

COUNTRY DOSSIER

Greece

Water, climate, fertilisers and crops: National study and a study of each region, potential benefits of our products, external trade

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Fields of the Messara plain, seen from Phaistos (Crete).

Foreword

This dossier describes Greece from the angle of water, climate, fertilisers and crops. It is written for the ministries in charge of agriculture, water and trade, the regional directorates of agriculture, cooperatives and producer organisations. It answers three questions: Where is water short, for which crops, and in which regions? It then examines what our products can change, in rainfed as well as irrigated farming, and what that can mean for the country's external trade.

Reading the sources. Every figure refers to a source, named in the text and detailed in Annex A. Each source carries a confidence level:

How to read this document

- **A**: Official statistics or international database (World Bank, FAO, Greek public bodies (ELSTAT, Ministry of Rural Development and Food, AADE tax authority) and the European Union).
- **B**: Research institute, laboratory, United Nations agency or recognised climate model.
- **C**: Manufacturer statement, website, press or estimate.
- "M" means million; "Mm³" means million cubic metres; "t" means tonnes; "$" means current US dollars.
- A "scenario" is a calculation based on the trials cited. It is not a measurement made in Greece.

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Summary

The points below summarise the dossier. The figures come from public sources: The World Bank, FAO (FAOSTAT, AQUASTAT), Greek public bodies (ELSTAT, Ministry of Rural Development and Food, AADE tax authority) and the European Union, PVGIS and NASA POWER. The production gains and water savings are scenarios, described in Annex B.

10.41 M
Inhabitants in 2025 (World Bank)

840,620 ha
Of olives harvested in 2023, the main crop

2.00 M ha
Equipped for irrigation (2024)

906 Mm³
Of irrigation water saved a year, central scenario

10,625 M$
Of agricultural exports in 2024 (FAOSTAT)

Key points

• **Irrigation, a pillar of production.** 2.00 million hectares equipped for irrigation in 2024, or 69% of the 2.89 million hectares of cropland.

• **Olives: The main crop.** 840,620 ha harvested in 2023, for 2.50 million tonnes, or 2.97 t/ha.

• **Water is not short over the year, it is short between two rains.** National water stress is only 20.3%, but at Heraklion, the air demands 889 mm more than it rains.

• **In irrigation, the water saved enlarges the schemes.** 906.0 Mm³ a year in the central scenario, enough to irrigate about 224,226 more ha, or 11.2% of the equipped area.

• **An organic chain.** 271,690 ha of certified organic cropland in 2024: ECOFERT® is EU Bio certified.

• **All nitrogen is imported.** 195,817 t of nitrogen used in 2024, 222,370 t imported, no national production.

• **Farm trade.** $10,625 million of exports and $10,835 million of imports in 2024. First sale: Cheese from whole cow milk ($1,055 million). First purchase: Cheese from whole cow milk ($755 million).

Key figures

Key indicators for Greece

Indicator	Value	Year	Source (level)
Population	10.41 M	2025	World Bank (A1)
GDP per capita	26,948 $	2025	World Bank (A1)
Agriculture share of GDP	3.6%	2025	World Bank (A1)
Agricultural employment	10.7%	2025	World Bank (A1)
Cropland	2,888,000 ha	2024	FAOSTAT (A6)
Area equipped for irrigation	2,001,000 ha	2024	FAOSTAT (A6)
Harvested area: Olives	840,620 ha	2023	FAOSTAT (A2)
Certified organic cropland	271,690 ha	2024	FAOSTAT (A6)
Agricultural exports	10,625 M$	2024	FAOSTAT (A4)
Agricultural imports	10,835 M$	2024	FAOSTAT (A4)
Mineral nitrogen, agricultural use	195,817 t	2024	FAOSTAT (A5)

Source: Table based on the sources indicated.

1. Green Solutions and our products

Green Solutions develops products for water, fertilisation and crop protection. Four families are of interest to this dossier. The yields cited are those published by the manufacturer or by the trials, with their confidence level.

Products covered by this dossier

Product	Claimed use	Published evidence (level)
EVERGREEN® (water-retention polymer)	Holds rain or irrigation water as a gel, near the roots.	Trials on maize, potato, watermelon, date palm and soybean. Level B to C.
ECOSORB® (water-retention polymer based on corn starch)	Same use; action lasting 2 to 3 years according to the website.	Soybean trial (China); laboratory acrylamide analysis. Level B to C.
ECOFERT® (fertiliser)	Fertiliser certified by SOHISCERT and EU Bio, usable in organic farming.	Published certificate; potato trial combined with EVERGREEN®. Level A (certificate), C (results).
Paulownia ALTIFOLIA®	Fast-growing tree for agroforestry.	Website figures; no trial in Greece. Level C.
Water Vital®, NAPEMA®	Outside the scope of this dossier.	No independent source in the documents consulted.

Source: Green Solutions website (product sheets and published trials), Annex A.

The indicative dose published on the website is 30 to 75 kg/ha.



Haymaking in the Thessalian plain.

2. Greece in figures

Greece had 10.41 million inhabitants in 2025, 21% of them in rural areas. Agriculture accounts for 3.6% of gross domestic product and employs 11% of the labour force. The country covers 128.9 thousand km², of which 39% is agricultural land. Undernourishment affects 2.5% of the population.

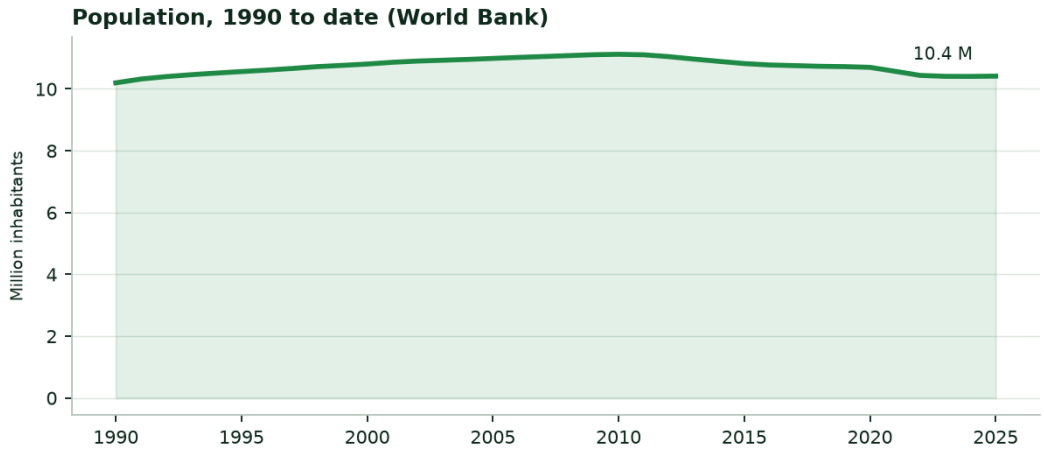


Figure 1. Population of Greece, 1990 to date. Source: World Bank (A1)

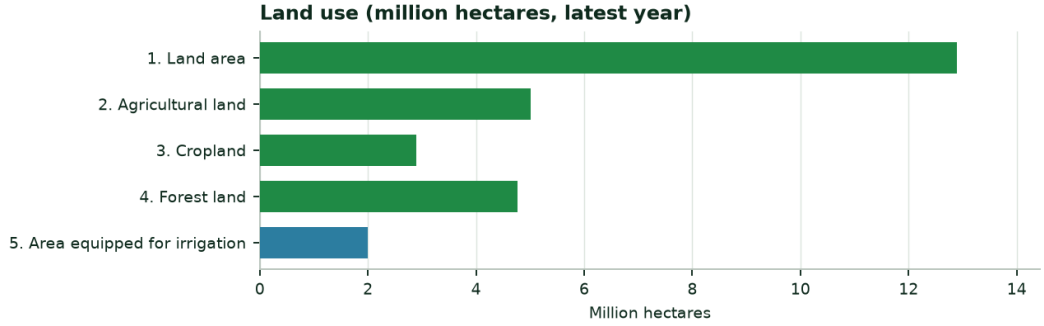


Figure 2. Land use, latest year published. Source: FAOSTAT (A6)

Agricultural and water indicators, latest year published

Indicator	Value	Year	Source
Cropland certified organic	271,690 ha	2024	FAOSTAT (A6)
Average cereal yield	4,053 kg/ha	2024	World Bank (A1)
Fertiliser use per hectare of arable land	186.6 kg/ha	2024	World Bank (A1)
Water withdrawals, agricultural share	80.5%	2022	World Bank (A1)
Internal freshwater resources	58.0 km³	2022	World Bank (A1)
Internal resources per inhabitant	5,557 m³	2022	World Bank (A1)



Fields and orchards seen from Acrocorinth, near Corinth.

3. Sunshine, rainfall and climate change

3.1 Sunshine

Global solar radiation reaches 1,584 to 1,882 kWh/m² a year depending on the region. Energy is not the limit: Water available at the right time makes the harvest.

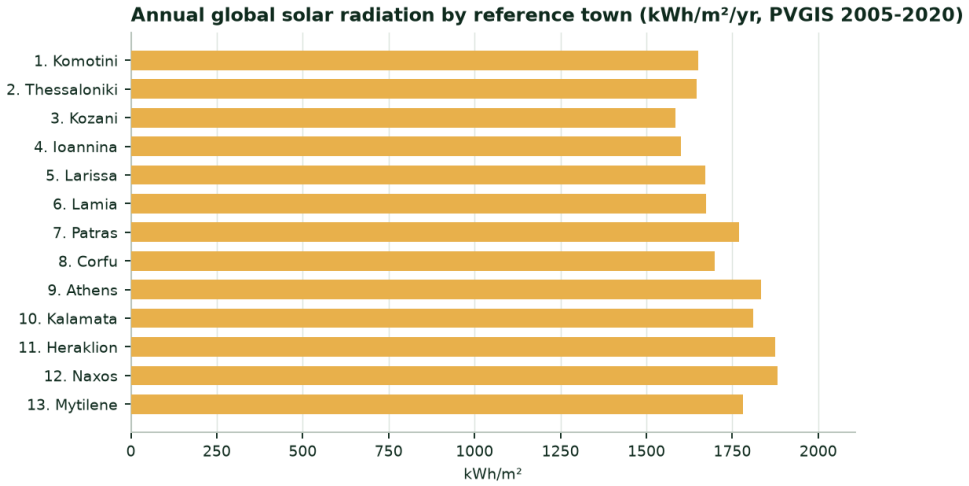


Figure 3. Annual global solar radiation in each reference town. Source: PVGIS (A8)

3.2 Rainfall and evapotranspiration

It rains 1,020 mm a year at Corfu, but only 442 mm at Naxos, where reference evapotranspiration reaches 1,278 mm. Rain falls from October to March, heavier in the west (Epirus, Ionian Islands) than in the east and the Cyclades. Summer is hot and dry: It is the season when irrigated crops need water most.

Mean monthly rainfall, 1991-2020 (mm per month)

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Komotini	61	55	52	40	46	36	25	17	37	56	71	78
Thessaloniki	43	38	44	39	45	34	26	22	41	49	49	59
Kozani	43	41	44	44	49	37	29	27	44	54	55	59
Ioannina	104	97	80	56	41	22	14	23	73	98	143	151
Larissa	47	42	47	35	38	25	24	21	38	53	53	56
Lamia	58	50	55	37	34	21	23	21	36	57	64	63
Patras	93	76	65	38	28	20	14	16	43	70	109	111
Corfu	116	107	95	62	43	28	18	31	80	116	162	162
Athens	62	53	55	31	21	15	11	8	23	44	73	81
Kalamata	99	77	59	34	22	21	10	10	47	61	106	114
Heraklion	94	76	49	23	15	5	2	4	17	47	64	93
Naxos	83	73	47	24	16	4	1	1	14	39	61	79
Mytilene	99	89	63	46	24	14	4	2	18	50	77	107

Source: NASA POWER (A9); author's calculation.

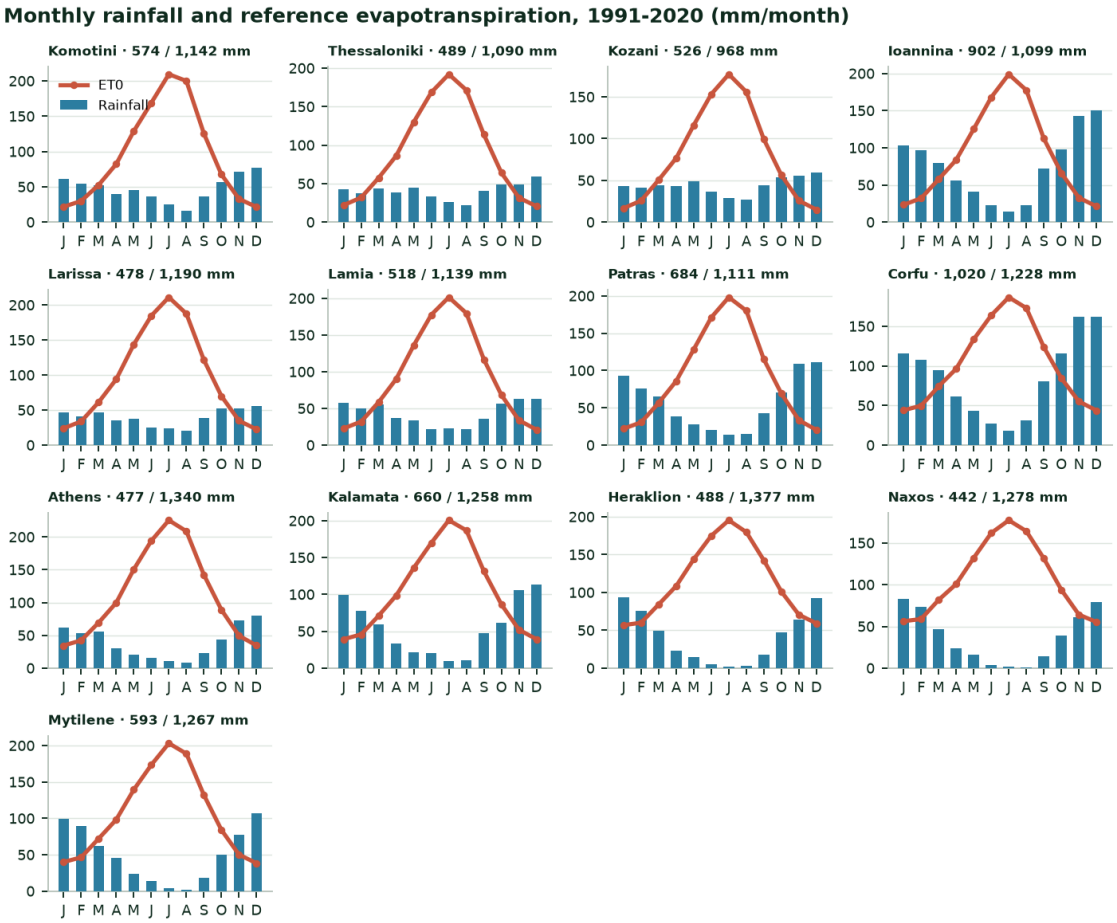


Figure 4. Monthly rainfall and reference evapotranspiration by city, 1991-2020. Source: NASA POWER (A9)

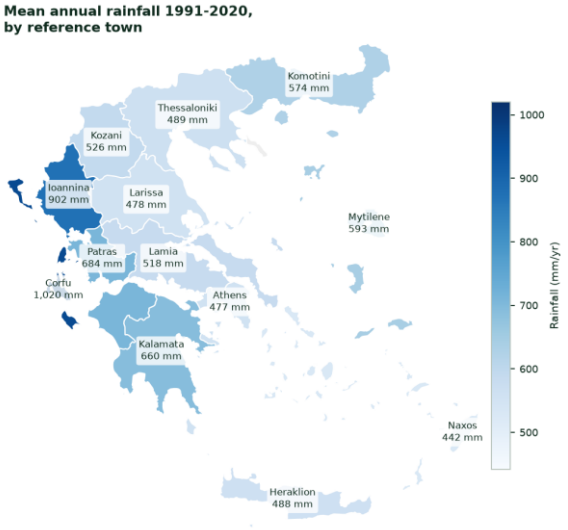
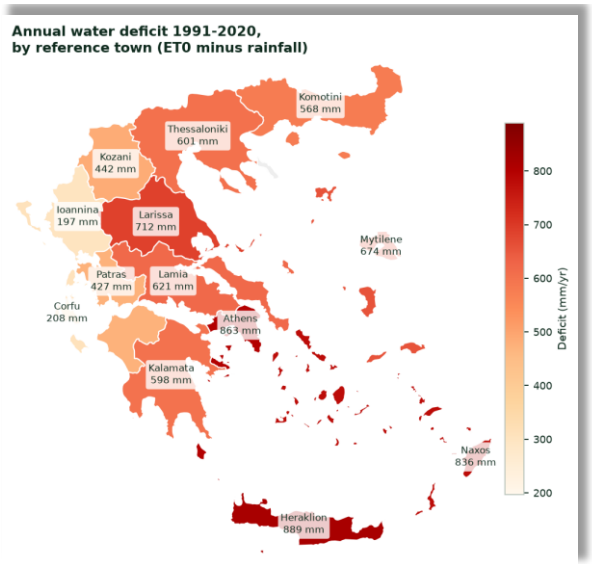


Figure 5. Mean annual rainfall 1991-2020, by region. Source: NASA POWER (A9), Natural Earth (A10).



Annual water deficit, by region. Source: NASA POWER (A9), Natural Earth (A10).

3.3 Climate change

Mean annual temperature is rising. At Larissa it went from 15.4 °C in 1981 to 18.2 °C in 2024, a trend of 0.48 °C per decade. At Heraklion the trend is 0.36 °C per decade, from 18.7 °C to 20.4 °C. Warmer air dries the soil faster between two rains.

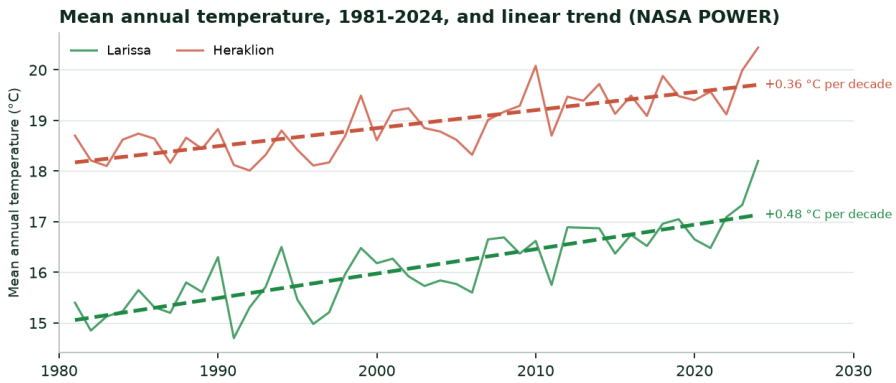


Figure 6. Mean annual temperature, 1981-2024, and linear trend. Source: NASA POWER (A9)



An Arcadian landscape, in the Peloponnese.

4. Water: Resources, irrigated areas, withdrawals

4.1 Resources and withdrawals

Total freshwater withdrawals are 10,047 million m³ a year (2022). Agriculture withdraws 80.5% of it, that is 8,085 Mm³. Internal resources are 58.0 km³ a year and water stress is 20.3%: The country has water, but little of it is mobilised for crops.

Freshwater: Withdrawals and resources

Indicator	Value	Year	Source
Total withdrawals	10,047 Mm³	2022	World Bank (A1)
Agricultural share	80.5%	2022	World Bank (A1)
Agricultural withdrawals	8,085.3 Mm³	2022	Calculated from A1
Area equipped for irrigation	2,001,000 ha	2024	FAOSTAT (A6)
Agricultural withdrawals per equipped hectare	4,041 m³/ha	—	Calculation (Annex B)
Water stress	20.3%	2022	World Bank (A1)

4.2 Irrigated areas

FAOSTAT counts 2,001,000 hectares equipped for irrigation in 2024. FAOSTAT gives 2,001,000 ha equipped for irrigation, a figure unchanged for several years, and 1,175,870 ha actually irrigated in 2024

(A6). Irrigation dominates on the plains of Thessaly, Macedonia and Thrace (cotton, maize, rice, fruit) and in Crete (greenhouse vegetables, olives).



The Christianoupoli dam lake (Messenia).

4.3 What the water saving represents

In the central scenario, the saving is 906.0 million m³ a year, or 11.2% of agricultural withdrawals. At 4,041 m³ per equipped hectare, this water would irrigate about 224,226 more hectares, or 11.2% of today's equipped area.

5. Fertilisers: Quantities, purchases, spending

5.1 Quantities used

In 2024, agricultural use reaches 195,817 tonnes of nitrogen, 59,864 tonnes of phosphate (P2O5) and 86,724 tonnes of potash (K2O). The country produces no nitrogen fertiliser: It imported 222,370 tonnes of nitrogen in the same year. Per hectare of arable land, use is 186.6 kg per hectare.

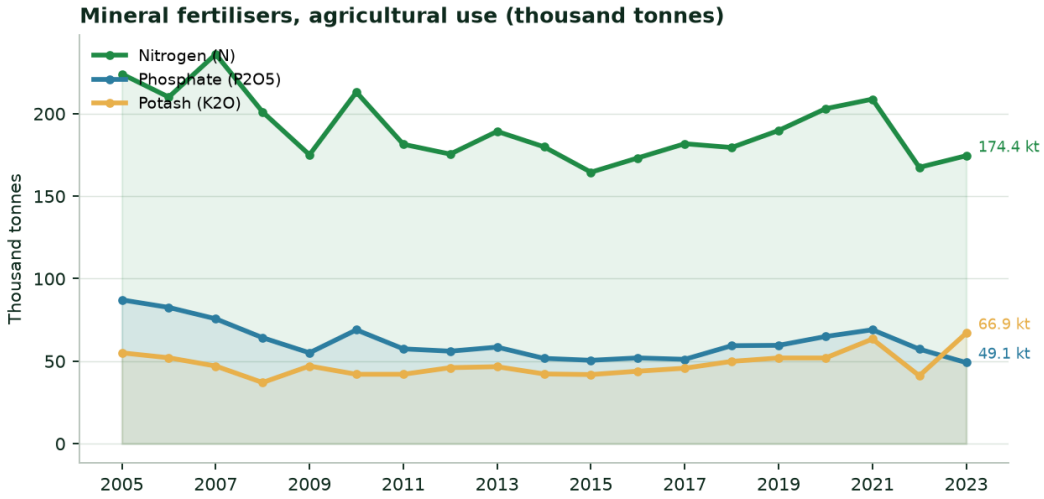


Figure 7. Mineral fertilisers, agricultural use, 2005-2023. Source: FAOSTAT (A5)

5.2 Regulatory framework

A fertilising product can be sold in Greece under the national regime or with CE marking under Regulation (EU) 2019/1009. For water-retention polymers, Delegated Regulation (EU) 2024/2770 sets biodegradability criteria applicable from 17 October 2028 (A13).



A peach orchard in spring, in the north of the country.

5.3 Indicative spending

In 2024, the indicative minimum spending on mineral fertilisers reaches $248 million, at international fertiliser prices (calculation in Annex B, lower bound).

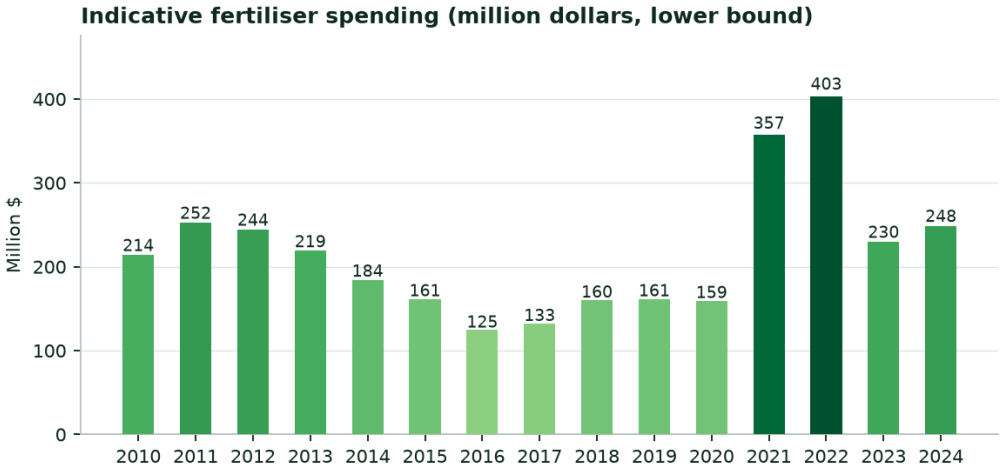


Figure 8. Indicative fertiliser spending, lower bound. Source: Author's calculation from A5 and A7

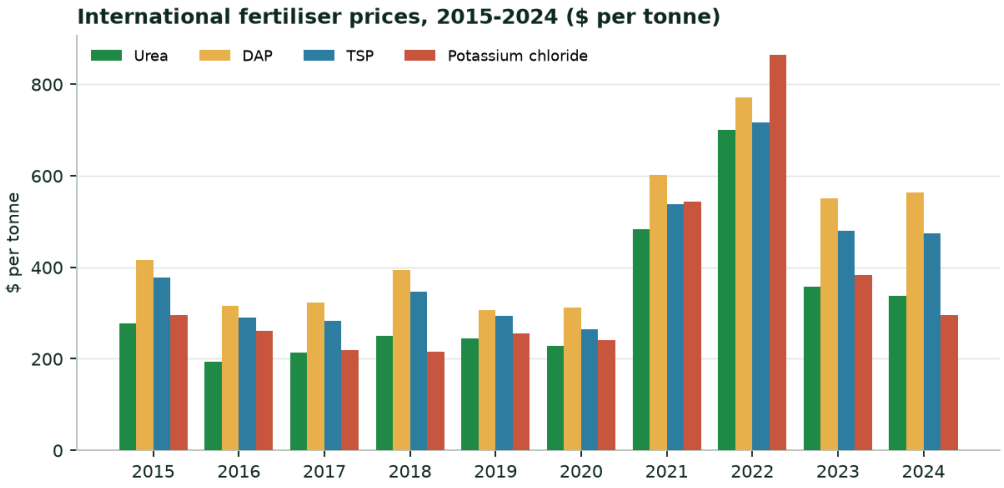


Figure 9. International prices of urea, DAP, TSP and potassium chloride. Source: World Bank, Pink Sheet (A7)

6. The regions at a glance

The table compares the thirteen regions, each represented by a reference town. Mount Athos, an autonomous region, is not studied. Climate figures are 1991-2020 averages, except radiation (2005-2020).

Climate of the capitals, 1991-2020 means

Region (city)	Rainfall (mm/yr)	ET0 (mm/yr)	Deficit (mm/yr)	Radiation (kWh/m²/yr)	Temperature (°C)
East Macedonia and Thrace (Komotini)	574	1,142	568	1,650	14.7
Central Macedonia (Thessaloniki)	489	1,090	601	1,646	15.0
Western Macedonia (Kozani)	526	968	442	1,584	11.7
Epirus (Ioannina)	902	1,099	197	1,600	15.0
Thessaly (Larissa)	478	1,190	712	1,671	16.1
Central Greece (Lamia)	518	1,139	621	1,673	14.9
Western Greece (Patras)	684	1,111	427	1,770	14.1
Ionian Islands (Corfu)	1,020	1,228	208	1,699	18.0
Attica (Athens)	477	1,340	863	1,832	17.6
Peloponnese (Kalamata)	660	1,258	598	1,810	17.9
Crete (Heraklion)	488	1,377	889	1,875	18.9
South Aegean (Naxos)	442	1,278	836	1,882	18.5
North Aegean (Mytilene)	593	1,267	674	1,781	17.1

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

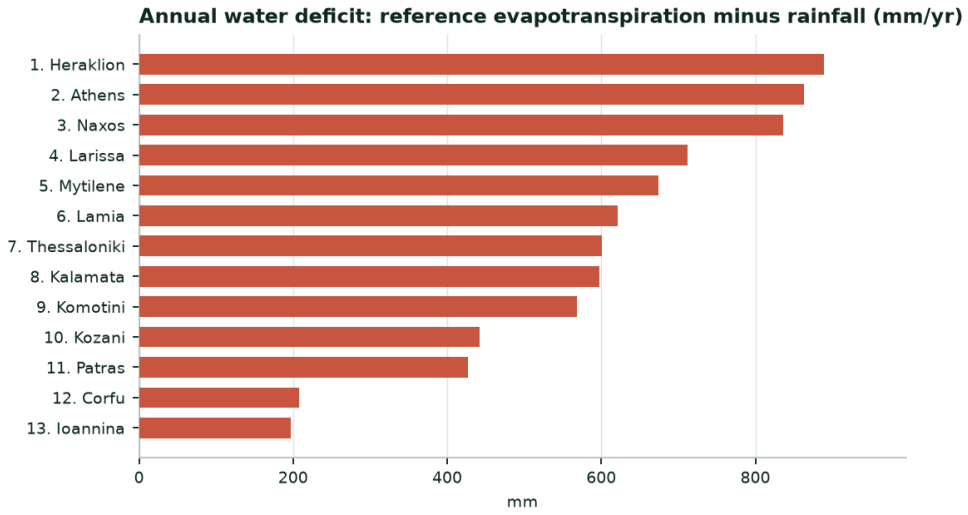


Figure 10. Annual water deficit: Reference evapotranspiration minus rainfall. Source: NASA POWER (A9)



Cotton fields under sprinkler irrigation.

7. The twenty main crops: Three rankings

7.1 By harvested area

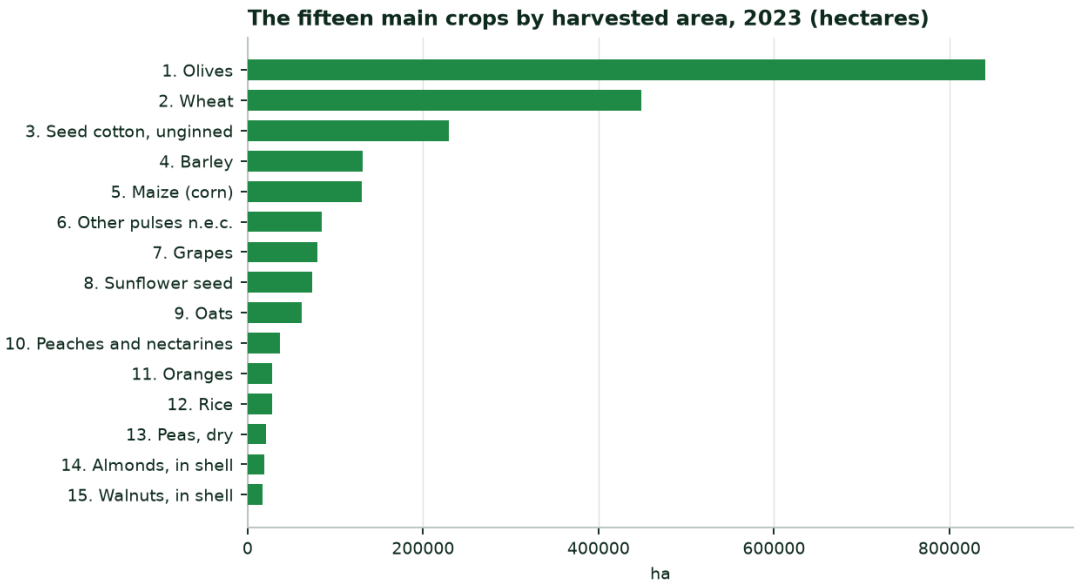


Figure 11. The fifteen main crops by harvested area, 2023 (hectares). Source: FAOSTAT (A2)

The ten main crops by area, 2023

Crop	Harvested area (ha)	Production (t)	Yield (t/ha)
Olives	840,620	2,498,942	2.97
Wheat	448,460	1,309,180	2.92
Seed cotton, unginned	229,805	699,069	3.04
Barley	130,780	362,520	2.77
Maize (corn)	130,560	1,416,690	10.85
Other pulses n.e.c.	84,870	103,870	1.22
Grapes	79,420	564,210	7.10
Sunflower seed	73,510	157,190	2.14
Oats	61,650	69,190	1.12
Peaches and nectarines	37,040	574,780	15.52

Source: FAOSTAT (A2).

7.2 By production

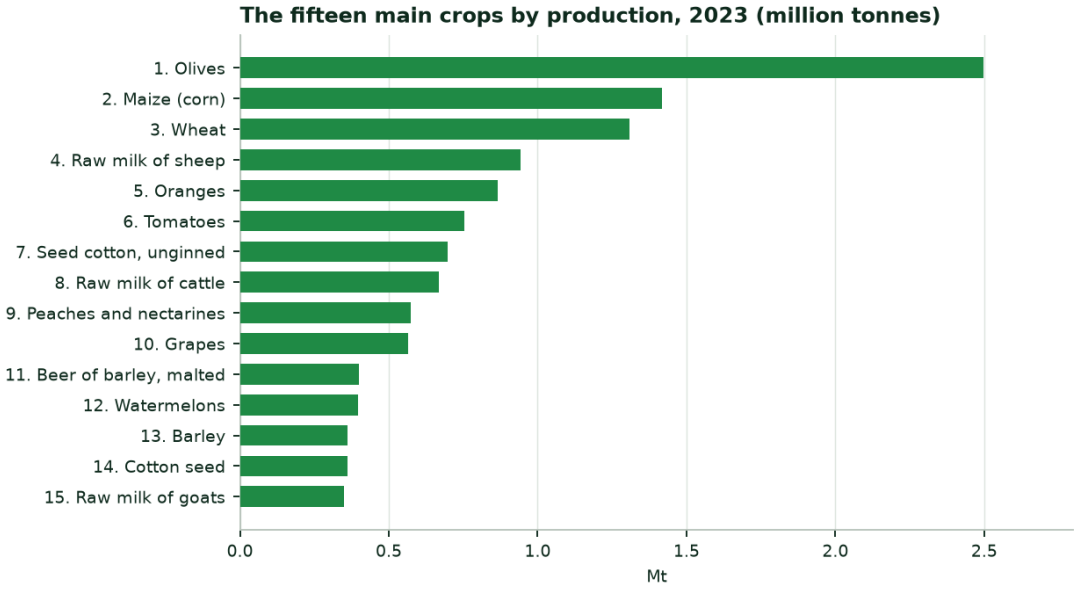


Figure 12. The fifteen main crops by production, 2023 (million tonnes). Source: FAOSTAT (A2)

7.3 By production value

By production value, the three main crops are: Olives, grapes and tomatoes (FAOSTAT, 2022, current US dollars).

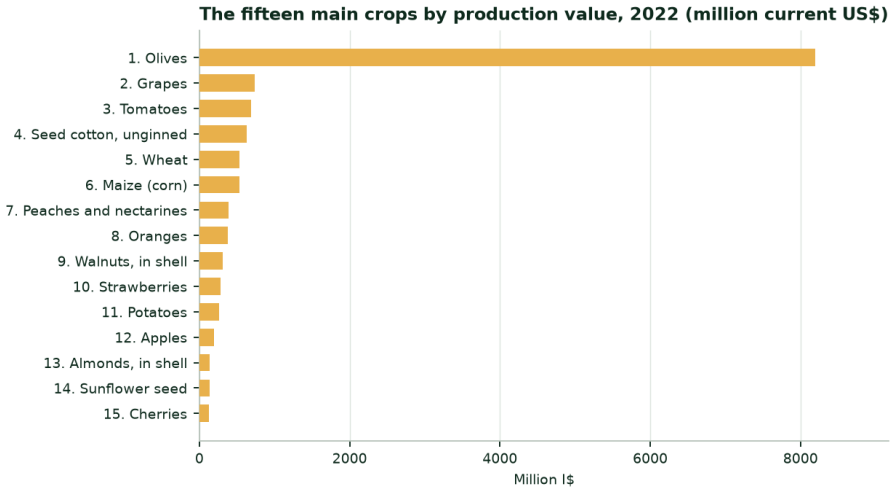


Figure 13. The fifteen main crops by production value, 2022 (million current US$). Source: FAOSTAT (A3)



Vines and the village of Exo Gonia, Santorini.

8. Extrapolation by crop: Irrigation and rainfed crops

8.1 Method

Method in brief

• **Irrigation.** National agricultural water is shared between irrigated crops (vegetables and melons, potato, maize, cotton, rice, fruit, vines and other irrigated land), in proportion to their harvested areas; the equipped area is shared the same way.

• Each calculation applies the effect of the trial cited: A quarter (cautious), half (central), all of it (high). Without a trial: 5, 10 and 20% of water, with no yield gain.

8.2 Trials used as analogues

Trials cited and their use in the calculation

Trial	Crop	Water	Yield	Use in the calculation
Maize, Türkiye (TIGEM, Konya, 2025)	Maize	-38.9%	+17.1%	Maize: Water and yield
Soybean, China	Soybean	Assumption	+11.3%	Not used; cited for reference
Watermelon, Mexico (2023)	Watermelon	-60.5%	+30.0%	Vegetables and melons: Water and yield
Potato, South Africa (2025)	Potato	-52.0%	+31.4%	Potato: Water and yield
Date palm, UAE (ICBA, 2021)	Palm	-82.0%	+20.0%	Not used; cited for reference

Source: A14 to A18 (published trials and manufacturer's website, levels B and C).

No trial has yet been conducted in Greece: The figures below apply the trials cited to the country's average yields.

8.3 Irrigation: Vegetables and melons, Potato, Maize and Cotton

Equipped area assigned, trial used and water saved (central scenario)

Crop group	Equipped area (ha)	Share	Trial or assumption	Water saved (Mm^3/yr)

Crop group	Equipped area (ha)	Share	Trial or assumption	Water saved (Mm³/yr)
Vegetables and melons (tomato, watermelon, pepper, others)	49,230	2.5%	Watermelon, Mexico (2023)	60.2
Potato	10,960	0.5%	Potato, South Africa (2025)	11.5
Maize (irrigated)	130,560	6.5%	Maize, Türkiye (TIGEM, 2025)	102.9
Cotton	229,805	11.5%	Generic assumption, no trial	92.9
Rice	27,600	1.4%	Generic assumption, no trial	11.2
Fruit (peach, orange, kiwi, cherry, apple, almond, others)	191,790	9.6%	Generic assumption, no trial	77.5
Vines (table, wine and dried grapes)	79,420	4.0%	Generic assumption, no trial	32.1
Other irrigated land (irrigated olives and vines, lucerne, fodder)	1,281,635	64.0%	Generic assumption, no trial	517.9

Source: Author's calculation (Annex B).

Water saved, extra irrigable hectares and production gain, by scenario

Scenario	Water (Mm³/yr)	Extra hectares	Production (t/yr)
Cautious	453.0	112,113	233,241
Central	906.0	224,226	466,482
High	1,812.0	448,452	932,964

Source: Author's calculation (Annex B).

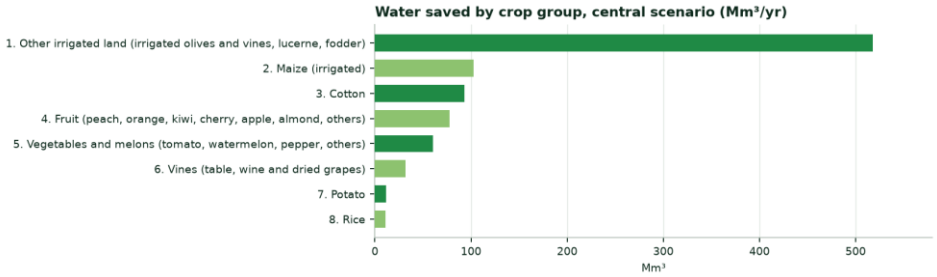


Figure 14. Water saved by crop group, central scenario. Source: Author's calculation

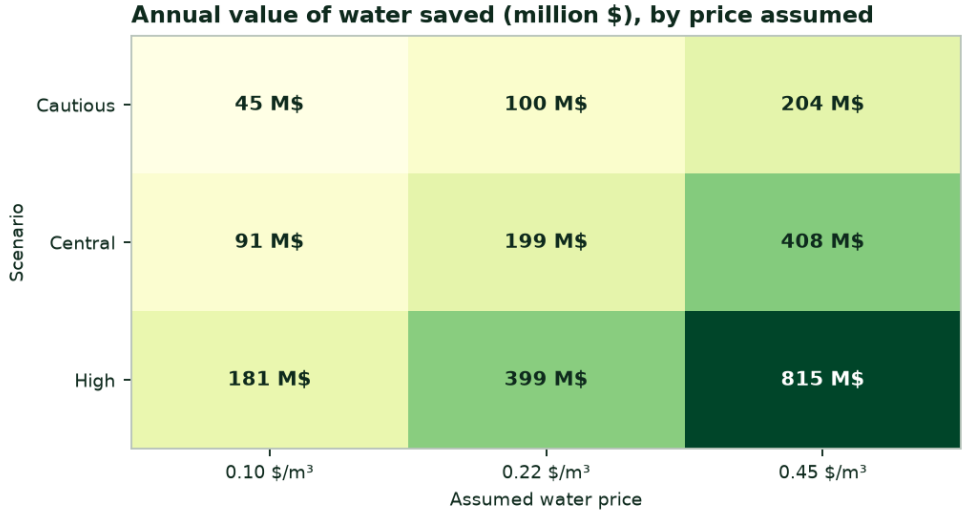


Figure 15. Annual value of the water saved, by price assumed per cubic metre. Source: Author's calculation; prices assumed, no national tariff

8.4 Reading the results

Key points

• The "other irrigated land" group gives 57% of the irrigation water saving (generic assumption, no trial).

• The gains are counted by scenario and, in rainfed farming, per 10,000 ha treated: A cooperative or a public programme can scale them to its own area.

9. Potential benefits of our products

The table lists what the products may bring according to the documents available, with their confidence level and their limit.

Potential benefits, by situation

Benefit	Published figures	Source (level)	Limit
Irrigation water saving	Date palm −82%; watermelon −60.5%; potato −52%; maize −38.9%	A14 to A18 (B, C)	One trial per crop; none in Greece
Yield	Maize +17.1%; potato +31.4%; watermelon +30%; date palm +20%; soybean +11.2 to +11.4%	A14 to A18 (B, C)	Trials conducted under irrigation or in other climates
Organic farming (ECOFERT®)	Certified by SOHISCERT and EU Bio	A21 (A)	Valid for the certified product
Safety: Acrylamide (ECOSORB®)	Below 3.0 µg/g	A19 (B)	One laboratory, one date
REACH compliance (EVERGREEN®)	≤ 0.1% of substances of very high concern in 233 substances tested	A20 (B)	Screening, not an approval
Agroforestry (Paulownia ALTIFOLIA®)	13 to 15 m in 6 to 8 years (website)	A22 (C)	No trial in Greece

Source: Annex A.



Orange trees around Mycenae (Argolis).

10. External trade: Exports, imports, importing

10.1 Overview, 2023 and 2024

Agricultural products and total merchandise trade (million $)

Indicator	2023	2024
Agricultural exports (crops and livestock)	10,248	10,625
Agricultural imports (crops and livestock)	9,953	10,835
Exports, all merchandise	55,047	53,988
Imports, all merchandise	88,617	91,428

Source: FAOSTAT (A4).

10.2 Exports

The three main farm products exported in 2024 are: Cheese from whole cow milk ($1,055 million), olive oil ($1,018 million) and cotton lint, ginned ($466 million).

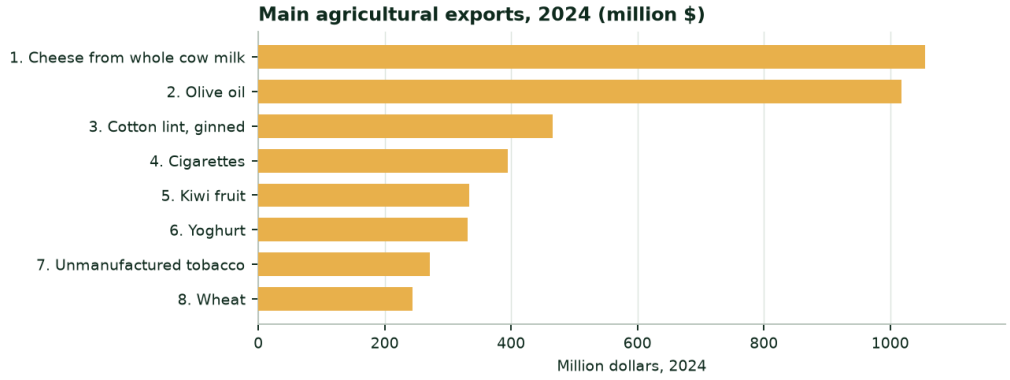


Figure 16. Main agricultural exports, 2024. Source: FAOSTAT (A4)

10.3 Imports

The main farm purchases are: Cheese from whole cow milk ($755 million), meat of cattle with the bone, fresh or chilled ($475 million) and meat of pig with the bone, fresh or chilled ($437 million).

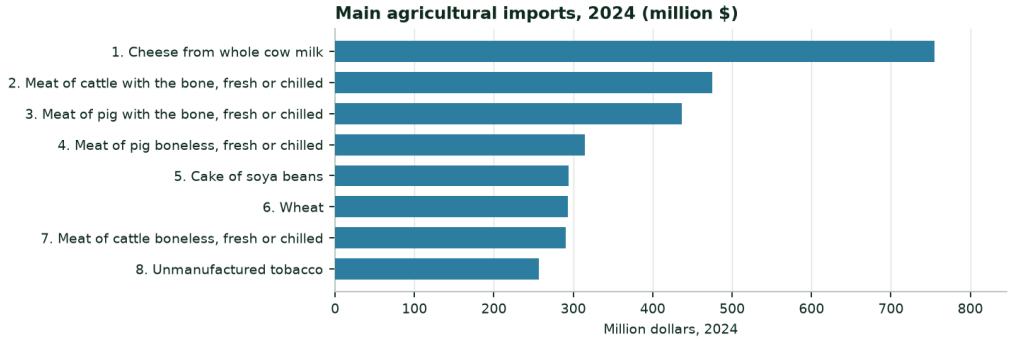


Figure 17. Main agricultural imports, 2024. Source: FAOSTAT (A4)



Figure 18. The Friday farmers' market in Kolonaki (Athens).



The Athens central market, Athinas Street.

10.4 Importing water-retention polymers into Greece

What to know

• **Customs duty (subheading 3906.90):** The European Union common tariff, from 0 to 6.5% depending on the line; the "other" line (3906.90.90) is at 6.5% (A11). Products made in the Union move duty-free.

• **VAT:** Standard rate of 24%; the reduced rates of 13% and 6% cover lists of goods set by law (A12). The rate applicable to a water-retaining agent is to be confirmed with the AADE tax authority.

• **Placing on the market:** A fertilising product can be sold under the Greek regime or with CE marking under Regulation (EU) 2019/1009 (A13). For water-retention polymers, Delegated Regulation (EU) 2024/2770 sets biodegradability criteria applicable from 17 October 2028 (A13).

• **Classification:** Code 3906.90 is an inference for our products; Greek Customs settles it.

11. A study of each region

Each region is described through the city that represents it. The figures describe the climate; the water deficit (evapotranspiration minus rainfall) shows where water is most short. The description of crops is qualitative.



The Messara plain, in Crete.

East Macedonia and Thrace (Komotini)

East Macedonia and Thrace: Cotton, wheat, maize, tobacco and sunflower on the irrigated plains of Thrace, sheep farming.

Indicator	Value
Annual rainfall, 1991-2020	574 mm
Reference evapotranspiration	1,142 mm
Annual water deficit	568 mm
Months with less than 50 mm of rain	6
Global solar radiation	1,650 kWh/m²
Mean temperature	14.7 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Central Macedonia (Thessaloniki)

Central Macedonia: Rice of the Axios delta, cotton, maize, peaches and kiwi of the Giannitsa plain.

Indicator	Value
Annual rainfall, 1991-2020	489 mm
Reference evapotranspiration	1,090 mm
Annual water deficit	601 mm
Months with less than 50 mm of rain	11
Global solar radiation	1,646 kWh/m²
Mean temperature	15.0 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Western Macedonia (Kozani)

Western Macedonia: Cereals, saffron, apples and vines on cooler plateaus.

Indicator	Value
Annual rainfall, 1991-2020	526 mm
Reference evapotranspiration	968 mm
Annual water deficit	442 mm
Months with less than 50 mm of rain	9
Global solar radiation	1,584 kWh/m²
Mean temperature	11.7 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Epirus (Ioannina)

Epirus: Livestock, meadows and citrus of the Arta plain, under the country's highest rainfall.

Indicator	Value
Annual rainfall, 1991-2020	902 mm
Reference evapotranspiration	1,099 mm
Annual water deficit	197 mm
Months with less than 50 mm of rain	4
Global solar radiation	1,600 kWh/m²
Mean temperature	15.0 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Thessaly (Larissa)

Thessaly, the largest plain: Irrigated cotton, wheat, maize and lucerne; flooded by Storm Daniel in 2023.

Indicator	Value
Annual rainfall, 1991-2020	478 mm
Reference evapotranspiration	1,190 mm
Annual water deficit	712 mm
Months with less than 50 mm of rain	9
Global solar radiation	1,671 kWh/m²
Mean temperature	16.1 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Central Greece (Lamia)

Central Greece: Cotton, cereals and olives in the Sperchios and Boeotia valleys.

Indicator	Value
Annual rainfall, 1991-2020	518 mm
Reference evapotranspiration	1,139 mm
Annual water deficit	621 mm
Months with less than 50 mm of rain	7
Global solar radiation	1,673 kWh/m²
Mean temperature	14.9 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Western Greece (Patras)

Western Greece: Olives, currants, citrus and vegetables of Achaea, Elis and Aetolia-Acarnania.

Indicator	Value
Annual rainfall, 1991-2020	684 mm
Reference evapotranspiration	1,111 mm
Annual water deficit	427 mm
Months with less than 50 mm of rain	6
Global solar radiation	1,770 kWh/m²
Mean temperature	14.1 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Ionian Islands (Corfu)

Ionian Islands: Ancient olive groves and vines, on islands that are wet in winter.

Indicator	Value
Annual rainfall, 1991-2020	1,020 mm
Reference evapotranspiration	1,228 mm
Annual water deficit	208 mm
Months with less than 50 mm of rain	4
Global solar radiation	1,699 kWh/m²
Mean temperature	18.0 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Attica (Athens)

Attica: Vines, olives, Aegina pistachios and vegetables around the city.

Indicator	Value
Annual rainfall, 1991-2020	477 mm
Reference evapotranspiration	1,340 mm
Annual water deficit	863 mm
Months with less than 50 mm of rain	7
Global solar radiation	1,832 kWh/m²
Mean temperature	17.6 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Peloponnese (Kalamata)

Peloponnese: Kalamata olives, Argolis oranges, Nemea vines and raisins.

Indicator	Value
Annual rainfall, 1991-2020	660 mm
Reference evapotranspiration	1,258 mm
Annual water deficit	598 mm
Months with less than 50 mm of rain	6
Global solar radiation	1,810 kWh/m²
Mean temperature	17.9 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Crete (Heraklion)

Crete: Olives, vines, and greenhouse vegetables in Ierapetra and the Messara plain.

Indicator	Value
Annual rainfall, 1991-2020	488 mm
Reference evapotranspiration	1,377 mm
Annual water deficit	889 mm
Months with less than 50 mm of rain	8
Global solar radiation	1,875 kWh/m²
Mean temperature	18.9 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

South Aegean (Naxos)

South Aegean: Naxos potatoes, Santorini vines and goats, on dry islands.

Indicator	Value
Annual rainfall, 1991-2020	442 mm
Reference evapotranspiration	1,278 mm
Annual water deficit	836 mm
Months with less than 50 mm of rain	8
Global solar radiation	1,882 kWh/m²
Mean temperature	18.5 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

North Aegean (Mytilene)

North Aegean: Olives of Lesbos, mastic of Chios and sheep.

Indicator	Value
Annual rainfall, 1991-2020	593 mm
Reference evapotranspiration	1,267 mm
Annual water deficit	674 mm
Months with less than 50 mm of rain	6
Global solar radiation	1,781 kWh/m²
Mean temperature	17.1 °C

Source: NASA POWER (A9); PVGIS (A8); author's calculation.

Annex A. Sources and confidence levels

Ref.	Source	Level
A1	World Bank, World Development Indicators (WDI), Greece	A
A2	FAOSTAT, crops and livestock (QCL), areas, production, 2014-2023	A
A3	FAOSTAT, value of production (QV), current US dollars, 2019-2023	A
A4	FAOSTAT, trade in crops and livestock products, 2018-2024	A
A5	FAOSTAT, mineral fertilisers, agricultural use, production and imports, 2005-2023	A
A6	FAOSTAT, land use, areas equipped for irrigation, organic farming	A
A7	World Bank, Pink Sheet (world prices of urea, DAP, TSP and potassium chloride)	A
A8	PVGIS (European Commission Joint Research Centre), radiation, 2005-2020	B
A9	NASA POWER (NASA Langley Research Center), daily data: Rainfall, temperature, humidity, wind and radiation, 1981-2024; reference evapotranspiration calculated by the author with FAO-56 (Penman-Monteith)	B
A10	Natural Earth, first-level administrative boundaries and country outline	B
A11	World Bank, WITS (UNCTAD TRAINS database), European Union, applied MFN duties, subheading 3906.90 (seven national lines), 2023	A
A12	PwC, Worldwide Tax Summaries, Greece, other taxes: VAT rates	C
A13	Regulation (EU) 2019/1009 on fertilising products (CE marking), and Delegated Regulation (EU) 2024/2770 setting biodegradability criteria for water-retention polymers, applicable from 17 October 2028	A
A14	Soybean trial, China (yield), manufacturer's website	C
A15	Date palm trial, UAE (ICBA, 2021), manufacturer's website	B
A16	Watermelon trial, Mexico (2023), manufacturer's website	C
A17	Potato trial, South Africa (2025), manufacturer's website	C
A18	Maize trial, Türkiye (TIGEM, Konya, 2025), manufacturer's website	B
A19	ECOSORB® acrylamide analysis (Polymex laboratory, 2024)	B
A20	EVERGREEN® REACH / SVHC screening (SGS, 2023)	B
A21	ECOFERT® certificate (SOHISCERT, EU Bio)	A
A22	Paulownia ALTIFOLIA® sheet figures (website)	C

Annex B. Calculation method

1. Agricultural water. Total withdrawals (10,047 Mm³, 2022) × agricultural share (80.47%) = 8,085.3 Mm³.

2. Irrigation. The equipped area (2,001,000 ha) and agricultural water are shared between irrigated groups (vegetables and melons, potato, maize, cotton, rice, fruit, vines and other irrigated land) in proportion to their harvested areas (2,001,000 ha), without exceeding each group's harvested area. Our sources have no irrigation statistic by crop. Other crops are treated as rainfed and receive no irrigation water in the calculation. The crop data used are those of 2023: For 2024, FAOSTAT does not yet give the cotton or olive harvest. The equipped area exceeds the harvested area of the irrigable crops retained: The difference forms an "other irrigated land" group (irrigated olives and vines, lucerne, fodder), with the generic assumption. Maize is treated as irrigated, as on the Greek plains. FAOSTAT does not publish Greece's production value by crop in current US dollars: Values are therefore in current US dollars.

3. Scenarios. Water saved = group water × trial effect: A quarter (cautious), half (central), all of it (high). Without a trial: 5, 10 and 20%.

4. Extra hectares. Water saved ÷ water per equipped hectare (4,041 m³/ha).

6. Value of water. Three assumed prices (0.10; 0.22 and 0.45 $/m³); no national tariff was adopted.

7. Fertilisers. Minimum spending = nitrogen ÷ 0.46 × urea price + phosphate ÷ 0.46 × TSP price + potash ÷ 0.60 × potassium chloride price (A7).

8. Climate. Rainfall, reference evapotranspiration (FAO-56) and temperature: 1991-2020 means of the NASA POWER grid cell containing each city; radiation: PVGIS, 2005-2020. Temperature trends are linear regressions over 1981-2024. NASA POWER combines reanalyses and satellite data on a grid of about 50 km: Two nearby cities can share the same cell, and its rainfall can differ from local station records. On the maps, each region is coloured according to the value of its reference town.

9. Trade. Totals are those of the FAOSTAT crops and livestock line; products are listed one by one, without aggregates. Rice amounts add husked rice, broken rice and milled rice.

Annex C. Photo credits

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Olive harvest in Sitia (Crete).

Green Solutions

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