ENVIRONMENTAL PRODUCT DECLARATION IN ACCORDANCE WITH ISO 14025 FOR:

SESAME SEED from TEKFEN TARIMSAL ARAŞTIRMA ÜRETİM VE PAZARLAMA A.Ş.

Programme:	The International EPD [®] System, <u>www.environdec.com</u> EPD Turkey, a fully aligned regional programme, <u>www.epdturkey.org</u>
Programme operator:	EPD International AB & EPD Turkey
EPD registration number:	S-P-02233
Publication date:	2021-09-28
Valid until:	2026-09-27











Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com
	Info@environdec.com EPD Turkey, a fully aligned regional programme www.epdturkey.org
	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden
Programme Operator:	EPD Turkey: SÜRATAM-Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15, 34415 Kağıthane / İstanbul, Turkey www.suratam.org

Product category rules (PCR): PCR Arable and Vegetable Crops Product Category Classification: UN CPC 011, 012, 014, 017, 0191 (PCR 2020:07 Version 1.0), The International EPD® System

PCR review was conducted by PCR Committee: Filippo Sessa, Quantis, <u>filippo.sessa@quantis-intl.com</u> Giuseppe Maio, CCPB, <u>gmaio@ccpb.it</u> Laura Marchelli, Barilla, <u>Laura.Marchelli@barilla.com</u> Francesca Falconi, LCAlab, <u>francesca.falconi@enea.it</u>

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

 \Box EPD process certification \boxtimes EPD verification

Third party verifier: Hüdai Kara, PhD, Metsims Sustainability Consulting

Junta: barn

In case of recognised individual verifiers: Approved by: The International EPD[®] System

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

 \Box Yes \boxtimes No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable.





Company information

Owner of the EPD: Tekfen Tarımsal Araştırma Üretim ve Pazarlama A.Ş.

LCA Study conducted and EPD® prepared by: Yasemin Tatar, Tekfen Tarım Sustainability Specialist Contact: Yasemin Tatar, Tekfen Tarım Sustainability Specialist (E-mail: yasemin.tatar@tekfen.com.tr) Phone: +90 212 359 33 00

Address: Kültür Mahallesi Budak Sokak Tekfen Sitesi D Blok No:2 34340 Ulus Beşiktaş/İstanbul

Description of the organisation:

Established in 1956, Tekfen Group of Companies operates in three core business areas: Contracting, Agricultural-Industry (Agri-Industry) and Investment and Services. Tekfen Holding is the umbrella company for all of the firms and subsidiaries in the Tekfen Group.

Tekfen Tarımsal Araştırma, Üretim ve Pazarlama A.Ş. (Tekfen Agricultural Research, Production and Marketing, Inc.) is the umbrella company of the Tekfen Agricultural Production Group and was established in 2017 with the aim to bring a corporate perspective to agricultural production, which plays a vital role in securing a sustainable future. This move allows the Group to put its know-how gained during almost four decades in the field of agricultural inputs as well as its science-based approach and strong financial structure in the service of agricultural production.

With 76 agricultural engineers on its payroll who bring agriculture together with science and the most up-to-date technologies, Tekfen Agri exports fresh fruits to 80 different customers in 22 countries under the Alanar Fruit brand name, which Tekfen entirely acquired in May 2019. The company also uses its own seeds and saplings to grow bread wheat seeds, high-grade edible and seed potatoes, cherries, Bursa black figs, apricots, pomegranates, Japanese plums, nectarines, and bananas. Tekfen Agri is one of the few agricultural production companies in the world to produce such a diverse range of species. Tekfen Agri also contributes to raising productivity and quality in agricultural production by offering high-quality seeds, seedlings and saplings to farmers. As Turkey's first and one of the few technological centres of agriculture, the Agripark complex located in Adana has been producing disease-free seeds and seedlings since 2004 through the tissue culture method and carries out crop seed breeding practices. The facility, which was registered as an R&D Centre in 2018, carries out studies that primarily focus on the improvement of Turkish agriculture benefiting from Anatolia's rich endemic biodiversity.

Tekfen Agri has been at the fore of its sector by allocating 8.5% of its revenues to research and product development in 2020. The Company ranked 3rd in the agriculture category of the "Turkish Companies with the Highest R&D Expenditure in 2019" list prepared by the Turkishtime journal.

In 2020, 4 varieties of bread wheat (Tekfen 1039, Tekfen 2001, Tekfen 2077 and Tekfen 2095) and 1 variety of sesame suitable for machine harvesting (Equi2017010) have been registered by Republic of Turkey Ministry of Agriculture and Forestry Variety Registration and Seed Certification Centre.

Tekfen Agri undertakes its seedling operations through Hishtil-Toros Fidecilik (HTF) (which is a subsidiary of Tekfen Agri). Conducting its operations in high-tech greenhouses at two locations, with 50 decares in Antalya and 26 decares in Adana, HTF grows high-quality, healthy seedlings that are in compliance with recognised Good Seeds and Plants Practices (GSPP) standards.

Tekfen Agri's Corporate Farming Karaman plantations and Antalya Çandır pilot banana greenhouses have been awarded the GAP (Good Agricultural Practices) certificate in 2020.

In order to minimize the restrictive and negative effects of the pandemic, Tekfen Agri has taken the necessary precautions against COVID-19 since the first day, prioritising the health of its employees, business partners and customers. In that regard, by carrying out the Infection Prevention and Control





Procedures specified by the Turkish Standards Institution (TSE), Tekfen Agri's Nevşehir Underground Storage and Agripark facilities and Alanar Fruit's İznik and Alaşehir facilities have been awarded the TSE COVID-19 Safe Production Certificate.

Having established its waste management infrastructure with a system where waste is effectively separated at source, a Zero Waste Certificate (Basic Level) has been obtained for Tekfen Agri's Nevşehir Underground Storage and Adana Agripark facilities and Alanar Fruit's Alaşehir facility.

Name and location of production site:

Field production site of sesame seed: Dörtağaç, District Seyhan of Adana, Turkey Sieving and packing plant: Agripark Facility, District Seyhan of Adana, Turkey

Product information

Product name: Sesame Seed

Cultivation and Production Process:

Soil preparation is done before planting. After a good seed bed is prepared, sowing is carried out in the damp soil not too deep. In addition, seed-coated pesticides (fungicides and insecticides) are applied to the seeds before planting. In sesame farming, practices carried out during the period from sowing to harvest are collected under care operations: cultivation, irrigation and pest-control. And finally, after the production, the harvesting process is carried out.

The products that are taken to the big bags under the combine harvester in the field is then transported to Tekfen Agri's warehouse (Agripark facility located in Adana). Transportation is carried out by trucks or TIR. Sesame seeds coming to Agripark facility with big bags are passed through a sieving machine using special sieves and they are cleaned of stalk, soil and other foreign materials. Then it is taken back to the big bags and transported to the warehouse. Sieved and humidity decreased pure sesame seeds are stored in Tekfen Agri's warehouses until they are transported to the final buyer.

Production diagram:



Product description: Shatter resistant sesame variety is suitable for mechanical harvesting (Equi2017010). It has been registered by the Seed Registration and Certification Centre Directorate of the Turkish Ministry of Agriculture and Forestry. Sesame seed contains around %47-51 oil.

UN CPC code: 0143-Sesame seed

Geographical scope: Turkey

The geographical scope of this EPD is Turkey.





LCA information

Functional unit / declared unit: The declared unit is 1 kg of sesame seed (with about moisture content 7-8%)

Reference service life: Not applicable for this product category.

Time representativeness: Primary data represents the 2020 production year.

Database(s) and LCA software used: The background data used as secondary data in the life cycle model were taken from Ecoinvent (v3.6), Agri-Footprint (v4.0), World Food LCA Database WFLDB (v3.5) and Agribalyse (v3.0) databases within SimaPro LCA software (version 9.1.0.11).

Description of system boundaries: "Cradle-to-gate"

The system boundary covers product stage from extraction of raw materials to the production of finished packaged sesame seed at the silo storage and packaging facility gate (Agripark). This study has adopted an LCA calculations procedure which is separated into two different lifecycle stages: upstream and core processes. Within this LCA work, downstream stage is not declared.

The upstream phase includes the following processes:

•Production of fertilizers used in the agricultural production,

•Production of pesticides used in the agricultural production,

•Manufacturing of packaging materials used for final product

The core phase includes the following processes:

•Field preparation, planting, sesame plant care, harvest, post-harvest processes,

•Water used for irrigation and pesticide applications,

•Emissions due to fertilizers and pesticides use, •Impacts due to the production of electricity and fuels used in the core module,

•Direct emissions of fuel consumptions,

•Wastes related to the agricultural phase and post-harvest operations,

•Transportation of raw materials to the core,

•Transportation of sesame seed harvested from field to Tekfen Agri's warehouse (Agripark facility),

•Internal transport via forklift within Agripark facility,

Excluded lifecycle stages: In this study, production of capital goods, infrastructure, production of manufacturing equipment, and personnel-related activities were not included. Energy utilization for office lighting, heating and the other activities except production (sieving process) were excluded.

More information:

Cut-off rules: There are no excluded raw materials (seed, fertilizers, pesticides used and water consumption) in this study. All of them were taken into account in the study.

Allocation rules: No allocation procedures were applied in LCA modelling, as it presents only the production data of sesame seed.

Data quality: Throughout this study, ISO 14040/44 guidelines were followed. Primary data was collected from Tekfen Agri's Field Seed Operation for the 2020 production year (farm inputs, amounts of raw materials used, farm operations, transport figures, energy consumption, water consumption and amounts of wastes, warehouse operations). Farm data represents the period from 1st July 2020 to 30th November 2020 (production period).





Content declaration

Materials / chemical substances	Value	Unit
Seed	100	%

Packaging

The composition of the product as supplied is as follows (% values in kg):

99.8% Sesame Seed Product

0.24% Packaging Material (Big bag) - Packaging for the transportation and distribution

Environmental performance

The following table shows the impact estimate results which are relative expressions and do not predict impacts on category endpoints or the transgression of thresholds, safety margins or risks.

Potential environmental impacts per kg of sesame seeds

PARAMETER		UNIT	Upstream	Core	Downstrea m	TOTAL (Upstream+Core)
Global	Fossil	kg CO ₂ eq.	1.74	1.61	MND	3.36
warming	Biogenic	kg CO ₂ eq.	0.00149	-0.0232	MND	-0.0217
(GWP)	Land use and land transformation	kg CO₂ eq.	0.00722	0.000104	MND	0.00733
	TOTAL	kg CO ₂ eq.	1.75	1.59	MND	3.34
Depletion p stratosphe (ODP)	potential of the ric ozone layer	kg CFC 11 eq.	2.57E-07	2.45E-07	MND	5.02E-07
Acidificatio	on (fate not	kg SO2 eq	6.52E-03	5.44E-02	MND	6.09E-02
Eutrophica (EP)	tion potential	kg PO₄³- eq.	1.77E-03	3.07E-02	MND	3.25E-02
Formation tropospher (POCP)	potential of ric ozone	kg NMVOC	4.22E-03	2.48E-02	MND	2.90E-02
Abiotic der potential –	oletion Elements	kg Sb eq.	1.34E-05	9.47E-06	MND	2.29E-05
Abiotic dep potential – resources	oletion Fossil	MJ, net calorific value	20.7	21.6	MND	42.3
Water scar	city potential	m³ eq.	2.57	0.189	MND	2.76
Freshwate	r Ecotoxicity	[PAF.m3.day]	276	258	MND	534
Marine Wa Eutrophica	ter ition	kg N eq	9.51E-05	3.54E-03	MND	3.63E-03
Land use		m2a crop eq	5.06E-02	7.27E+00	MND	7.32E+00

MND: Module Not Declared





Use of resources per kg of sesame seeds

PARAMETER		UNIT	Upstream	Core	Downstrea m	TOTAL (Upstream+Core)
Primary energy	Use as energy carrier	MJ, net calorific value	0.787	3.07	MND	3.85
– Renewable	Used as raw materials	MJ, net calorific value	0	0	MND	0
	TOTAL	MJ, net calorific value	0.787	3.07	MND	3.85
Primary Use as energy carrier		MJ, net calorific value	21.7	22.1	MND	43.7
– Non- renewable	Used as raw materials	MJ, net calorific value	0.105	0	MND	0.105
	TOTAL	MJ, net calorific value	21.8	22.1	MND	43.8
Secondary n	naterial	kg	0	0	MND	0
Renewable secondary fuels		MJ, net calorific value	0	0	MND	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	MND	0
Net use of fresh water		m ³	0.0348	0.0703	MND	0.105

MND: Module Not Declared

Waste production and output flows

Waste production per kg of sesame seeds

PARAMETER	UNIT	Upstream	Core	Downstream	TOTAL (Upstream+Core)
Hazardous waste disposed	kg	2.78E-05	2.74E-05	MND	5.52E-05
Non-hazardous waste disposed	kg	9.59E-02	2.60E-01	MND	3.56E-01
Radioactive waste disposed	kg	2.76E-05	1.37E-04	MND	1.65E-04

MND: Module Not Declared

Note: It should be mentioned that according to the information taken from Tekfen Agri's Field Seed Operation, there are no direct radioactive wastes during the production processes. Within the core stage, the amount of radioactive waste generation mostly is in relation with the background processes of diesel.

Output flows per kg of sesame seeds

PARAMETER	UNIT	Upstream	Core	Downstream	TOTAL (Upstream+Core)
Components for reuse	kg	0	0	MND	0
Material for recycling	kg	0	0	MND	0
Materials for energy recovery	kg	0	0	MND	0
Exported energy, electricity	MJ	0	0	MND	0
Exported energy, thermal	MJ	0	0	MND	0

MND: Module Not Declared





REFERENCES

The International EPD System	The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. <u>www.environdec.com</u>
International EPD® System; General Programme Instructions (EPD)	International EPD® System; General Programme Instructions (EPD); Ver 3.0.1 del 2019/09/18 <u>www.environdec.com</u>
PCR: Arable And Vegetable Crops Product Category Classification: UN CPC 011, 012, 014, 017, 0191	PCR: Arable And Vegetable Crops Product Category Classification: UN CPC 011, 012, 014, 017, 0191 (Version1.0) 2020/07, www.environdec.com
ISO 14040/44	Environmental management – Life cycle assessment principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)
ISO 14025:2006	Environmental labels and declarations – Type III Environmental declarations – Principles and procedures
Ecoinvent (v3.6)	Ecoinvent Centre, www.ecoinvent.org
SimaPro (version 9.1.0.11)	SimaPro LCA Package, Pré Consultants, the Netherlands, <u>www.pre-</u> sustainability.com; <u>www.simapro.com</u>
Agri-Footprint (v4.0.)	Agri-footprint includes linked unit process inventories of crop cultivation, crop processing, animal production systems and processing of animal products for multi-impact life cycle assessments. Agri-footprint also contains inventory data on transport, fertilizers production and auxiliary materials; <u>www.agri-footprint.com</u>
Agribalyse (v3.0)	This database has been produced as part of AGRIBALYSE program lead by ADEME and INRAE since 2009. It contains agricultural and food products produced and/or consumed in France. It follows CIQUAL nomenclature, the French nutritional database. <u>www.agribalyse.fr</u>
WFLDB (v3.5)	World Food LCA Database; www.guantis-intl.com/metrics/databases/wfldb-food





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 (CO2 -eq). It is also known as Global Warming Potential (GWP). The carbon footprint shall include emissions and removals of greenhouse gases arising from fossil sources, biogenic sources, and direct land use change. The reporting shall be done in separate sub-indicators for the different sources, unless other guidance is provided in the reference PCR.

Acidification Potential (AP): 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 SO2. NOx and NH3. The acidification potential is measured in mass of sulphur dioxide equivalent (SO2-eq).

Eutrophication Potential (EP): It is an abnormal proliferation of vegetation in the aquatic ecosystems caused by the addition of nutrients into rivers, lakes or ocean, which determinates a lack of oxygen. The eutrophication potential is mainly influenced by emission into water of phosphates and nitrates. It is expressed in mass of PO_4^{3-} equivalent.

Photochemical Oxidant Formation Potential (POFP): Chemical reaction brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight forms the ozone in the troposphere. The indicator is mainly influenced by VOCs (Volatile organic compounds) is usually expressed in mass of non-metallic organic compounds (NMVOC).

Land Use: This indicator is measured mass of C deficit. and represents the impact related to the use of soil.

Marine Water Eutrophication: This indicator is measured in g N eq. and represents the impact related to eutrophication due to nitrogen and phosphorus emissions in water.

Aquatic Ecotoxicity: This indicator is measured in Comparative Toxic Unit (CTU) and refers to the impact of toxic substances (chemical and physical agents) on aquatic ecosystems.

Water Scarcity Potential: The water scarcity potential provides additional information related to the availability of water in different geographical locations. This indicator is measured in volume of water and it relates water use to local scarcity of water. This enables differentiation between situations where water extraction causes different levels of impact.

Abiotic Depletion Potential Element (ADP-e): Impact from depletion of resources excluding fossil fuel resources (such as oil or natural gas) expressed in equivalent antimony so to take into account scarcity of resources.

Non-Renewable Primary Energy: Non-renewable energy resources required to manufacture the product. Sources of non-renewable energy are fossil fuels and uranium.

Renewable Primary Energy: Renewable energy resources required to manufacture the product. Sources of renewable energy are biomass, wind, solar or hydraulic sources for example.

Net Fresh Water: The net use of fresh water does not constitute a "water footprint" as potential environmental impacts due to the water use in different geographical locations is not captured. Net freshwater use is included as an indicator in the section of resource use, calculated from the life cycle inventory (Input of net fresh water consumed in the life cycle stages).



TEKFEN TARIMSAL ARAŞTIRMA ÜRETİM VE PAZARLAMA A.Ş.

HEAD OFFICE

Kültür Mahallesi Budak Sokak Tekfen Sitesi D Blok No:2 34340 Ulus Beşiktaş/İstanbul

> Tel: +90 212 359 33 00 Fax: +90 212 287 87 97 e-mail: tarim@tekfen.com.tr