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DI SCIENZE AGRARIE,
ALIMENTARI E AMBIENTALI

UNIVERSITA' DEGLI STUDI DI PERUGIA
DIPARTIMENTO DI
SCIENZE AGRARIE, ALIMENTARI E AMBIENTALI

Laboratorio di Analisi Chimico-fisiche
Via San Costanzo
Tel. 075.5857914

Prot. n. 237082 del 26 GIUGNO 2026

CERTIFICATE OF ANALYSIS N. 2/2026

Sample of: OLIVE OIL (Sample San Sebastiano 18/06/26) presented on 18th June 2026
From: Paneolio Impresa Sociale società cooperativa agricola, Via Sant'Anna 3 - 06035 Gualdo Cattaneo (PG) – Italy

RESULT OF ANALYSIS

Legal Quality parameters*

	San Sebastiano 18/06/2026
Free fatty acid (% oleic acid)	0,20
Peroxide value (meq.O_2/Kg oil)	5,6
K_{232}	1,752
K_{270}	0,136
Δ K	-0,004

* Test not accredited by ACCREDIA (the Italian Accreditation Body)

RS

borgo XX giugno 74
06121 Perugia

Responsabile dell'Analisi
Prof. Maurizio Servili
Segretario Amministrativo
DSA3
Sig.ra Stefania Rosignoli

Direzione DSA3 075 585 6060/6062
antonio.boggia@unipg.it
Prof.Maurizio Servili 075 585 7942
maurizio.servili@unipg.it
Segreteria Amministrativa 075 585 6427
andrea.biagetti@unipg.it

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Phenolic composition and α-tocopherol content (mg/Kg) of EVOO.*

	San Sebastiano 18/06/26
Hydroxytyrosol (3,4-DHPEA)	2,6 ± 0,1
Tyrosol (*p*-HPEA)	3,2 ± 0,1
Vanillic acid	0,3 ± 0,02
p-Coumaric acid	1,0 ± 0,02
Oleacein (3,4-DHPEA-EDA)	684,0 ± 5,0
Oleocantale (*p*-HPEA-EDA)	170,1 ± 0,2
(+)-1-Acetoxypinoresinol	39,2 ± 1,9
(+)-Pinoresinol	14,1 ± 0,1
Oleuropein aglycone isomer (3,4-DHPEA-EA)	258,4 ± 8,2
Ligstroside aglycone	17,8 ± 0,6
Luteolin	n.d.
Apigenin	n.d.
Total phenols	1190,8 ± 9,8
Sum of oleuropein derivatives[a]	945,1 ± 9,6
Sum of ligustrside derivatives[b]	191,0 ± 0,6
Sum of lignans[c]	53,4 ± 1,9
α-tocopherol	257,9 ± 4,6

* The results are the mean of two determinations ± the standard deviation; the quantitative evaluation of the phenolic compounds was determined by constructing calibration curves for each compound analyzed and the results are expressed as mg/kg (Taticchi et al., 2020, Food Chemistry, 128369). * Data are the mean of two repetitions ± the standard deviation. a The sum of oleuropein derivatives includes: hydroxytyrosol oleacein and oleuropein isomer aglycone; b the sum of ligstroside derivatives includes: tyrosol oleocanthal and ligustroside aglycone; c the sum of lignans derivatives includes: (+)-1-acetoxypinoresinol and (+)-pinoresinol. n.d. not detected.
* Test not accredited by ACCREDIA (the Italian Accreditation Body)

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Analyses methods

Legal Quality Parameters

Legal quality parameter analysis was carried out for the product classification of olive oils. Acidity, peroxide value, and spectrophotometric constants (K232, K270, and ΔK) were detected according to the methods presented in Regulation (UE) 2015/1830 (OJEC, 2015).

Phenolic Compounds

The phenolic fraction was extracted from the EVOOs by a liquid–liquid extraction method, mixing the EVOO sample with a methanol/water solution (80/20 v/v) as described by Taticchi et al. (2021). The quantitative concentration and qualitative composition of EVOO samples were determined using high-performance liquid chromatography (HPLC) by Agilent Technologies MOD. 1100 controlled by ChemStation (Agilent Technologies, Palo Alto, CA USA). The device was equipped with the following components: vacuum degasser system; a quaternary pump; an autosampler; a thermostated compartment for the column, and finally a diode array detector (DAD) and a fluorescence detector (FLD). Phenolic acids, tyrosol, hydroxytyrosol, and the other aglycone derivatives of oleuropein and ligstroside were detected by using the DAD with a wavelength of 278 nm, whereas the flavonoids were detected at 330 nm. The extraction methods and chromatographic tests were carried out according to the method described by Selvaggini et al. (2006). The quantitative and qualitative compositions of hydrophilic phenols, separated by using a Spherisorb ODS1 (5 µm, 4.6 mm × 250 mm, Waters, Milford, MA, USA) column, were elaborated by ChemStation software (Agilent Technologies, Palo Alto, CA, USA) and expressed in mg/kg of EVOO.

Alfa – Tocopherol

For the extraction of α-tocopherol (vitamin E), 1 g of oil sample was dissolved in 10 mL of isopropanol, filtered through a 0.2 µm PVDF syringe filter (Carlo Erba, Milan, Italy), and analyzed using an Agilent 1290 Infinity II UHPLC system equipped with a quaternary pump, autosampler, thermostated column compartment, and diode array detector (DAD). The chromatographic system was controlled using OpenLab ChemStation software. Chromatographic separation was performed on a Zorbax Eclipse Plus C18 column (2.1 × 150 mm, 1.8 µm). The injection volume was 5 µL, and the mobile phase consisted of 0.2% acetic acid in water (solvent A) and methanol (solvent B), delivered at a flow rate of 0.6 mL min^{-1}. The gradient elution program was as follows: 2% A and 98% B at 0 min; 0% A and 100% B after 1 min, maintained for 7 min; the initial conditions were then restored over 2 min, followed by a 5 min re-equilibration period. The total run time was 15 min, while the data acquisition time was 10 min. α-Tocopherol was detected at 294 nm using the DAD. Quantification was performed by external calibration using an analytical α-tocopherol standard. The results were expressed as mg kg^{-1} of oil.

Perugia, 26th June 2025

THE ANALYST
(Michele A. Giglioni)
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THE RESPONSIBLE OF THE ANALYSIS
(Prof. Maurizio Servili)
.....

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