

COUNTRY DOSSIER

Algeria

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

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Palm grove and dune at Taghit, in Béchar province.

Foreword

This dossier describes Algeria 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 in short supply? For which crops? In which regions? It then examines what difference our products can make, 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, Algerian Customs, Ministry of Agriculture, Algerian administration).
- **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; "I$" means constant 2014-2016 international dollars.
- A "scenario" is a calculation based on the trials cited. It is not a measurement made in Algeria.

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Summary

The points below summarise the dossier. The figures come from public sources: The World Bank, FAO (FAOSTAT, AQUASTAT), Algerian Customs, Ministry of Agriculture, Algerian administration, PVGIS and ERA5. The production gains and water savings are scenarios, described in Annex B.

47.44 M
Inhabitants in 2025 (World Bank)

1.80 M ha
Of wheat harvested in 2024, the main crop

1.36 M ha
Equipped for irrigation (2024)

1,472 Mm³
Of irrigation water saved a year, central scenario

213 M$
Of agricultural exports in 2024 (FAOSTAT)

Key points

• **Irrigation, a pillar of production.** 1.36 million hectares equipped for irrigation in 2024, or 16% of the 8.51 million hectares of cropland.

• **Wheat: The main crop.** 1,800,000 ha harvested in 2024, for 3.00 million tonnes, or 1.67 t/ha.

• **Water is scarce.** National water stress reaches 144.8%; at Adrar, atmospheric water demand exceeds rainfall by 2,873 mm.

• **In irrigated farming, the water saved could allow irrigation schemes to be expanded.** 1,472.4 Mm³ a year in the central scenario, enough to irrigate about 289,607 more ha, or 21.2% of the equipped area.

• **An organic supply chain.** 3,790 ha of certified organic cropland in 2024: ECOFERT® is EU Bio certified.

• **Fertilisers made locally.** 70,200 t of nitrogen used in 2024; the country produces 1,043,200 t and imports 47,292 t.

• **Farm trade.** $213 million of exports and $11,514 million of imports in 2024. Leading export: Dates ($105 million). Leading import: Wheat ($1,970 million).

Key figures

Key indicators for Algeria

Indicator	Value	Year	Source (level)
Population	47.44 M	2025	World Bank (A1)
GDP per capita	6,051 $	2025	World Bank (A1)
Agriculture's share of GDP	14.5%	2025	World Bank (A1)
Agricultural employment	9.5%	2025	World Bank (A1)
Cropland	8,513,200 ha	2024	FAOSTAT (A6)
Area equipped for irrigation	1,365,000 ha	2024	FAOSTAT (A6)
Harvested area: Wheat	1,800,000 ha	2024	FAOSTAT (A2)
Certified organic cropland	3,790 ha	2024	FAOSTAT (A6)
Agricultural exports	213 M$	2024	FAOSTAT (A4)
Agricultural imports	11,514 M$	2024	FAOSTAT (A4)
Mineral nitrogen, agricultural use	70,200 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 reported in 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 Algeria. 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.



Wheat fields around Abou El Hassen, in Chlef province.

2. Algeria in figures

Algeria had 47.44 million inhabitants in 2025, 24% of them in rural areas. Agriculture accounts for 14.5% of gross domestic product and employs 9% of the labour force. The country covers 2,381.7 thousand km², of which 17% is agricultural land. Undernourishment affects 2.5% of the population.

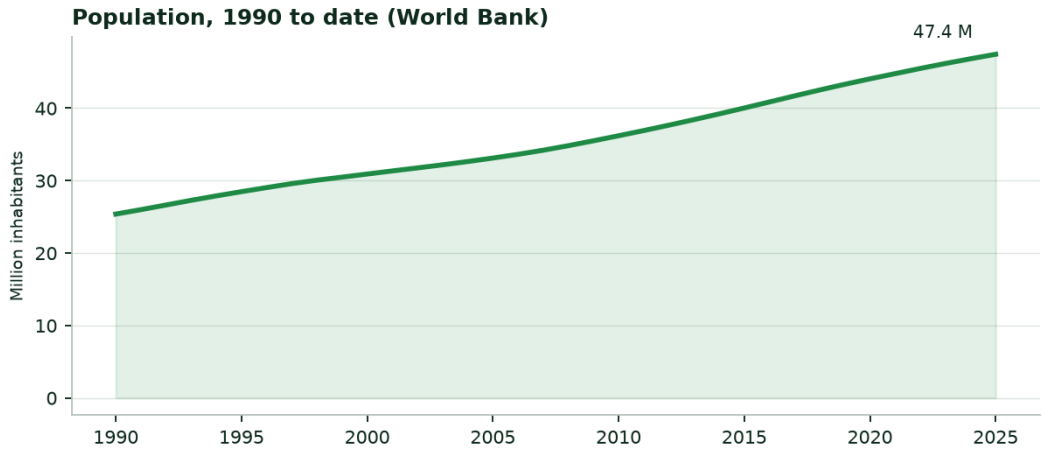


Figure 1. Population of Algeria, 1990 to date. Source: World Bank (A1)

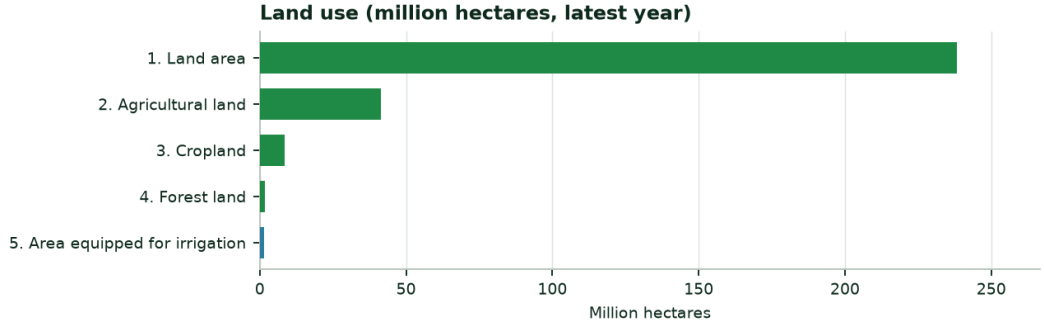


Figure 2. Land use, latest year published. Source: FAOSTAT (A6)

Agricultural and water indicators, latest year published

Indicator	Value	Year	Source
Cropland certified organic	3,790 ha	2024	FAOSTAT (A6)
Average cereal yield	1,537 kg/ha	2024	World Bank (A1)
Fertiliser use per hectare of arable land	20.7 kg/ha	2024	World Bank (A1)
Water withdrawals, agricultural share	67.4%	2022	World Bank (A1)
Internal freshwater resources	11.2 km³	2022	World Bank (A1)
Internal resources per inhabitant	247 m³	2022	World Bank (A1)



Farmers with their vegetable harvest.

3. Sunshine, rainfall and climate change

3.1 Sunshine

Global solar radiation reaches 1,748 to 2,382 kWh/m² a year depending on the region. Energy is not the limiting factor: Water available at the right time determines the harvest.

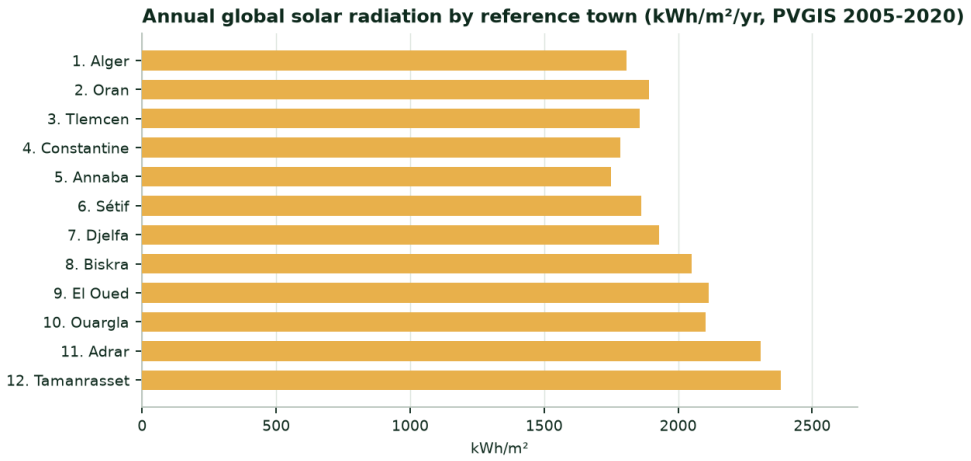


Figure 3. Annual global solar radiation in each reference town. Source: PVGIS (A8)

3.2 Rainfall and evapotranspiration

Annual rainfall is 588 mm at Annaba, but only 16 mm at Adrar, where reference evapotranspiration reaches 2,889 mm. Rain falls mostly from autumn to spring; summer is dry everywhere. It exceeds 500 mm on the eastern coast and falls below 100 mm as soon as the Sahara begins.

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

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alger	81	68	62	60	43	7	1	8	28	57	87	78
Oran	46	38	40	35	21	5	0	3	16	32	59	44
Tlemcen	62	51	61	56	37	11	2	6	22	42	61	46
Constantine	50	44	53	53	49	18	8	18	30	39	42	48
Annaba	77	70	70	63	42	12	2	11	38	54	74	74
Sétif	56	52	60	64	56	21	10	22	44	43	46	50
Djelfa	29	25	29	36	30	14	8	14	35	31	21	24
Biskra	14	8	16	16	6	2	1	3	17	13	12	11
El Oued	10	5	9	7	3	1	0	1	6	5	8	7
Ouargla	7	3	5	4	2	0	0	0	3	4	4	4
Adrar	2	2	2	3	0	0	0	0	2	2	2	1
Tamanrasset	2	1	4	1	3	2	1	4	2	2	1	1

Source: ERA5 via Open-Meteo (A9); author's calculation.



Figure 4. Monthly rainfall and reference evapotranspiration by city, 1991-2020. Source: ERA5 via Open-Meteo (A9)

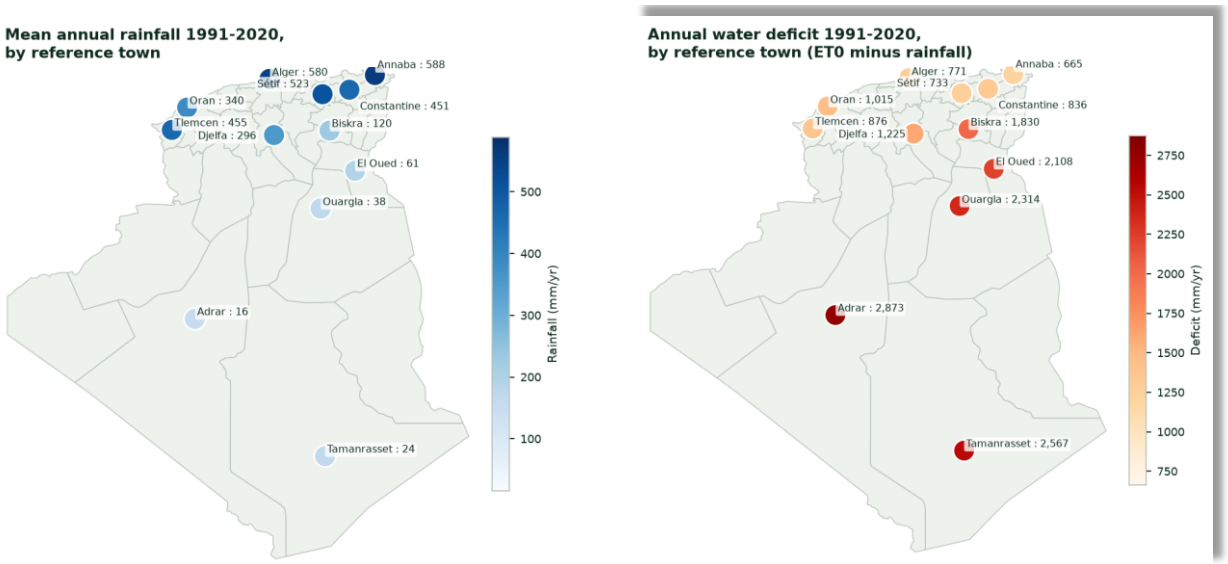


Figure 5. Mean annual rainfall 1991-2020, by region. Source: ERA5 (A9), Natural Earth (A10). *Annual water deficit, by region. Source: ERA5 (A9), Natural Earth (A10).*

3.3 Climate change

Mean annual temperature is rising. At Alger it went from 17.6 °C in 1981 to 19.1 °C in 2024, a trend of 0.21 °C per decade. At Ouargla the trend is 0.45 °C per decade, from 22.4 °C to 24.4 °C. Warmer air dries the soil faster between rainfall events.

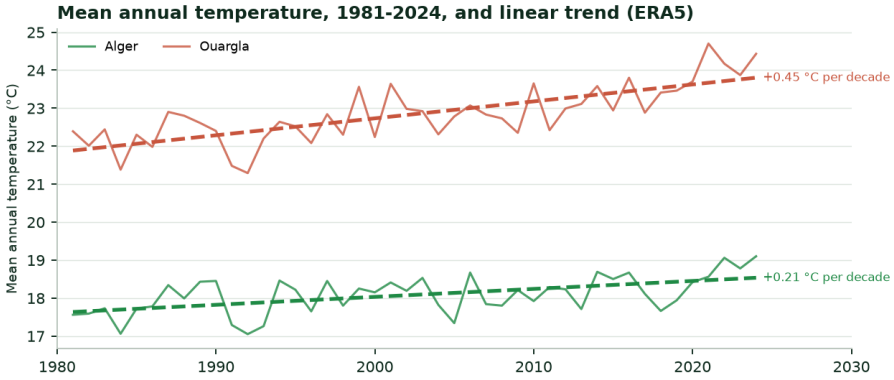


Figure 6. Mean annual temperature, 1981-2024, and linear trend. Source: ERA5 (A9)



The Grand Erg Occidental and its palms, at Taghit.

4. Water: Resources, irrigated areas, withdrawals

4.1 Resources and withdrawals

Total freshwater withdrawals are 10,292 million m³ a year (2022). Agriculture accounts for 67.4% of these withdrawals, that is 6,940 Mm³. Internal resources are 11.2 km³ a year and water stress is 144.8%: The resource is already heavily used: Every cubic metre kept in the soil counts.

Freshwater: Withdrawals and resources

Indicator	Value	Year	Source
Total withdrawals	10,292 Mm³	2022	World Bank (A1)
Agricultural share	67.4%	2022	World Bank (A1)
Agricultural withdrawals	6,939.9 Mm³	2022	Calculated from A1
Area equipped for irrigation	1,365,000 ha	2024	FAOSTAT (A6)
Agricultural withdrawals per equipped hectare	5,084 m³/ha	—	Calculation (Annex B)
Water stress	144.8%	2022	World Bank (A1)

4.2 Irrigated areas

FAOSTAT counts 1,365,000 hectares equipped for irrigation in 2024. FAO estimated the irrigation potential at 1,240,000 ha based on soil suitability, 730,000 ha based on available water and 510,000 ha with renewable water only (A11). Irrigation serves the large northern schemes (Mitidja, Chelif, Habra, Seybouse), small- and medium-scale borehole irrigation, and the oases and centre pivots of the Sahara.



The Tilesdit dam, in Djurdjura National Park.

4.3 What the water saving represents

In the central scenario, the saving is 1,472.4 million m³ a year, or 21.2% of agricultural withdrawals. At 5,084 m³ per equipped hectare, this water would irrigate about 289,607 more hectares, or 21.2% of today's equipped area.

5. Fertilisers: Quantities, purchases, spending

5.1 Quantities used

In 2024, agricultural use reaches 70,200 tonnes of nitrogen, 58,800 tonnes of phosphate (P2O5) and 26,700 tonnes of potash (K2O). The country produces 1,043,200 tonnes of nitrogen and 32,400 tonnes of phosphate (P2O5); it imported 47,292 tonnes of nitrogen in the same year. Per hectare of arable land, use is 20.7 kg per hectare.

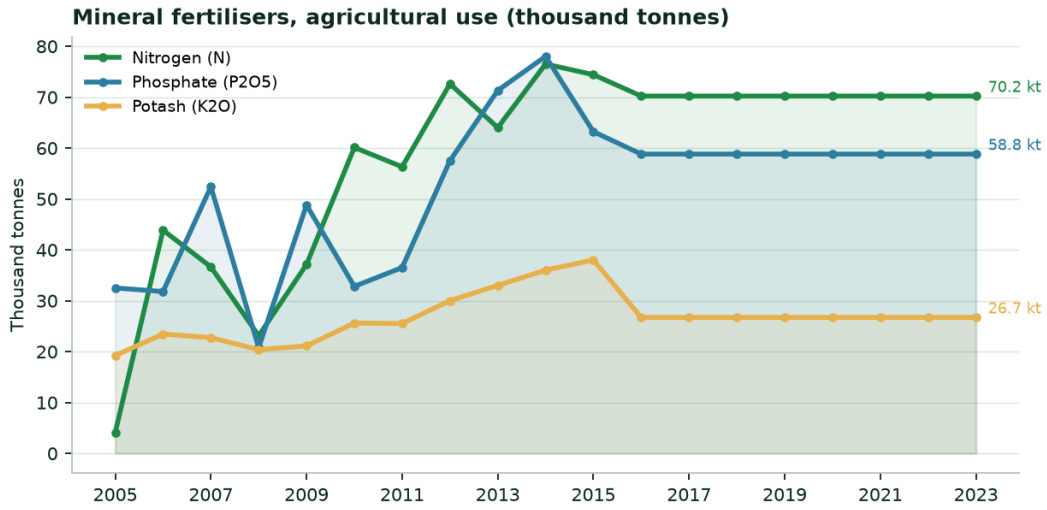


Figure 7. Mineral fertilisers, agricultural use, 2005-2023. Source: FAOSTAT (A5)

5.2 Regulatory framework

Making and selling fertilisers requires an authorisation from the plant protection authority of the Ministry of Agriculture; IANOR publishes the Algerian fertiliser standards (A13).



A wheat field in Algeria.

5.3 Indicative spending

In 2024, the indicative minimum spending on mineral fertilisers reaches $125 million, at international fertiliser prices (calculation in Annex B, lower bound).

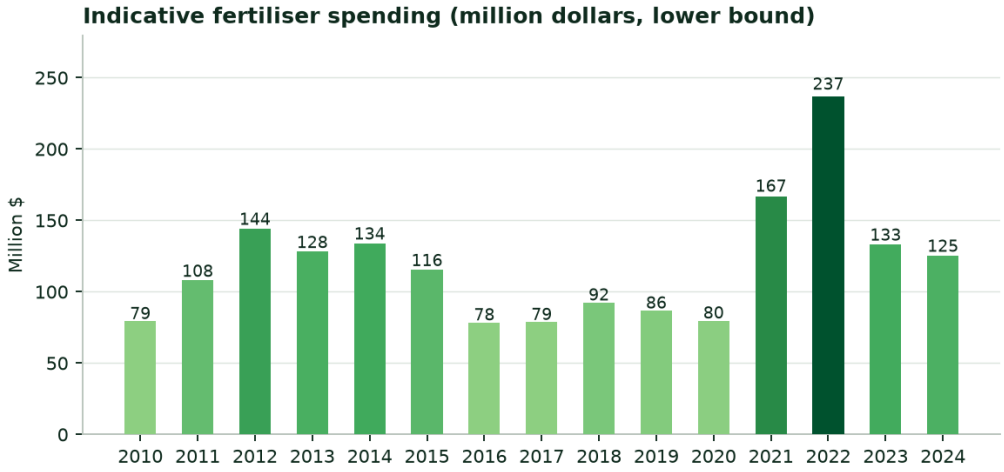


Figure 8. Indicative fertiliser spending, lower bound. Source: Author's calculation from A5 and A7

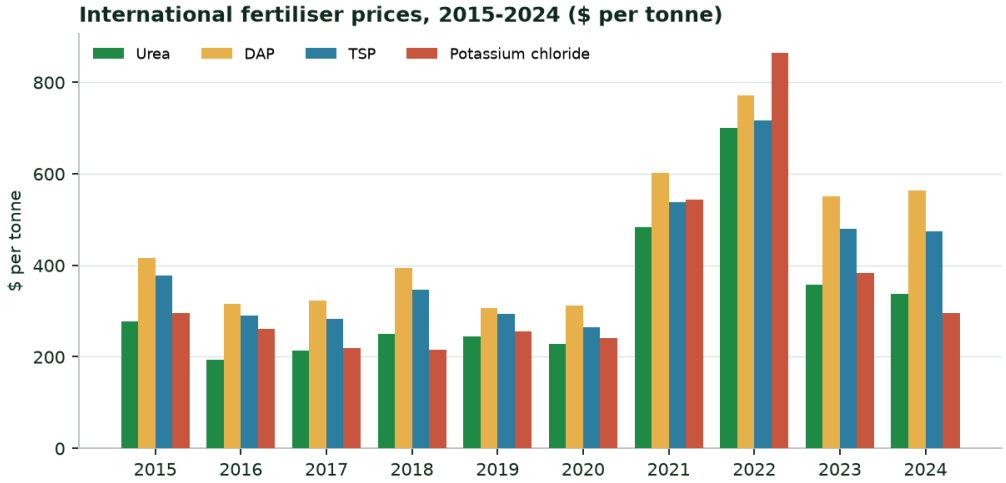


Figure 9. International prices of urea, DAP, TSP and potassium chloride. Source: World Bank, Pink Sheet (A7)

6. The regions at a glance

The table compares twelve reference towns, from the coast to the Sahara. 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)
Algiers (Alger)	580	1,351	771	1,808	18.0
Oran (Oran)	340	1,355	1,015	1,891	18.2
Tlemcen (Tlemcen)	455	1,331	876	1,856	15.5
Constantine (Constantine)	451	1,287	836	1,785	15.7
Annaba (Annaba)	588	1,253	665	1,748	18.1
Sétif (Sétif)	523	1,256	733	1,862	13.6
Djelfa (Djelfa)	296	1,521	1,225	1,929	15.0
Biskra (Biskra)	120	1,950	1,830	2,050	21.3
El Oued (El Oued)	61	2,169	2,108	2,114	21.4
Ouargla (Ouargla)	38	2,352	2,314	2,102	22.8
Adrar (Adrar)	16	2,889	2,873	2,308	25.7

Region (city)	Rainfall (mm/yr)	ET0 (mm/yr)	Deficit (mm/yr)	Radiation (kWh/m²/yr)	Temperature (°C)
Tamanrasset (Tamanrasset)	24	2,591	2,567	2,382	22.3

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

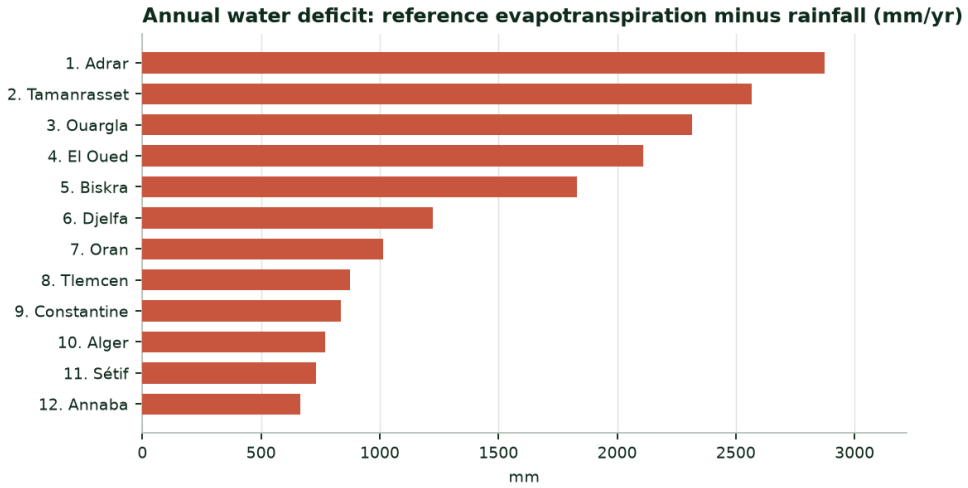


Figure 10. Annual water deficit: Reference evapotranspiration minus rainfall. Source: ERA5 (A9)



The Ghoufi canyon, in the Aurès.

7. The twenty main crops: Three rankings

7.1 By harvested area

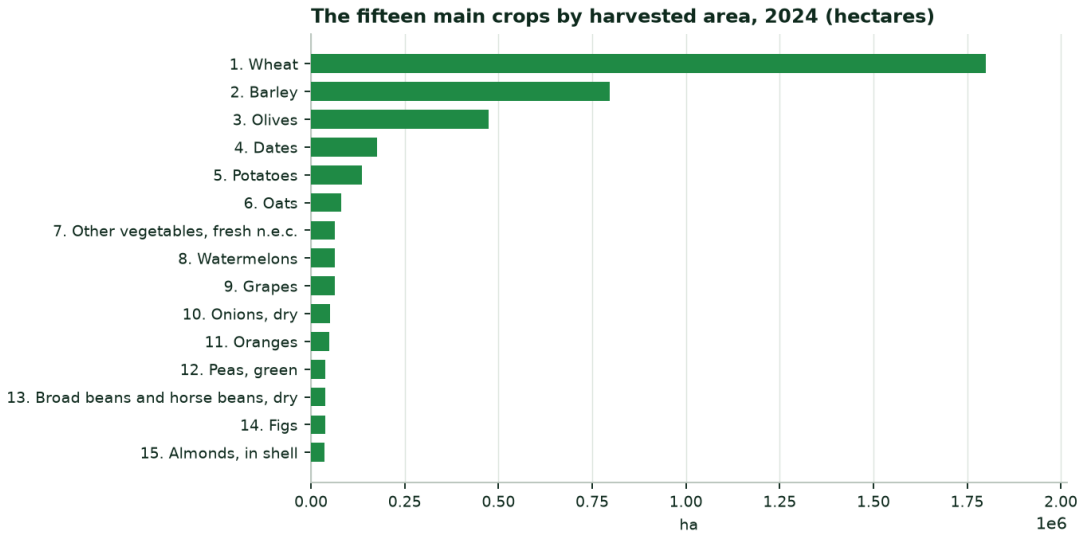


Figure 11. The fifteen main crops by harvested area, 2024 (hectares). Source: FAOSTAT (A2)

The ten main crops by area, 2024

Crop	Harvested area (ha)	Production (t)	Yield (t/ha)
Wheat	1,800,000	3,000,000	1.67
Barley	797,601	1,000,000	1.25
Olives	474,116	913,243	1.93
Dates	175,962	1,337,301	7.60
Potatoes	135,414	4,596,493	33.94
Oats	80,000	105,000	1.31
Other vegetables, fresh n.e.c.	63,171	1,706,681	27.02
Watermelons	62,949	2,520,724	40.04
Grapes	62,829	605,260	9.63
Onions, dry	49,763	1,830,194	36.78

Source: FAOSTAT (A2).

7.2 By production

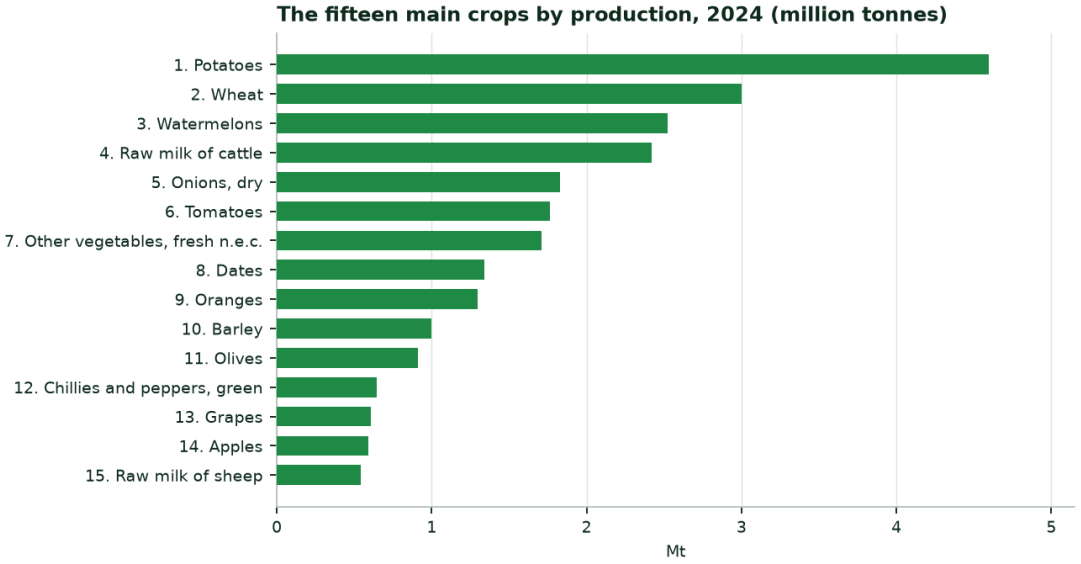


Figure 12. The fifteen main crops by production, 2024 (million tonnes). Source: FAOSTAT (A2)

7.3 By production value

By production value, the three main crops are: Dates, potatoes and olives (FAOSTAT, 2023, constant international dollars).

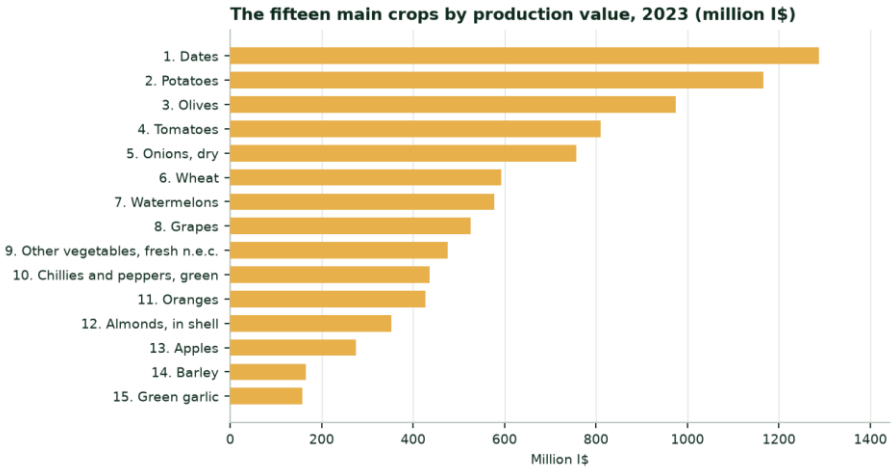


Figure 13. The fifteen main crops by production value, 2023 (million I$). Source: FAOSTAT (A3)



Irrigated potatoes in the Sahara.

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, date palm, maize, citrus, other fruit 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) or the full effect (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%	Date palm: Water and yield

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

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

8.3 Irrigation: Vegetables and melons, Potato, Date palm and Maize

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, onion, pepper, others)	378,777	27.7%	Watermelon, Mexico (2023)	582.5
Potato	135,414	9.9%	Potato, South Africa (2025)	179.0
Date palm	175,962	12.9%	Date palm, UAE (ICBA, 2021)	366.8
Maize	2,000	0.1%	Maize, Türkiye (TIGEM, 2025)	2.0
Citrus (orange, clementine, others)	68,168	5.0%	Generic assumption, no trial	34.7
Other fruit (apple, grape, apricot, peach, pear)	170,831	12.5%	Generic assumption, no trial	86.9
Other irrigated land (cereals, olive, fodder)	433,848	31.8%	Generic assumption, no trial	220.6

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	736.2	144,803	1,269,163
Central	1,472.4	289,607	2,538,325
High	2,944.8	579,214	5,076,650

Source: Author's calculation (Annex B).

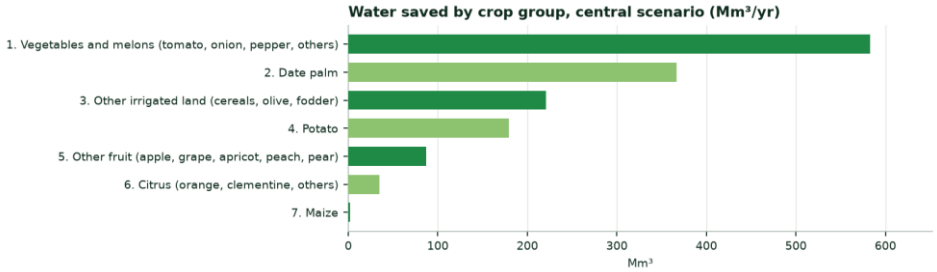


Figure 14. Water saved by crop group, central scenario. Source: Author's calculation

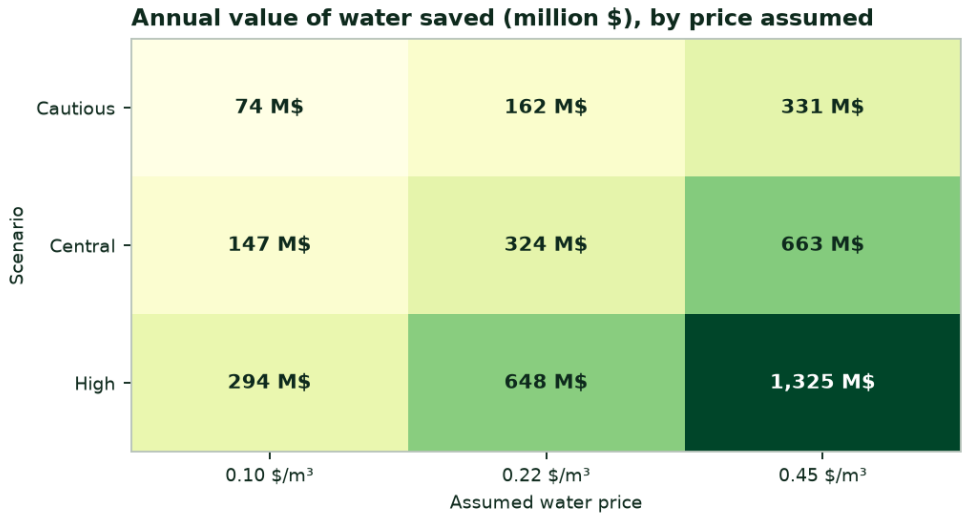


Figure 15. Annual value of the water saved, by price assumed per cubic metre. Source: Author's calculation; prices assumed, no national tariff

8.4 Reading the results

Key points

• The "vegetables and melons" group gives 40% of the irrigation water saving (watermelon, Mexico (2023)).

• 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 the confidence level and limitations of each.

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 Algeria
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 Algeria

Source: Annex A.



Farmland north of Chlef.

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)	389	213
Agricultural imports (crops and livestock)	11,428	11,514
Exports, all merchandise	51,799	49,580
Imports, all merchandise	41,849	46,100

Source: FAOSTAT (A4).

10.2 Exports

The three main farm products exported in 2024 are: Dates ($105 million), wheat and meslin flour ($19 million) and refined sugar ($17 million).

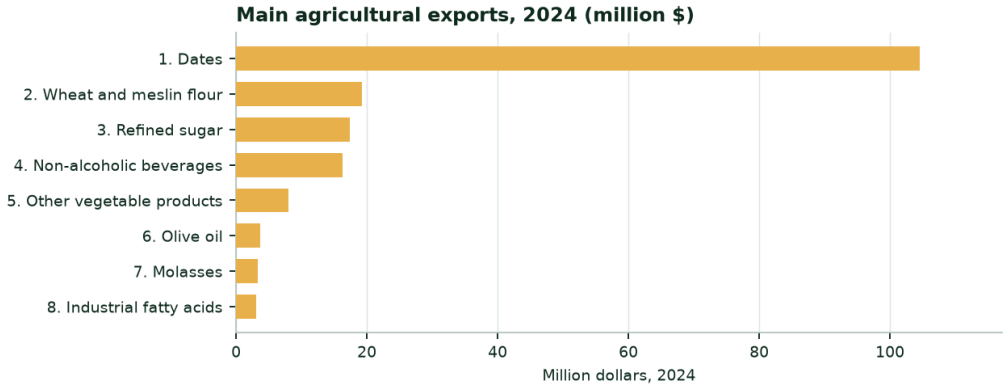


Figure 16. Main agricultural exports, 2024. Source: FAOSTAT (A4)

10.3 Imports

The main farm purchases are: Wheat ($1,970 million), raw sugar ($1,175 million) and maize (corn) ($1,141 million).

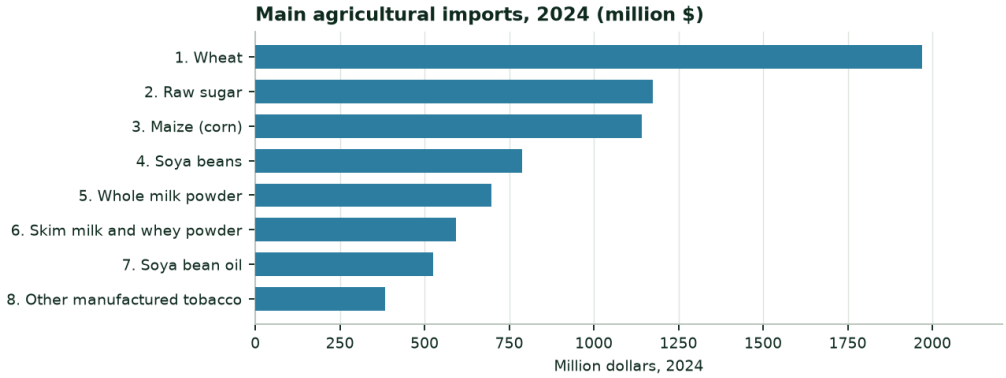


Figure 17. Main agricultural imports, 2024. Source: FAOSTAT (A4)



Figure 18. Potatoes at El Oued, in the heart of the Sahara.



Apricots at the Casbah market in Algiers.

10.4 Importing water-retention polymers into Algeria

What to know

- **Customs duty (subheading 3906.90.20, acrylic polymers in powder form):** 5% (A12).
- **Import taxes:** 19% VAT, 3% solidarity tax (TCS) and 2% PRCT levy on the same line (A12).
- **European Union origin:** The Algeria-European Union association agreement opens a free trade area for industrial products; the preferential duty of the line is to be confirmed with Algerian Customs (A12).
- **Registration:** Making and selling fertilisers requires an authorisation from the plant protection authority of the Ministry of Agriculture; Algerian fertiliser standards are handled by IANOR (A13). No text specific to water-retaining agents was found.
- **Classification:** Code 3906.90 is an inference for our products; Algerian Customs settle 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 scarcest. The description of crops is qualitative.



Souama, in Greater Kabylie (Tizi Ouzou province).

Algiers (Alger)

The Mitidja plain: Citrus, market gardening, vines and orchards, on a heavily used aquifer, next to the country's largest market.

Indicator	Value
Annual rainfall, 1991-2020	580 mm
Reference evapotranspiration	1,351 mm
Annual water deficit	771 mm
Months with less than 50 mm of rain	5
Global solar radiation	1,808 kWh/m²
Mean temperature	18.0 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Oran (Oran)

The drier western coast: Cereals, vines, olive and market gardening; the Mina and Chelif plains irrigated from dams.

Indicator	Value
Annual rainfall, 1991-2020	340 mm
Reference evapotranspiration	1,355 mm
Annual water deficit	1,015 mm
Months with less than 50 mm of rain	11
Global solar radiation	1,891 kWh/m²
Mean temperature	18.2 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Tlemcen (Tlemcen)

Western hills and plains: Olive, cereals, orchards and market gardening, with the Maghnia plain.

Indicator	Value
Annual rainfall, 1991-2020	455 mm
Reference evapotranspiration	1,331 mm
Annual water deficit	876 mm
Months with less than 50 mm of rain	7
Global solar radiation	1,856 kWh/m²
Mean temperature	15.5 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Constantine (Constantine)

The eastern high plains: Rainfed durum wheat and barley, pulses and livestock.

Indicator	Value
Annual rainfall, 1991-2020	451 mm
Reference evapotranspiration	1,287 mm
Annual water deficit	836 mm
Months with less than 50 mm of rain	10
Global solar radiation	1,785 kWh/m²

Indicator	Value
Mean temperature	15.7 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Annaba (Annaba)

The humid east: Seybouse and Bouteldja plains, processing tomatoes, market gardening, citrus and milk.

Indicator	Value
Annual rainfall, 1991-2020	588 mm
Reference evapotranspiration	1,253 mm
Annual water deficit	665 mm
Months with less than 50 mm of rain	5
Global solar radiation	1,748 kWh/m²
Mean temperature	18.1 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Sétif (Sétif)

The cereal High Plateaus: Wheat, barley, late-season potato and livestock, with cold winters.

Indicator	Value
Annual rainfall, 1991-2020	523 mm
Reference evapotranspiration	1,256 mm
Annual water deficit	733 mm
Months with less than 50 mm of rain	6
Global solar radiation	1,862 kWh/m²
Mean temperature	13.6 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Djelfa (Djelfa)

Steppe: Sheep farming, barley and fodder; borehole irrigation is spreading.

Indicator	Value
Annual rainfall, 1991-2020	296 mm
Reference evapotranspiration	1,521 mm
Annual water deficit	1,225 mm
Months with less than 50 mm of rain	12
Global solar radiation	1,929 kWh/m²
Mean temperature	15.0 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Biskra (Biskra)

The Ziban: Date palm, including Deglet Nour, and the main hub of early greenhouse vegetables.

Indicator	Value
Annual rainfall, 1991-2020	120 mm
Reference evapotranspiration	1,950 mm
Annual water deficit	1,830 mm

Indicator	Value
Months with less than 50 mm of rain	12
Global solar radiation	2,050 kWh/m²
Mean temperature	21.3 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

El Oued (El Oued)

The Souf: Centre-pivot potato on sand, date palm and market gardening, irrigated from deep aquifers.

Indicator	Value
Annual rainfall, 1991-2020	61 mm
Reference evapotranspiration	2,169 mm
Annual water deficit	2,108 mm
Months with less than 50 mm of rain	12
Global solar radiation	2,114 kWh/m²
Mean temperature	21.4 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Ouargla (Ouargla)

Oued Righ and the Ouargla basin: Palm groves and centre-pivot cereals, on aquifers that barely recharge.

Indicator	Value
Annual rainfall, 1991-2020	38 mm
Reference evapotranspiration	2,352 mm
Annual water deficit	2,314 mm
Months with less than 50 mm of rain	12
Global solar radiation	2,102 kWh/m²
Mean temperature	22.8 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Adrar (Adrar)

Touat and Gourara: Palm groves watered by foggaras and new centre-pivot cereals.

Indicator	Value
Annual rainfall, 1991-2020	16 mm
Reference evapotranspiration	2,889 mm
Annual water deficit	2,873 mm
Months with less than 50 mm of rain	12
Global solar radiation	2,308 kWh/m²
Mean temperature	25.7 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Tamanrasset (Tamanrasset)

Hoggar: Small irrigated gardens, date palm, market gardening and livestock, in a high-altitude desert climate.

Indicator	Value
Annual rainfall, 1991-2020	24 mm

Indicator	Value
Reference evapotranspiration	2,591 mm
Annual water deficit	2,567 mm
Months with less than 50 mm of rain	12
Global solar radiation	2,382 kWh/m²
Mean temperature	22.3 °C

Source: ERA5 via Open-Meteo (A9); PVGIS (A8); author's calculation.

Annex A. Sources and confidence levels

Ref.	Source	Level
A1	World Bank, World Development Indicators (WDI), Algeria	A
A2	FAOSTAT, crops and livestock (QCL), areas, production, 2014-2024	A
A3	FAOSTAT, value of production (QV), constant 2014-2016 I$, 2019-2024	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	ERA5 (Copernicus), via Open-Meteo: Rainfall, reference evapotranspiration, temperature, 1981-2024	B
A10	Natural Earth, first-level administrative boundaries and country outline	B
A11	FAO, "Irrigation in Africa in figures" (Water Report No. 14, 1997), Algeria profile: Irrigation potential (1992 data)	A
A12	Algerian customs tariff, subheading 3906.90.20.00 (other acrylic polymers in powder form), as listed by ConformePro from the Algerian Customs tariff; Algeria-European Union association agreement (free trade area for industrial products)	A
A13	Ministry of Agriculture, plant protection authority: Fertiliser registration (list of regulated activities, code 104.107); IANOR, technical committee CTN 31 "Fertilisers"	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 (10,292 Mm³, 2022) × agricultural share (67.43%) = 6,939.9 Mm³.

2. Irrigation. The equipped area (1,365,000 ha) and agricultural water are shared between irrigated groups (vegetables and melons, potato, date palm, maize, citrus, other fruit and other irrigated land) in proportion to their harvested areas (1,365,000 ha), without exceeding each group's harvested area. Our sources provide no irrigation statistics by crop. Other crops are treated as rainfed and receive no irrigation water in the calculation. The equipped area exceeds the harvested area of the selected irrigable crops: The difference forms an "other irrigated land" group (cereals, olive, fodder), with the generic assumption. Cereals and olive are otherwise treated as rainfed for the rest of their area.

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

4. Extra hectares. Water saved ÷ water per equipped hectare (5,084 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 ERA5 grid cell containing each city; radiation: PVGIS, 2005-2020. Temperature trends are linear regressions over 1981-2024. ERA5 is a reanalysis: Its rainfall can differ from local station records. On the maps, each broad area is shown as a point at its reference town: The current fifty-eight wilayas are not in Natural Earth.

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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A flower garden at Akbil (Aïn El Hammam), facing the Djurdjura.

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