Environmental Product Declaration

Italian Apples

ASSOMELA
ASSOCIAZIONE ITALIANA PRODUTTORI DI MELE

EPD®
THE INTERNATIONAL EPD® SYSTEM

*** 4 POs of the 12 associated to Assomela**

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Information related to
2023 harvest

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The International EPD® System
www.environdec.com

Programme operator
EPD International AB
Sector EPD

This EPD has been developed in accordance with ISO 14025.
An EPD should provide current information, and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

Assomela

Assomela is the Italian association of Producer Organizations (POs), representing **73% of the national apple production**.

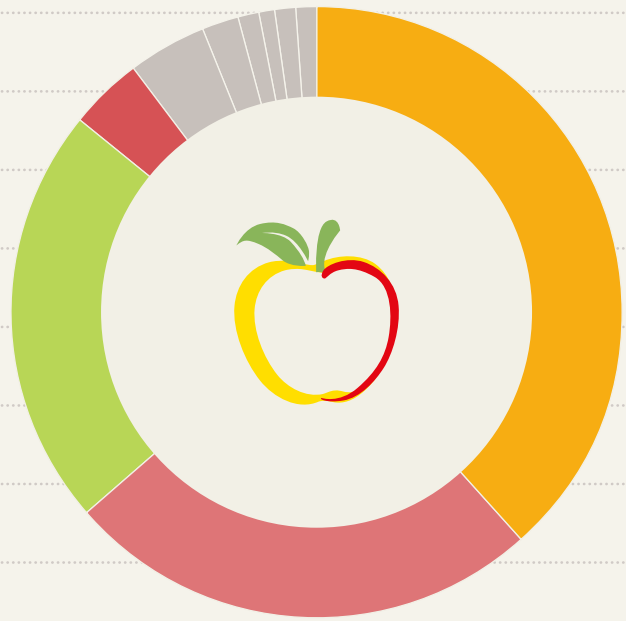
Assomela brings together POs **VI.P** (Val Venosta) **VOG - Home of Apples** and **VOG Products** of the province of Bolzano, **Melinda**, **La Trentina** and **Mezzacorona** of the province of Trento, **Melapiù** of the region Emilia Romagna, **Rivoira, Gullino, Joinfruit** and **Lagnasco** of the region Piemonte, **Frutta Friuli SCA** of the region Friuli Venezia Giulia.

The mission of Assomela is the representation of associated producers' interests by coordinating and realizing research projects of common interest.

PERCENTAGE OF THE POs ON THE ASSOMELA TOTAL PRODUCTION

This Environmental Product Declaration was performed by **4** of the 12 POs associated in Assomela (La Trentina, Melinda, VI.P e VOG - Home of Apples), which represent almost **90% of total production** of the Association.

- **38%** VOG - Home of Apples
- **25%** Melinda
- **22%** VI.P
- **4%** La Trentina
- **4%** Rivoira
- **2%** Joinfruit
- **1%** Mezzacorona
- **1%** Frutta Friuli SCA
- **1%** Melapiù
- **1%** Lagnasco
- **<1%** Gullino
- **<1%** Melavì



Producers' organizations involved in the project

La Trentina (Trento)

The La Trentina Cooperative represents about **850 producer members** united in a single cooperative. Annual production is about **65,000 tons** of apples on about **1,450 hectares**.

www.latrentina.it

laTrentina
Buona come la sua terra.

Melinda (Cles)

The Melinda Consortium since 1989 has assembled **16 cooperatives** and **3,600 production units**. Cooperatives are base in the Non and Sole Valleys and produce about **420,000 tons** a year on around **6,700 hectares**.

www.melinda.it

Melinda®

VOG - Home of Apples (Terlano)

VOG - Home of Apples is the Consortium of Alto Adige Fruit and Vegetable Cooperatives. It unites **11 cooperatives** comprising about **4,600 producers** who, on an area of about **11,000 hectares**, produce an annual harvest of about **530,000 tons** of apples.

www.vog.it

VOG
Home of apples

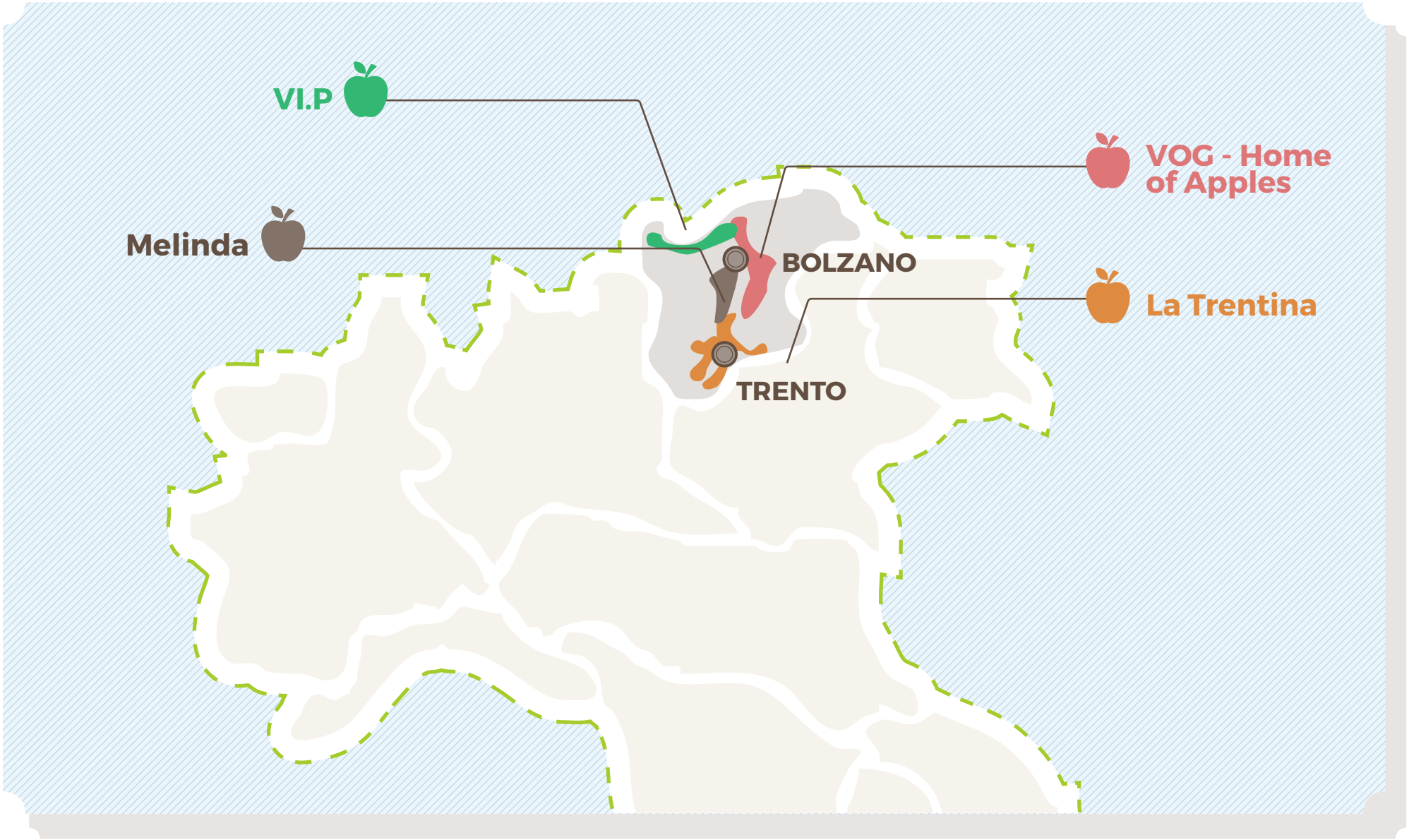
VI.P (Laces)

VI.P unites **6 cooperatives** in the Val Venosta to which **1,400 apple growers** belong, producing an annual harvest of about **330,000 tons** on an area of about **5,300 hectares**.

www.vip.coop

VIP
First class apple partner

The cultivation areas



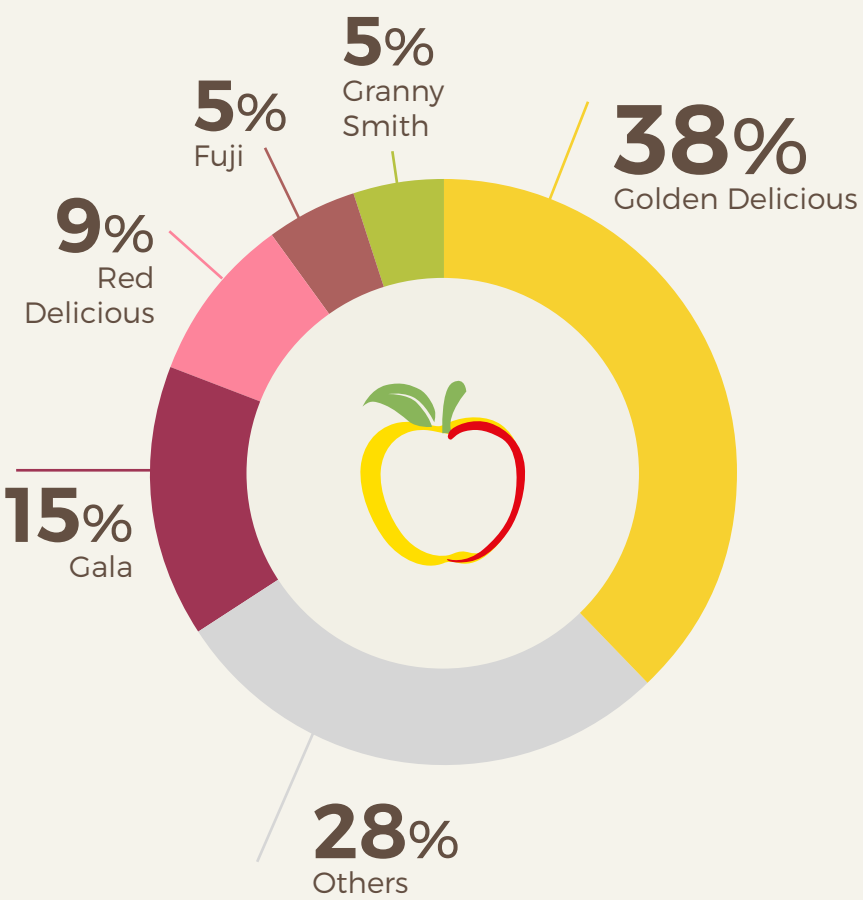
The apple

Apples are the fruit, more precisely false fruits, of the apple tree. The plant comes from **central Asia** and is present in Italy with around **2,000 nominal varieties**.It is hard to know how many varieties there are, in particular if we consider the historical superimposition of different denominations and all the extinct or untraceable species.

Even though the natural ripening is in the period between the **beginning of August and the beginning of November**, apples are available throughout the year thanks to conservation techniques. Conservation is possible in storage facilities where apples are maintained at low temperatures and at controlled atmosphere.
When requested by the market, apples are then withdrawn from these **storage plants** and taken to the **processing plants** in which they are sized, selected and packaged.

The apples we studied are cultiveted in the area analysed in this project. Varieties can differ for agronomic aspects, such as the **quantity of necessary feritlizers** and **yield**, but differences in the environmental impacts are not significative. For this reason, the resulting impact can be considered to be referring to an **"average apple"**. It is worth noting that the variety **Golden Delicious** is the most produced by the associated producers.

ASSOMELA APPLE – VARIETY



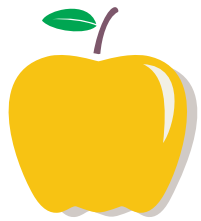
Functional unit

The data presented are referred to **1 kg of apples sold unpacked.** The apples subject of the declaration are intended for direct consumption. The shelf life varies from a few days to a few weeks, depending on the variety and on the temperature of the preservation environment. Product losses due to the distribution and sales phase, estimated for the entire fruit and vegetable sector at 10% of the marketed product (FAO, 2011), were not taken into account.

This EPD considers average values and represents an average product, not available for purchase on the market.

Product contents

Apples contain many vitamins and minerals, especially **vitamin C** and **potassium**. They are rich in **pectin**, a food fiber very important for a good digestion and for an extended sensation of satiety.
They contain **flavonoids**, which have a positive effectv on the immune system, are anti-inflammatory and may reduce the risk in contracting some kind of cancer. Shown below the detail of apples' nutritional properties.

ENERGY VALUE	ELEMENTS	MINERALS	VITAMINS
Energy – 53 kcal	Water – 82.5 g	Potassium – 125 mg	Vitamin A – 8 µg
	Proteins – 0.3 g	Phosphorus – 12 mg	Vitamin B1 – 0.02 mg
	Fat – 0.1 g	Calcium – 7 mg	Vitamin B2 – 0.02 mg
	Carbohydrates – 13.7 g	Sodium – 2 mg	Vitamin C – 6 mg
	Food fibers – 2 g	Iron – 0.3 mg	Niacin – 0.3 mg

The methodology for the calculation

The data presented in this environmental declaration were calculated by analyzing the impacts of the activities carried out during all the phases from the **orchard** to the **product distribution** to the consumer. The nursery phase has not been considered since the average orchard duration may exceed 25 years and thus the impacts of this phase can be considered negligible. This aspect is coherent according to the PCR (Par. 4.3.1.1).

This EPD refers to the average values for the 2023 harvest:

Agricultural phase: 1/1/2023 - 31/10/2023
Production process phase: 1/8/2023- 31/07/2024

PHASES OF APPLES PRODUCTION

UPSTREAM

> Production of raw materials used during the farming phase
> Production of auxiliary materials used during the plant phase
> Packaging materials production

CORE

> Emissions related to the farming phase
> Emissions related to the the plant and storing phase
> Water consumption
> Wastes production and treatment

DOWNSTREAM

> Distribution
> Packaging End of Life

FARMING

All the activities carried out between the end of an apple picking season and the beginning of the next one are part of this phase.
The main environmental factors concern oil use and water consumption, together with the use of pesticides and fertilizers.

PLANT

Storage

After the harvest, apples are immediately left in storage cells in controlled atmosphere, where they stay untill put on the market. The main environmental impact is the consumption of electric energy.

Processing

Processing is the phase of the selection, washing and packing of the apples requested by the consumers. Electric energy and water are the impacts of this phase.

PACKAGING

The packing phase occurs right after the processing phase. It refers to the production and the use of packaging materials.

DISTRIBUTION

The distribution happens both in Italy and abroad, and it principally consists for most in land transport by truck and for a small percentage in sea transport by ship.

Main hypotheses taken into account

CULTIVATION

Consumption of water and diesel oil were estimated from four POs according to the real consumption of the sample of farms. Data on other consumption (fertilizers and pesticides) have been obtained by the production specifications of the areas interested and then validated with specific information. The data about yields were evaluated according to the average age of the crops and the production volume. The data about produced waste were collected by APOT, the fruit and vegetable organization of Trentino. There are no LUC-related GWP emissions from primary data, as the orchard area in the areas considered has remained unchanged over the last 20 years. The contribution from LUC in the results is only due to secondary data.

PLANT

Storage

The electric energy consumption has been estimated by dividing the total storages' consumption by the quantity of stored apples. The average value has been calculated as described in the section referring to the calculation of the means.

Processing

In this phase electric energy consumptions, water consumption and waste production have been considered. The data gathered from a sample plants were elaborated as indicated at page 15.

PACKAGING END OF LIFE

The end of life of packging primary was assessed as an average scenario of waste disposal compostable in Italy (more than 50% of Assomela's market), assumed as representative for the entire international context.

USAGE

It is supposed that domestic preservation happens at room temperature. Scraps due to the possible non edible part were not considered.

DISTRIBUTION

The impacts referred to the transportation phase have been calculated by supposing a transport of 840 km by truck and 655 km by ship, because in addition to the Italian and European markets, the distribution also concerned overseas, Asian and North African markets.

PACKAGING

The presented data refer to the selling of unpacked apples and considering the use of one biodegradable and compostable bag for 1 kg of apples. However, other two packaging possibilities are presented.

The environmental impacts

ENVIRONMENTAL IMPACT INDICATORS data relating to 1 kg of product		MEASURE	UPSTREAM		CORE		DOWNSTREAM		TOTAL
			Agricultural raw materials production	Packaging e auxiliary materials production	Field phase	Plant and storage	Distribution	Packaging End of life	
Global Warming Potential (GWP)	fossil	kg CO_2 eq	4,95E-03	9,46E-03	4,07E-02	6,69E-02	7,31E-02	8,14E-05	**1,95E-01**
	biogenic	kg CO_2 eq	1,70E-06	1,24E-05	1,24E-06	1,20E-03	2,45E-06	1,42E-03	**2,64E-03**
	land use and land use change	kg CO_2 eq	4,33E-06	2,41E-04	1,10E-06	2,23E-06	1,78E-06	2,42E-10	**2,51E-04**
	TOTAL	kg CO_2 eq	4,95E-03	9,71E-03	4,07E-02	6,81E-02	7,31E-02	1,50E-03	**1,98E-01**
Acidification potential (AP)		mol H+ eq	4,87E-05	5,72E-05	3,89E-04	1,70E-04	4,03E-04	2,23E-07	**1,07E-03**
Eutrophication potential (EP), aquatic freshwater		kg P eq	4,32E-07	7,27E-07	1,22E-05	9,38E-07	6,00E-08	9,63E-09	**1,44E-05**
Eutrophication potential (EP), aquatic marine		kg N eq	4,32E-06	1,44E-05	3,44E-04	3,60E-05	1,32E-04	2,42E-06	**5,33E-04**
Eutrophication potential (EP), terrestrial		mol N eq	9,10E-05	1,31E-04	1,97E-03	3,98E-04	1,45E-03	6,96E-07	**4,04E-03**
Photochemical ozone creation potential (POCP)		kg NMVOC eq	1,54E-05	4,52E-05	4,81E-04	1,78E-04	4,83E-04	7,10E-07	**1,20E-03**
Ozone depletion potential (ODP)		kg CFC11 eq	1,79E-08	4,00E-10	5,65E-10	1,56E-09	1,44E-09	1,94E-12	**2,19E-08**
Abiotic depletion potential (ADP) for minerals and metals		kg Sb eq	2,29E-09	3,14E-09	1,23E-09	7,57E-10	2,25E-09	9,96E-14	**9,68E-09**
Abiotic depletion potential (ADP) for fossil resources		MJ	6,70E-03	5,93E-02	4,16E-03	1,91E-01	9,48E-03	3,16E-04	**2,71E-01**
Water deprivation potential (WDP)		m3 depriv.	2,68E-03	1,14E-02	2,13E+00	3,25E-01	3,92E-04	7,37E-03	**2,47E+00**

The values reported are the result of rounding. That is why the results might be slightly different from the sum of the individual components.

The environmental impacts

USE OF RESOURCES data relating to 1 kg of product		MEASURE	UPSTREAM		CORE		DOWNSTREAM		TOTAL
			Produzione materie prime agricole	Packaging e materiali ausiliari di stabilimento	Fase di campo	Stabilimento e stoccaggio	Distribuzione	Fine vita packaging	
Renewable energy resources	Use as energy carrier	MJ, net calorific value	2,24E-03	2,45E-02	9,06E-04	3,75E-01	3,26E-03	2,96E-05	**4,06E-01**
	Use as raw materials	MJ, net calorific value	0,00E+00	3,41E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,41E-02**
	TOTAL	MJ, net calorific value	2,24E-03	5,86E-02	9,06E-04	3,75E-01	3,26E-03	2,96E-05	**4,40E-01**
Non renewable energy resources	Use as energy carrier	MJ, net calorific value	6,70E-03	5,77E-02	4,16E-03	1,91E-01	9,48E-03	3,16E-04	**2,69E-01**
	Use as raw materials	MJ, net calorific value	0,00E+00	1,59E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,59E-03**
	TOTAL	MJ, net calorific value	6,70E-03	5,93E-02	4,16E-03	1,91E-01	9,48E-03	3,16E-04	**2,71E-01**

The values reported are the result of rounding. That is why the results might be slightly different from the sum of the individual components.

The influence of primary packaging

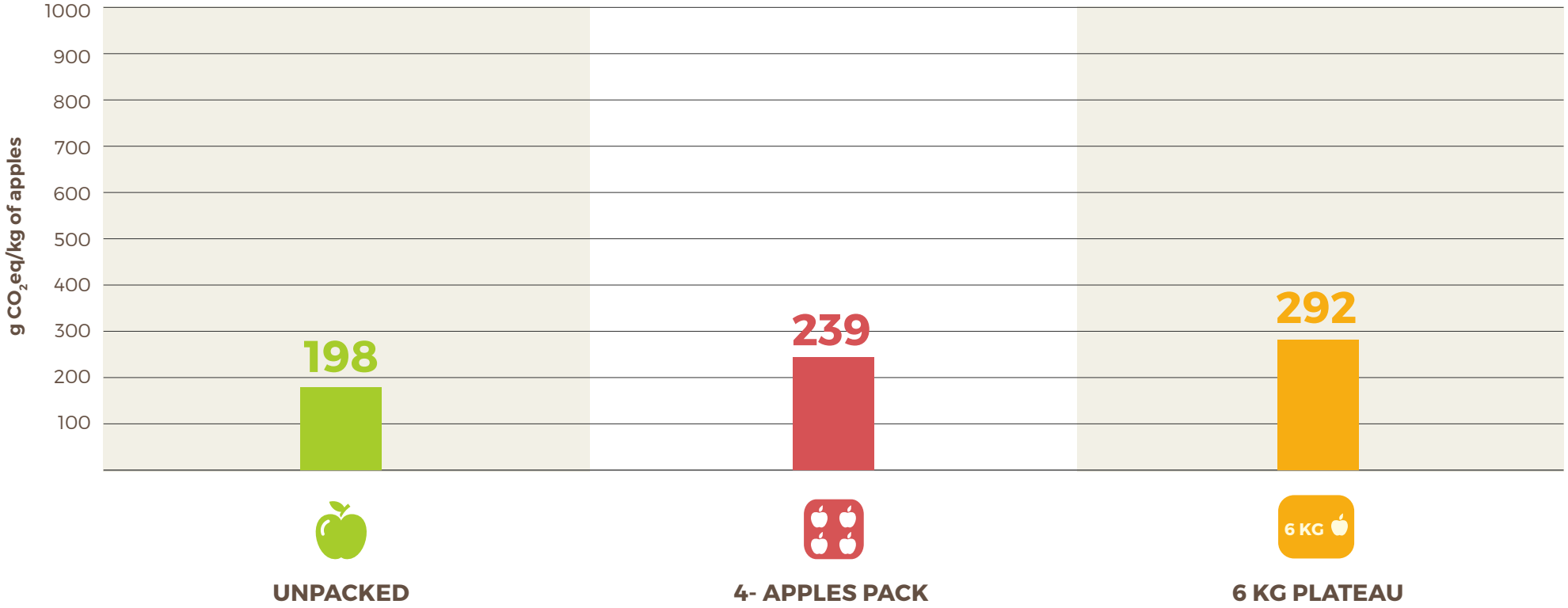
The fossil GWP of 1 kg of apples with three different kinds of packaging has been calculated:

> Unpacked, relating to the selling of loose apples at supermarkets (the use of one biodegradable and compostable bag made per 1 kg of apples has been taken into consideratio);

> A 4 apples pack, relating to a cardboard tray of 4 apples with a plastic film in PVC;

> 6 kg tray, relating to a cardboard tray with an R-PET layer containing 6 kg of apples.

For all three packaging, only the primary packaging and an average end-of-life scenario representative of the Italian situation were considered.



Information and contacts

REFERENCE

Assomela, as EPD owner, has the sole owership, liability and responsability of this EPD.

PROGRAM OPERATOR: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden info@environdec.com

THIRD PARTY EPD VERIFICATION

Product category rules (PCR)
Fruits and nuts
2019:01
Version 1.01
CPC code: 013 Fruits and nuts

PCR review was conducted by:
The Technical Committee of the International EPD® System.
Chair: Filippo Sessa.
Contact via info@environdec.com

Independent verification of the declaration and data, according to ISO 14025:

- ☐ EPD process verification
- ☑ EPD verification - Third party verifier

Procedure for follow-up of data during EPD validity involves third part verifier:

- ☑ Yes
- ☐ No

Third party verifier: Ugo Pretato - pretato@studiofieschi.it www.studiofieschi.it

Approved by: "The International EPD® System Technical Committee, supported by Secretariat

EPDs within the same product category but from different programmes may not be comparable

CONTACTS

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Technical support and grafic design: Life Cycle Engineering srl – Italy www.lcengineering.eu

Glossary

CARBON FOOTPRINT

A product carbon footprint is the total amount of greenhouse gases produced along the entire life cycle. It is expressed in equivalent mass of carbon dioxide (CO_2-eq).
In agriculture a significant contribution is given by the emission of nitrous oxide (N_2O) due to the fertilizers use.

www.ipcc.ch

WATER DEPRIVATION POTENTIAL

Water deprivation measures the available water remaining per unit of surface in a given watershed relative to the world average, after human and aquatic ecosystem demands have been met. This method builds on the assumption that the potential to deprive another user of water is directly proportional to the amount of water consumed and inversely proportional to the available water remaining per unit of surface and time in a region (watershed).

www.wulca-waterlca.org

ACIDIFICATION POTENTIAL

It is a phenomenon for which precipitation is unusually acidic, meaning that it has substandard levels of pH. It can have harmful effects on plants, aquatic animals and infrastructure. Acid rain is caused by emissions of SO_2. NO_x and NH_3.

EUTROPHICATION POTENTIAL

It is an abnormal proliferation of vegetation in the aquatic ecosystems caused by the addition of nutrients into rivers, lakes or marine water, which determinates a lack of oxygen. The eutrophication potential is mainly influenced by emission into water of phosphates and nitrates.

PHOTOCEMICAL OZONE CREATION POTENTIAL

Production of compounds that, under the light effect, are able to promote an oxidation reaction leading to ozone production in the troposphere.
The indicator is mainly influenced by VOCs (Volatile organic compounds).

OZONE DEPLETION POTENTIAL

Degradation of the stratospheric layer of the ozone involved in blocking the UV component of sunrays. Depletion is due to particularly reactive components that originate from chlorofluorocarbon (CFC) or chlorofluoromethanes (CFM). The substance employed as benchmark measure for OPD is trichlorofluoromethane, or CFC-11.

Notes and references

Differences compared to the previous version

- All primary data have been updated to the 2023 harvest.
- The national residual mix has been updated to the year 2023.
- The characterization factors of the calculation method used have been updated to the latest version available.

References

- International EPD® System; General Programme Instructions (EPD); ver 3.01 del 2019-09-18
- PCR 2019:01 Fruits and nuts, ver 1.01 of 2019-08-18
- PCR 2020:07 Arable and vegetables crops, ver 1.01 of 2023-03-16
- CPC code 013 Fruits and nuts
- FAO. (2011). Global food losses and food waste – Extent, causes and prevention
- LCA applicata alla filiera di coltivazione e di distribuzione delle mele da parte degli associati in Assomela, ver 02 of 2025/01/09

The results are calculated following Version 2.0 of the list of environmental performance indicators and on the characterization factors of the EF 3.1 reference package.

The calculation of the average

The informations presented refer to **four of the twelve Producer Organizations** associated to Assomela, operating in the regions of Trentino Alto Adige, Piemonte, Lombardia and Veneto. Since the goal of this declaration is to provide information typical of the whole association, the data have been processed in a way that allows to create different averages between the organizations that participate to the project, using weight factors calculated on the basis of production volumes. In detail, the average has been organised in **three different levels**:

• **(M1)** the average between the information relating to all the productive units (UP) referring to a single productive organization (PO) and relating to a specific variety so that it is computable the impact of a single variety produced by a PO. In this level, the data are considered "metadata", and are not subjects of communication;

• **(M2)** the average between the information calculated by single PO and referred to the same variety. This value, calculated by using the single variety production quantity as weighing element, allows to estimate the average impacts of every single variety;

• **(M3)** the total amount of apples produced per variety constitutes the weigh used for calculating the overall average value assigned to Assomela.

AVERAGE	REFERENCE PRODUCT	"OWNER"	DESCRIPTION	COMMUNICATION
M1	Variety	OP	Impact of the variety produced by a single PO	✗
M2	Variety	Assomela	Impact of the variety produced by the Association	✗
M3	Average apple	Assomela	Impact of the apple produced by the Association	✓