

Environmental Product Declaration (EPD®)
For D.O.P. Umbria Extra Virgin Olive Oil
Monini S.p.A.

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EPD®

01 *The All-Italian Story of a Passion*

MONINI, THE ALL-ITALIAN STORY OF A PASSION

A passion for quality that dates back over a century

The Monini company is an Italian success story based on tradition and quality. The company was founded in 1920 by Zefferino Monini, who, following his entrepreneurial instinct, decided to establish a business in the town of Spoleto, in the Italian region of Umbria. Thanks to its hills covered with olive groves, from which an oil with an intense yet balanced flavour is obtained, the Spoleto area has always been dedicated to the production of Extra Virgin Olive Oil.

The passion that Zefferino Monini Sr. developed for olives at an early age led him to dedicate himself to the production of Extra Virgin Olive Oil, whereby he founded the company “Zefferino Monini Olio di Oliva” in 1930. The knowledge and consumption of Extra Virgin Olive Oil at the time was limited and was locally confined exclusively to its areas of production. Most Italians, above all in the larger cities, either out of habit or lack of knowledge, used almost exclusively regular olive oil, rather than the extra virgin variety.

By deciding to market Extra Virgin Olive Oil beyond the confines of the Umbria region, Zefferino Monini launched a new trend in the oil industry. Thanks to his initiative and his passion for the natural product of his homeland, together with the exceptional quality of the oil obtained from the hills of Umbria, Zefferino Monini succeeded in writing the first page in the history of the Extra Virgin Olive Oil market. Once brought to the attention of a wider audience, Monini extra virgin olive oil became increasingly popular and began to be demanded by customers even further afield. The company ceased operations during the war as the product was subject to rationing. Once the distribution of foodstuffs was deregulated in 1945, however, the company’s operations continued with renewed energy. It was at this time that Zefferino’s sons, Giuseppe and Paolo, joined the company. Giuseppe and Nello flanked their father in his traditional laboratory, learning the all the tricks of the trade.

At the time, shopkeepers sold the product in bulk. Anticipating the future needs of the market, however, the first glass bottles began flanking the traditional demijohns by the year 1950.

01 *The All-Italian Story of a Passion*

A historic oil in modern times.



Today Monini is one of the leading companies in the Extra Virgin sector with a 2021 turnover of 153 million Euros and more than 110 employees. Almost 96% of the total turnover is achieved with the Monini brand. The strategy started in the 1920's by the founder, confirmed and increased by his son Giuseppe, is still carried on by the founder's grandchildren, Zefferino and Maria Flora who, with the same passion, continue to spread the culture of Extra Virgin Olive Oil in an educational, serious and not only commercial way. For three generations, the Monini family has been selecting Extra Virgin Olive Oils, choosing only mills where the hygiene conditions, processing facilities and storage of the olives and oil are of superior quality. A company in the vanguard in terms of structures, technology and quality control, still animated by a passion for craftsmanship to offer its consumers superior quality. Even today, Zefferino Monini personally tastes the oils to select those that will keep the promise of high quality, the same every time, just as his grandfather did.

02 *The Monini Group*

THE MONINI GROUP NORTH AMERICA, POLAND AND AUSTRALIA

A company that symbolizes the Italian Olive Oil Tradition

It is precisely this ability to spread the culture of Extra Virgin Olive Oil and to preserve the most authentic Italian oil art as a symbol of Made in Italy, which has led the Umbrian company to become a point of reference for the sector outside Italy.

In 2000 Monini North America Inc. was founded with headquarters in Norwalk, Connecticut, and a turnover that today is around 6 million dollars.
In Europe it is present with Monini Polska, a branch born in 2008 with headquarters in Poznan, Poland.

03 *The Company*

THE COMPANY

Environmental policy

Today Monini is a company in the vanguard in terms of structure, technology and quality control, capable of renewing tradition through a model of responsible company management, both from the environmental, social and ethical points of view. Monini is particularly attentive to the environment, as evidenced by interventions ranging from the installation of a photovoltaic system at the plant, to the purchase of energy from certified renewable sources to the introduction of recycled glass packaging. This policy has led Monini to be the first in Italy among the large oil companies to obtain the Environmental Product Declaration (EPD®) certification.

At the basis of Monini's environmental policy there is a simple philosophy: take nothing away from nature and the land. It is in fact these elements that provide all the precious raw material that has made the Spoleto-based company famous in Italy and throughout the world for almost 100 years. An exemplary commitment that Monini assumes with responsibility towards the territory and its precious fruits, preserving them for future generations. The best possible investment in order to keep alive over time the values that have made the tradition of the art of olive oil production safeguarded by Monini so great.

In 2021 Monini has launched a carbon neutrality project involving its two best-selling extra virgin olive oils in Italy and abroad, the Classico and the Delicato Monini, which together account for 67% of the bottles produced in a year by the company. This project represents a totally voluntary commitment, which Monini has undertaken aware of the need to offer a concrete contribution to the fight against global warming.

Packaging plant

The Monini S.p.A. production site is located in Spoleto (Italy) SS Flaminia Km 129.
Monini S.p.A. packages over 30,000,000 litres per year, of which approximately 87% is Extra Virgin Olive Oil. 45% of the 2021 turnover comes from the export market, which involves more than 52 countries. The company covers an area of 22,000 square metres, of which 11,800 square metres are covered, where there are seven packaging lines that guarantee a maximum production capacity of 15,000 litres per hour in various formats and a filtering line for raw materials.

03 *The Company*

THE COMPANY

Supply chain control

Oils made from olives of different varieties, origins and maturity, and stored under different conditions and for different time frames, naturally possess different characteristics. For this reason, Zefferino Monini Jr., together with some of his closest expert collaborators, select the best oils in a special tasting room on a daily basis, recording the intensity and the different flavour and olfactory characteristics of each oil sampled. Approximately 15,000 oil tasting sessions are held each year during the selection and receipt of the raw materials, as well as before packaging. These control activities are not only limited to the raw materials themselves, but the quality of the final product is also guaranteed by the loyalty, collaboration, and control activities performed by the entire supply chain.

Quality control

A state-of-the-art analytical laboratory monitors the quality and purity of each oil. These highly complex analyses are used to reveal the presence of any oils other than olive oil, as well as the presence of any undesired substances contained within the oils themselves due to treatments with agrochemicals (pesticides, herbicides or fungicides) or simply due to environmental pollution. Modern analytical techniques and sophisticated equipment allow for contaminants to be detected in tenths of parts per billion: this means that it is possible to detect the presence of even just one gram of a contaminant dissolved in 10,000 tonnes of oil.
The Monini analysis laboratory performs approximately 20,000 sets of analysis per year, controlling approximately 90,000 parameters. Most of the controls are performed upon the incoming product, thus allowing for non- compliant batches of oil to be rejected, while further controls are also carried out during the packaging stage. Subsequently, the quality levels of the oils destined for the national and international markets are sampled and monitored.

04 *Calculation of environmental performance*

CALCULATION OF ENVIRONMENTAL PERFORMANCE

Monini D.O.P. Umbria Extra Virgin Olive Oil 0.75-litre, 0.5-litre bottles



This EPD® refers to the product Extra Virgin Olive Oil D.O.P. Umbria. D.O.P. Umbria is produced from 100% of olives grown and harvested in the Colli Martani and Colli Assisi-Spoleto areas, milled in the mills of the same areas and bottled at the Monini plant in Spoleto (PG). The data used to calculate the environmental performance reported in this EPD® are updated to the olive production and oil extraction campaign of the year 2021.
The Extra Virgin D.O.P. Umbria oil is packaged in UVAG glass bottles of 750ml and 500ml; the primary packaging consists of two paper labels (front and back) applied to the bottle and an aluminium cap with plastic pourer; The standard secondary packaging consists of a cardboard box, and the tertiary packaging is the pallet.

In this EPD®, the density of Extra Virgin Olive Oil is considered to be 0.916 kg/litre.

Functional unit

In accordance with PCR 2010:07, the functional unit for the life cycle refers to one (1) litre of Extra Virgin Olive Oil, including its packaging.

04 *Calculation of environmental performance*

GEOGRAPHICAL ORIGIN

Monini D.O.P. Umbria Extra Virgin Olive Oil





Italy
Umbria.

04 *Calculation of environmental performance*

CHARACTERISTICS OF THE EXTRA VIRGIN OLIVE OIL

Monini D.O.P. Umbria Extra Virgin Olive Oil

Extra Virgin Olive Oil produced exclusively from olives picked and pressed in Umbria, mainly of the Moraiolo, Frantoio and Leccino varieties. Its peculiar characteristics are such that it has earned the EEC Protected Designation of Origin D.O.P. status.

For cooking

Its fine bouquet and woody notes, typical of Umbrian oil, allows it to be used raw on game, grilled meat, and legume soups.

NUTRITION DECLARATION for 100 ml	
Energy	3404 kJ
	828 kcal
Fats	92 g
Of which	
Satured Fatty Acids	14 g
Monosatured Fatty Acids	69 g
Polyunsatured Fatty Acids	9 g
Carbohydrates	0 g
Of which Sugar	0 g
Fibres	0 g
Protein	0 g
Salt	0 g
Vitamin E	17 mg*
*** 142% of nutrient reference values**	

04 *Calculation of environmental performance*

CHEMICAL AND PHYSICAL PROPERTIES

Monini D.O.P. Umbria Extra Virgin Olive Oil

MONINI QUALITY SPECIFICATIONS	Monini values	Values provided by law	Reference standards
Free acidity (% expressed as oleic acid)	0.25	≤ 0.8	(1-3)
Peroxides	6,17	≤ 20	(1-2-3)
UV adsorption:			
K_{232}	1,71	≤ 2.5	(1-3)
K_{270}	0.104	≤ 0.22	(1-2-3)
ΔK	-0.002	≤ 0.01	(1-2-3)
Waxes (mg/kg)	60	≤ 150	(1-2-3)
Biophenols (mg/kg)	300		

(1) REG. (EEC) N.2568/91 on the characteristics of olive oil and relevant methods of analysis
(2) CODEX STAN 33-1981 Standard for olive oils and olive-pomace oils.
(3) INTERNATIONAL OLIVE COUNCIL COI/T. 15/NC N.3/Rev. 12 Trade standard applying to olive oils and olive pomace oils

04 *Calculation of environmental performance*

CHEMICAL AND PHYSICAL PROPERTIES

Monini D.O.P. Umbria Extra Virgin Olive Oil

MAIN CONTAMINANTS RESIDUES		Monini values	Values provided by law	Reference standards
PAH: Polycyclic Aromatic Hydrocarbons (mg/kg)	B(a)P	< standard limit values	≤2	Reg. 1881/2006/UE and further modifications
	B(a)P B(a)A B(b)F CHR	< standard limit values	≤10	
Phthalates (mg/kg) Pesticide residues (mg/kg)		<3 (somma) <1 (singoli composti) < valori limite della norma	Those of the reference standards	Internal method Reg. 396/2005/UE and subsequent amendments
MAIN CONTAMINANT RESIDUES		< standard limit values	Those of the reference standards	Reg. 396/2005/UE and subsequent amendments

04 *Calculation of environmental performance*

BOUNDARIES OF THE SYSTEM

Upstream, core e downstream processes

In accordance with PCR 2010:07, the life cycle of the Extra Virgin Olive Oil is divided into the Upstream, Core and Downstream phases.

The Upstream phase includes the following processes:

- The operations required for establishment of the olive groves and the transformation of the terrain's use were not taken into consideration because the life cycle of an olive grove is greater than 25 years.
- The production of the olives used later in the Core process, involving the following processes:
  - *The production of the inputs utilized, such as for example, fertilisers and agrochemical products.*
  - *Waste management.*
  - *The use of the wood resulting from pruning or from the end of the olive trees' life cycle.*
  - *The transportation of the inputs to the region and to the olive production sites.*
  - *The extraction and use of the water.*
  - *The auxiliary materials used to harvest the olives (nets, cages, detergents, etc.).*
  - *The production of the fuel and electricity used at the plantations.*
- The production of packaging and auxiliary materials used for extracting oil at the oil mill and for filtration and fine filtering at the Monini plant.

04 *Calculation of environmental performance*

BOUNDARIES OF THE SYSTEM

Upstream, core e downstream processes

The Core phase includes the following processes:

- The transportation of the olives to the mill.
- The extraction of the oil from the olives.
- Waste management.
- The preservation of the oil.
- Transportation to the packaging plant.
- The packaging of the oil at the Monini facility in Spoleto.

In accordance with the 2010 PCR: 07, the construction of machinery (more than three years old) and the factories were not included. In addition, the packaging of chemical products and auxiliary materials used during the cultivation, at the olive mill and in the packaging stage, as well as the product labels and neck collar applied on the oil bottles, the shrink film and the adhesives applied to the pallet, they were not included for the cut-off rule (which excludes material flows of less than 1% of the total inventory).

- The transportation of the raw materials and energy inputs to the Core process.

The Downstream phase includes the following processes:

- Transportation from the final production/ storage site to a distribution platform.
- Transportation to the retailer.
- Waste management.
- The use of the product.
- The recycling or disposal of the packaging/materials after use.

04 *Calculation of environmental performance*

BOUNDARIES OF THE SYSTEM



04 *Calculation of environmental performance*
DATA QUALITY

The inventory analysis was carried out using specific data from: Monini S.p.A. and from the companies involved in the study regarding the cultivation and harvesting of the olives, oil extraction and storage, transport to the bottling site, packaging stage and distribution of the product.

Selected generic data were used from:

-Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91.
- The Methodology of the FAO Study: "global food losses and food waste - extent, causes and prevention" - FAO, 2011 by SIK - Swedish Institute for Food and Biotechnology, 2013.
-Eurostat,
http://epp.eurostat.ec.europe.eu/portal/page/portal/eurostat/home

- Production regulations for 'Umbria' Extra Virgin Olive Oil with Protected Designation of Origin DM 6/8/1998 - GURI n.193 del 20/8/1998.

- International databases (in particular Ecoinvent 3.8) for the production processes of semi-finished products, packaging materials, electrical and thermal energy and means of transport, as well as water supply and end-of-life.

In accordance with the General Program Instructions of the International EPD® System, version 3.01 of 18/09/2019, the contribution of other generic data to the impact indicators is less than 10%.

In addition, transport distance data were calculated using the online calculator Google Maps and Sea Rates for the calculation of transport distances by land and sea respectively

The Monini supply chain

The direct relationship with the private or co-operative oil mill (sometimes through the figure of a mediator to co-ordinate logistical and economic aspects) does not contribute to determining a favourable situation for data collection for the process unit belonging to the farm, involved in the cultivation of the olive tree. Nevertheless, compared to the previous version, the sample of suppliers (growers and mills) that actively participated in the collection of specific data has been maintained in this EPD®. The availability of a more representative sample has significantly improved the quality of the processed data, which have been refined to the point where they are probably very close to the actual value.

Comparison of EPD® within the same product category

The oils included in this document are based on the specification PCR 2010:07 version 3.0 updated 31/03/2020, developed in accordance with the General Programme Instructions of the International EPD® System, version 2.01 of 18/09/2013.
EPDs® from the same product category but from different programmes may not be comparable, as well as EPDs® from the same product category and programme but differing in packaging format.

04 *Calculation of environmental performance*

CULTIVATION AND COLLECTION OF THE OLIVES

Umbria, Italy

With reference to D.O.P. Umbria, the olive growing industry features 27,000 hectares of olive groves and 250 oil mills, of which only around one hundred are registered for the protected designation of origin. The average production is approximately 90,000 quintals of extra virgin olive oil a year, of which only 8,000 have the protected designation of origin status. Umbrian extra virgin olive oil comes from five areas, whereas Monini's D.O.P. Umbria comes from only two specific areas: the Martani Hills and Assisi-Spoleto Hills. This is the area where Monini – which markets approximately 20% of certified D.O.P. Umbria oil – is based.

The growing process is governed by the PDO regulation, which establishes a certain percentage of olive trees per type of cultivar.

In particular, to achieve the "Colli Assisi-Spoleto" geographical indication, at least 60% of the extra virgin olive oil must be obtained from Moraiolo olives, and maximum 30% from Leccino and Frantoio olives. To achieve the "Colli Martani" geographical indication, at least 20% of the extra virgin olive oil must be obtained from Moraiolo olives, and maximum 80% from S. Felice Leccino and Frantoio olives.

The sample farms considered in the study covered an average surface of 27 hectares and had an average of 270 plants/ha. The olive growing process required the use of agrochemicals. Olives are harvested manually with the use of olive harvesters.

04 *Calculation of environmental performance*

EXTRACTION OF THE OIL FROM THE OLIVES

Washing, crushing and malaxation

D.O.P. Umbria Extra Virgin Olive Oil is milled in selected oil mills in Umbria, including the one owned by Monini, Frantoio del Poggiolo, in Fabbreria, Spoleto (Perugia).

Washing and pressing

When the olives arrive at the mill they are immersed in a tank of water or, in modern plants, in special washing machines that maintain forced water movement in order to improve the results of the operation. After washing, the next step is the crushing, which in modern continuous-cycle facilities is carried out using a hammer crusher. With this system, the pulp is broken down by the impacts of high-speed rotary devices, and only in part by the mechanical action of the pit's fragments.
The processing is performed within an extremely short time frame.

Malaxation

Malaxation or mixing is an operation that follows crushing, the purpose of which is to break down the emulsion between water and oil, thus allowing the micelles of oil to merge into larger droplets, which tend to separate spontaneously from the water. This is performed in machines called mixers or maloxers.
The technical reference parameters during the mixing stage are the temperature and the duration. The temperature is critical for the yield in the subsequent extraction process and is closely related to the stability of the water-oil emulsion. With a low degree of emulsification, malaxation can be performed at temperatures slightly higher than the ambient temperature (from 22-24°C to 27°C); this is referred to as malaxation or cold extraction. With more stable emulsions, a more aggressive heating of the paste is required, with temperatures ranging from 27°C to 30°C.
The yield of the extraction increases with the temperature of the malaxation, but the quality of the paste decreases once the temperature of 30°C is reached.
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04 *Calculation of environmental performance*

EXTRACTION OF THE OIL FROM THE OLIVES

From malaxation to centrifugation

Centrifugation

The olive paste resulting from the malaxation process is subjected to centrifugation in a rotating conical drum, with a horizontal axis commonly referred to as a decanter.
Due to the different specific weights of water, oil, and olive pulp, the centrifugation separates them over 2 to 3 phases. The 3-phase decanter is the most consolidated and utilized type found in Italy.

In this case, three parts are separated by centrifugation:

- the olive pomace;
- the oil must, containing a small amount of water;
- the vegetation water, containing a small amount of oil.

The must oil, obtained from the extraction, always contains a residual amount of water, which is separated by the effect of the different densities of the two liquids through decanting or centrifugation.
Vertical centrifugation is the system used in all plants to separate the oil from the water. In this process, which is performed in vertical centrifugal separators, both the oil must and the vegetation water obtained from the horizontal centrifugation are processed.

04 *Calculation of environmental performance*

PACKAGING OF THE OIL

From storage to shipping

Arrival of the raw material and storage

The oil purchased by Monini is transported to the Spoleto plant by road and by sea. Monini S.p.A. has about 170 storage tanks with a total capacity of 10,000,000 litres, all in stainless steel, interconnected and equipped with electronic level probes in order to constantly monitor the quantities of oil in stock and those transferred from one tank to another.
All tanks are temperature-controlled and connected to an inert gas (nitrogen) distribution system for optimal product preservation.

Filtering

Immediately prior to packaging, the oils undergo a double filtration process.
Filtration does not alter in any way the quality and nutritional characteristics of the oil, but on the contrary allows for better preservation over time.

Packaging

Monini S.p.A. has 7 modern packaging lines, with a daily average bottling capacity of 200,000 litres, and a maximum capacity of 260,000 litres over 24 hours. These lines allow the oil to be bottled in 100 ml, 250 ml, 500 ml, 1 L, 3 L, and 5 L containers, in order to satisfy the various needs of the market. Every packaging line is equipped with video cameras, which systematically detect any foreign bodies in the containers, monitor the presence of the label and cap, and verify the production batch and the oil level of every single container.
State of the art automatic laser-guided shuttles transfer the pallets of packaged oil to the warehouse, where they are stored awaiting to be shipped.

04 *Calculation of environmental performance*

DISTRIBUTION AND USE PHASE

The final stages of the product's life cycle

Distribution

The product is distributed across Italy and the world. The transport distance was calculated based on the specific distance-weighted average for each bottle size.

Use phase

Monini DOP Umbria olive oil is recommended for raw use; therefore, it was assumed that the entire product would be consumed during use.

End of life of packaging and oil

The end-of-life scenario for packaging was modelled using official statistical data from ISPRA (2021) and Eurostat (referring to 2020) according to the recovery, incineration and landfill disposal processes for the individual packaging materials. The waste disposal processes of landfill and incineration were taken from the Ecoinvent database and are specific to the packaging material; for the recycling process, only the assumed transport of 100 km with lorries with a capacity between 16 and 32 tonnes was considered.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

List of the impact categories/1

The environmental performance of Monini products, as indicated below, is based on the Life Cycle Assessment (LCA) methodology and was calculated in accordance with the ISO 14040 and 14044 standards, the international EPD® system and PCR 2010:07. The management and updating of the environmental data concerning the EPD® products are regulated by a special procedure within the Manual for the Monini management systems.

Environmental impact indicators

The purpose of the impact assessment is to highlight the extent of the environmental changes that occur due to the atmospheric emissions and resource consumption associated with the production activities. The fundamental objective is to attribute the consumption and emission levels obtained during inventory to specific impact categories.

The list of impact categories is provided below.

Consumption of resources

Calculation of the amounts of energy resources used throughout the entire life cycle of the products.
These are divided into primary (renewable and non-renewable) and secondary energy sources, as well as water consumption.

Global warming

It is caused by the presence of greenhouse gases in the atmosphere that absorb the infrared radiation emitted by the earth, causing an increase in its average temperature.

The anthropogenic greenhouse gas of greatest concern is CO2.
The method for characterising the impacts of greenhouse gases is based on the Intergovernmental Panel on Climate Change (IPCC) statement that uses kg of CO2 equivalent over a 100-year time horizon (GWP 100 years, Global Warming Potential) as an impact indicator. The GWP is based on a relative scale that compares the gas in question with an equal mass of
The GWP is based on a relative scale that compares the gas considered with an equal mass of CO2, whose GWP is by definition 1. Fossil, biogenic and land-use change emissions are reported separately.

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04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

List of the impact categories/2

Formation of photochemical smog

This is a phenomenon typical of peak hours in big cities, which is quite pronounced in the summertime, when the sun's rays cause the unburned hydrocarbons and nitrogen oxides present in the exhaust fumes to react, thus resulting in harmful ozone. The method for characterizing the impact of photo-chemical smog is based on that of the United Nations Economic Commission for Europe (UNECE), which uses kg of NMVOC equivalent, POFP (Photo-chemical Ozone Formation Potential).

POFP is based on a relative scale, which compares the substance in question to an equal mass of equivalent NMVOC, the POFP of which is by definition equal to 1.

Acidification

The acidification indicator is linked to the emission of certain acidifying substances into the atmosphere, such as nitrogen oxides and sulphur oxides, which cause the pH of lakes, forests and oceans to decrease.

The method for characterizing acidification impacts is based on statements of Seppälä et al. 2006, Posch et al. 2008 using the moles of H+ equivalent (AP, Acidification Potential) as an impact indicator. AP is based on a relative scale which compares the substance in question to an equal mass of equivalent H+ eq, whose AP is by definition equal to 1.

Eutrophication

Indicates a condition of accumulation of nutrients within a given environment. Specifically, an over-abundance of nitrates and phosphates in an aquatic environment, which causes the proliferation of microscopic algae and, in turn, increased bacterial activity; the consequent lowering of oxygen in surface waters and in the soil causes a degradation of the environment which has become asphyxiated and, in the long term, results in the death of fish. The results report three indicators of potential eutrophication: terrestrial, marine and freshwater.

Land use

This category concerns the effects following the conversion or occupation of land. The impact is expressed in m^2 per year.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE
Monini D.O.P. Umbria Extra Virgin Olive Oil

EVALUATION METHOD

The calculation method adopted for the LCA study at the basis of this EPD® is the one described by PCR 2010:07, CPC Division 21537: Virgin olive oil and its fractions; version 3.0.1

The characterisation factors used to convert the data from the life cycle inventory analysis into impact categories are listed on the International EPD® System website.

It is emphasised that the results of environmental impact indicators on resource use and water scarcity should be used with caution, as the uncertainties of the results are high and experience with these indicators is limited.

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini DOP Extra Virgin Oil 0.75-litre glass bottle.

PARAMETERS Environmental impacts	Unit	UPSTREAM		CORE		DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
GWP, fossil	kg CO_2 eq	3,0915	0,5023	0,2689	0,0648	0,1001	0,0072	**4,0347**
GWP, biogenic	kg CO_2 eq	0,0005	0,0035	0,0011	0,00003	0,00001	0,0044	**0,00955**
GWP, Land use and land transformation	kg CO_2 eq	4,15E-04	9,56E-04	1,14E-05	6,22E-07	8,17E-07	9,32E-08	**0,0014**
TOTAL Global Warming Potential	**kg CO_2 eq**	**3,09237**	**0,50676**	**0,27000**	**0,06483**	**0,10011**	**0,01159**	**4,05**
Ozone layer depletion	kg CFC-11 eq	3,69E-07	2,95E-08	3,93E-08	1,51E-08	2,40E-08	1,71E-09	**4,79E-07**
Acidification potential	mol H+ eq	0,09577	0,00080	0,00114	0,00026	0,00047	0,00005	**0,09849**
Freshwater eutrophication	kg P eq	0,00158	0,00005	0,00005	0,00001	0,00001	0,000007	**0,00171**
Marine eutrophication	kg N eq	0,07523	0,00018	0,00024	0,00010	0,00017	0,00002	**0,07595**
Terrestrial eutrophication	mol N eq	0,42681	0,00187	0,00252	0,00106	0,00191	0,00022	**0,43439**
Photochemical ozone formation	kg NMVOC eq	0,01769	0,00045	0,00070	0,00028	0,00050	0,00006	**0,01968**
Abiotic depletion potential – Elements	g Sb eq	1,81E-05	2,13E-06	3,19E-09	2,37E-09	4,39E-09	3,23E-10	**0,000020**
Abiotic depletion potential – Fossil fuels	MJ	22,54302	3,29744	4,14070	0,93648	1,43186	0,10245	**32,45**
Water scarcity potential	m3	5,2756	0,0941	0,4320	0,0380	-0,0002	0,00000	**5,84**

Environmental impact in reference to the functional unit of the 0.75-litre bottle of DOP Extra Virgin Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini DOP Extra Virgin Oil 0.75-litre glass bottle.

PARAMETERS Use of resources	Unit	UPSTREAM			CORE	DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
Primary energy resources –Renewable Used as energy carriers	MJ	0,1726	0,3070	0,1758	0,1912	0,0018	0,0003	**0,849**
Primary energy resources –Renewable Used as raw materials	MJ	0,0271	0,0602	0,0449	0,0005	0,0004	0,0001	**0,133**
Primary energy resources –Renewable TOTAL	**MJ**	**0,1997**	**0,3671**	**0,2207**	**0,1917**	**0,0022**	**0,0005**	**0,982**
Primary energy resources –Non-renewable Used as energy carriers	MJ	23,884	3,585	4,461	1,002	1,520	0,109	**34,561**
Primary energy resources –Non-renewable Used as raw materials	MJ	0,070	0,020	0,000052	0,000007	0,000011	0,000002	**0,090**
Primary energy resources –Non-renewable TOTAL	**MJ**	**23,953**	**3,605**	**4,461**	**1,002**	**1,520**	**0,109**	**34,65**
Land use	m^2a	45,424	0,016	0,117	0,001	0,0001	0,0002	**45,56**
By-product	kg	0	0	3,390	0	0	0	**3,390**

Environmental impact in reference to the functional unit of the 0.75-litre bottle of DOP Extra Virgin Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Monini DOP Extra Virgin Oil 0.5-litre glass bottle

PARAMETERS Environmental impacts	Unit	UPSTREAM		CORE		DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
GWP, fossil	kg CO_2 eq	3,0915	0,5501	0,2689	0,0516	0,4494	0,0079	**4,4194**
GWP, biogenic	kg CO_2 eq	0,0005	0,0040	0,0011	0,00003	0,00003	0,0055	**0,01121**
GWP, Land use and land transformation	kg CO_2 eq	4,15E-04	9,83E-04	1,14E-05	5,14E-07	4,81E-06	1,19E-07	**0,0014**
TOTAL Global Warming Potential	**kg CO_2 eq**	**3,09237**	**0,55511**	**0,27000**	**0,05166**	**0,44941**	**0,01345**	**4,43**
Ozone layer depletion	kg CFC-11 eq	3,69E-07	3,24E-08	3,93E-08	1,20E-08	1,03E-07	1,89E-09	**5,58E-07**
Acidification potential	mol H+ eq	0,09577	0,00088	0,00114	0,00020	0,00630	0,00005	**0,10435**
Freshwater eutrophication	kg P eq	0,00158	0,00006	0,00005	0,00001	0,00006	0,000008	**0,00176**
Marine eutrophication	kg N eq	0,07523	0,00020	0,00024	0,00008	0,00173	0,00003	**0,07751**
Terrestrial eutrophication	mol N eq	0,42681	0,00206	0,00252	0,00080	0,01918	0,00025	**0,45162**
Photochemical ozone formation	kg NMVOC eq	0,01769	0,00049	0,00070	0,00021	0,00491	0,00007	**0,02407**
Abiotic depletion potential – Elements	g Sb eq	1,81E-05	2,36E-06	3,19E-09	1,79E-09	1,51E-08	3,61E-10	**0,000020**
Abiotic depletion potential – Fossil fuels	MJ	22,54302	3,63480	4,14070	0,74816	6,23005	0,11286	**37,41**
Water scarcity potential	m3	5,2756	0,1033	0,4320	0,0380	-0,0011	0,00000	**5,85**

Environmental impact in reference to the functional unit of the 0.5-litre bottle of DOP Extra Virgin Olive Oil and its packaging

04 *Calculation of environmental performance*

ENVIRONMENTAL PERFORMANCE

Oli Monini DOP Extra Virgin Oil 0.5-litre glass bottle

PARAMETERS Use of resources	Unit	UPSTREAM			CORE	DOWNSTREAM		LIFE CYCLE
		Olive cultivation	Packaging & other materials production	Olive oil extraction	Filtration brightening and packaging	Distribution	End of life	
Primary energy resources –Renewable Used as energy carriers	MJ	0,1726	0,3356	0,1758	0,1910	0,0076	0,0005	**0,883**
Primary energy resources –Renewable Used as raw materials	MJ	0,0271	0,0640	0,0449	0,0004	0,0016	0,0002	**0,138**
Primary energy resources –Renewable TOTAL	**MJ**	**0,1997**	**0,3997**	**0,2207**	**0,1914**	**0,0092**	**0,0007**	**1,021**
Primary energy resources –Non-renewable Used as energy carriers	MJ	23,884	3,943	4,461	0,802	6,614	0,120	**39,824**
Primary energy resources –Non-renewable Used as raw materials	MJ	0,070	0,031	0,000052	0,000005	0,000045	0,000003	**0,100**
Primary energy resources –Non-renewable TOTAL	**MJ**	**23,953**	**3,974**	**4,461**	**0,802**	**6,614**	**0,120**	**39,92**
Land use	m^2a	45,424	0,017	0,117	0,001	0,0004	0,0002	**45,56**
By-product	kg	0	0	3,390	0	0	0	**3,390**

Environmental impact in reference to the functional unit of the 0.5-litre bottle of DOP Extra Virgin Olive Oil and its packaging

05 *Changes compared to the previous version*

CHANGES COMPARED TO THE PREVIOUS VERSION

Some improvements were made to the LCA study of olive oil, which led to the updating of the values of the different impact indicators analysed; for example, water extraction and emission was regionalised according to the countries where olive growing and oil extraction take place.

First of all, the Ecoinvent database has been modified, updated from version 3.7.1 previously used to version 3.8; furthermore, the specific calculation of emissions from fertiliser application captures the characteristic fluctuations of cultivation operations. Compared to the previous year, most comparable impact indicators show a decrease.

Special changes were made to the packaging data: updated primary data were collected from all suppliers of the heaviest components of the product packaging, as well as a greater refinement of the configurations shipped in the reporting year. Finally, the distribution data were supplemented with the addition of transports between the Monini factory and a warehouse outside the factory.

06 *Additional Information*

Monini S.p.A. CERTIFICATIONS

Site	Typology		Certifying body	Year of issue
Production unit	**ORTHODOX UNION**	Kosher Certification		1992
Production unit	**DOP**	Production and packaging DOP Umbria		1998
Production unit	**ISO 9001:2015**	Standard for the management of Quality Systems		1999
Production unit	**REG. EU 2018/848 organic production and labelling of organic products**	production and packaging of organic products		2001
Production unit	**British Retail Consortium**	hygienic and sanitary safety of private label food products		2004
Production unit	**International Food Standard**	hygienic and sanitary safety of private label food products		2006
Production unit	**ISO 22000:2018**	Food Safety Management Systems		2010
Monini products	**EPD: Monini Extra Virgin Oil "Granfruttato"; "Classico" "Delicato"**	Environmental Declaration of Product (EPD®)	EPD	2012
Monini "Bios" chain	**Organic Products Certificate of Conformity IBD-Brazil**	Production of raw materials and packaging of organic products	IBD CERTIFICATIONS	2012

06 *Additional Information*

Monini S.p.A. CERTIFICATIONS

Site	Typology		Certifying body	Year of issue
Production unit	**HALAL**	Standard: HIA-01, HAS 23201 AND MS 1500 HALAL GUIDELINES & STANDARDS		2013
Monini products	**EPD: Monini Extra Virgin Oil "BIOS" "DOP Umbria"**	Environmental Declaration of Product (EPD®)		2014
Production unit	**JAS Organic Products Certificate of Conformity - Japan**	Organic manufacturing and packaging		2016
Monini "Bios" chain	**Certificate of Conformity of organic products OFDC-China**	Organic manufacturing and packaging		2016
Production unit	**HALAL**	Standard: GSO 2055-1 – MUIS-HC-S001 Thailand		2018
Production unit	**ISO 45001:2018**	Occupational health and safety management systems		2018
Monini products	**ISO 22005:2008**	Traceability system in agri-food chains		2020
Monini products	**Extra virgin Consortium Of Quality "CEQ"**	Traceability system in agri-food chains Technical Product Specification "Extra Virgin Olive Oil Quality CEQ".		2020
Production unit	**BRCGS Global Standard Food Safety Issue 8**	Module 13 - FSMA Preventive Controls Preparedness		2021
Monini products	**EPD: Monini Extra Virgin Oil "Nettare**	Environmental Declaration of Product (EPD®)		2022
Organisation	**"Responsability Award"**	Responsible management of corporate values		2022

06 *Additional Information*

ENVIRONMENTAL INFORMATION ADDITIONAL

The packaging used by Monini for Extra Virgin Olive Oil PDO UMBRIA is recyclable.

06 *Additional Information*

INFORMATION

Contacts

Monini S.p.A.

Vania Massari
e-mail: vania.massari@monini.com

Ambiente Italia Srl

Simona Canzanelli
e-mail: simona.canzanelli@ambienteitalia.it

Contract management for EPD® validation ®:

Bureau Veritas Italia S.p.A.

For further information

Monini S.p.A.

www.monini.com

International EPD® system

www.environdec.com

06 *Additional Information*

VERIFICATION

Product Category Rules (PCR): PCR 2010:07, CPC Division 21537: Virgin olive oil and its fractions; version 3.0.1
PCR review conducted by: The Technical Committee of the International EPD® System Chair: Adriana del Borghi, info@environdec.com
Independent third-party verification of declaration and data, in accordance with ISO 14025:2006 ☐EPD® process certification ☑EPD® verification
Third-party verifier: Bureau Veritas Italia Approved by: The Technical Committee of the International EPD® System
The procedure of data follow-up during the validity of the EPD includes the third-party verifier: ☑ Yes ☐No

EPDs within the same product category but from different programmes may not be comparable, nor are EPDs within the same product category and programme but differing in packaging format.

The holder of the EPD® has exclusive ownership, obligations and responsibilities regarding the EPD® itself

06 *Additional Information*

REFERENCES

1. ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
2. ISO 14044:2018 Environmental management - Life cycle assessment - Requirements and guidance
3. General Programme Instructions for Environmental Product Declarations, version 3.01 of 2013-09-19
4. Gustavsson et al., The methodology of the FAO study: "Global Food Losses and Food Waste - extent, causes and prevention"- FAO, 2011 From SIK - The Swedish Institute for Food and Biotechnology, 2013
5. PCR 2010:07, CPC Division 21537: Virgin olive oil and its fractions; version 3.0.1
6. COUNCIL REGULATION (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91
7. Life cycle assessment of Monini Extra Virgin Olive Oil - LCA report; Ambiente Italia S.r.l. updated in March 2023
8. ISPRA waste report 2022 - 2021 data
9. CONAI, General programme for the prevention and management of packaging and packaging waste - Final general report 2017
10. Association of Issuing Bodies, European residual mixes 2021

More information: website: International Olive Oil Council.

Eurostat (2020 data on packaging end-of-life)

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