volatili dell'OEVO



LOX pathway



Fruity

Set of olfactory sensations characteristic of the oil which depends on the variety and comes from sound, fresh olives, either ripe or unripe. It is perceived directly and/or through the back of the nose.



METODI: i composti volatili (VOCs) [2]

- 1 - Estrazione dei composti in spazio di testa e determinazione mediante HS-SPME-GC-MS

(metodo validato, 73 componenti analizzati mediante 9 ISTD per la normalizzazione e 11 standards esterni per rappresentare al meglio le diverse classi chimiche)

[2] Fortini M, Migliorini M, Cherubini C, Cecchi L, Calamai L. Talanta 165, 641–652 (2017).





ULTRASUONI ED EFFETTO SUI VOCs

VOC	1N-12N		P3U-P7U		C3U-C6U		OMN-OMU	
	U	N	U	N	U	N	U	N
LOX C5	0.25 a	0.25 a	0.47 a	0.53 a	0.15 a	0.14 a	1.61 a	1.46 a
LOX C6 aldehydes	7.98 a	8.24 a	11.98 a	12.06 a	5.22 a	5.16 a	34.24 a	34.78 a
LOX C6 esters	2.91 a	2.89 a	0.06 a	0.05 a	0.32 a	0.29 a	0.07 a	0.07 a
LOX C6 alcohols	0.77 a	0.76 a	1.36 a	1.77 a	0.70 a	0.55 a	1.63 a	1.77 a
Totale LOX	11.92 a	12.14 a	13.87 a	14.41 a	6.40 a	6.14 a	37.55 a	38.07 a
saturated C7-C10 aldehydes	< 0.01	< 0.01	0.29 a	0.30 a	< 0.01	< 0.01	0.15 a	0.18 a
mono-unsaturated C7-C10 aldehydes	0.02 a	0.02 a	< 0.01	< 0.01	0.05 a	0.04 a	< 0.01	< 0.01

Distribution of the different groups of volatiles produced during the lipoxygenase cascade (first 5 rows) and linked to oxidative defects (last 3 rows) in oils obtained with (U) and without (N) the use of ultrasound during milling. For each couple of oils, no differences were highlighted as indicated by the same letter (a).





I RISULTATI...in sintesi

- Incremento delle rese in olio soprattutto per olive a maturazione non completa e riduzione dei tempi di frangitura
 - La qualità organolettica e nutraceutica dell'olio non è modificata dagli US
- 
- Fenoli totalmente comparabili fra oli ottenuti con e senza l'utilizzo di US
 - La somma dei VOCs positivi (LOX, note green e fruttate) non è modificata dagli US
 - L'apporto di energia meccanica in frantoio non induce sviluppo di note sensoriali negative negli oli.

Istituto Nutrizionale Carapelli ha permesso la ***end-users validation***





Grazie a tutti ..per l'attenzione

