TERRITORY DOSSIER

# Guadeloupe

Water, climate and crops: Study of the territory and its zones, potential benefits of our products, importing into the overseas departments

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*A sugar cane field near the Bologne rum distillery.*

# Foreword

This dossier describes Guadeloupe from the angle of water, climate and crops. It is written for the State and local authority services in charge of agriculture and water, chambers of agriculture, cooperatives and producer organisations. It answers three questions: Where and how does water serve agriculture, for which crops, and in which zones? It then examines what difference our products can make, and what is needed to import them.

**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 public database (INSEE, Ministry of Agriculture, French Biodiversity Agency, FAO, customs).
- **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; "ha" means hectares.
- A "scenario" is a calculation based on trials cited or a declared assumption. It is not a measurement made in Guadeloupe.

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# Summary

The points below summarise the dossier. The figures come from public sources: INSEE, the 2020 agricultural census, the national water withdrawals database, FAOSTAT, PVGIS and ERA5. The water savings are scenarios, described in Annex B.

| | | |
|---|---|---|
| **384 000**<br>Inhabitants on 1 January 2022 (INSEE) | **31,770 ha**<br>Of agricultural area in 2020 | **4,000 ha**<br>Irrigated in 2020, or 13% of the agricultural area |
| **12.2 Mm³**<br>Of irrigation water declared in 2023 | **12,430 ha**<br>Of sugar cane, the main crop by area | **1.22 Mm³**<br>Of irrigation water saved a year, central scenario |

**Key points**

• **Drinking water dominates withdrawals.** In 2023, irrigation represents 11.8% of the 103.8 Mm³ declared; drinking water represents 85%.

• **An agriculture of small farms.** 7,227 farms for 31,770 ha in 2020, or 4.4 ha on average; 97% are micro or small farms.

• **Two export crops.** Sugar cane (12,430 ha) and banana (2,100 ha) occupy 46% of the agricultural area.

• **Irrigation is a targeted supplement.** 4,000 irrigated ha, or 3,051 m³ declared per irrigated hectare a year.

• **A modest water-saving scenario, honestly counted.** 1.22 Mm³ a year in the central scenario, enough to irrigate about 400 more ha. No trial exists in a humid tropical climate: The dossier counts no yield gain.

• **French and European law apply.** Importing a fertilising product requires an ANSES authorisation or the CE marking of European regulation 2019/1009; VAT is 8.5%, and the octroi de mer may be added (Annex A).

## Key figures

### Key indicators for Guadeloupe

| Indicator | Value | Year | Source (level) |
|---|---|---|---|
| Population | 383,569 | 2022 | INSEE (A1) |
| Territory area | 163,350 ha | 2023 | FAOSTAT (A5) |
| Agricultural area | 31,770 ha | 2020 | Agreste (A2) |
| Farms | 7,227 | 2020 | Agreste (A2) |
| Irrigated area | 4,000 ha | 2020 | SDES (A3) |
| Area equipped for irrigation | 9,700 ha | 2024 | FAOSTAT (A5) |
| Declared irrigation water | 12.2 Mm³ | 2023 | Hub'Eau, BNPE (A4) |
| Declared drinking water | 87.9 Mm³ | 2023 | Hub'Eau, BNPE (A4) |

*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 Guadeloupe. 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.




*Spices at the Saint-Antoine market.*

# 2. Guadeloupe in figures

Guadeloupe is an archipelago of 1,630 km², made of two main islands, Grande-Terre and Basse-Terre, and the islands of La Désirade, Marie-Galante and Les Saintes (Agreste). It is a French overseas department: French and European law apply there. Guadeloupe had 383,569 inhabitants on 1 January 2022 (INSEE, A1); the population has fallen by 0.5% a year on average since 2016.

According to the 2020 agricultural census, the territory has 7,227 farms on 31,770 ha of agricultural area; 60% of farms keep animals, for 37,680 livestock units (A2). FAOSTAT counts 21,614 ha of cropland in 2024 and 9,700 ha equipped for irrigation (A5).

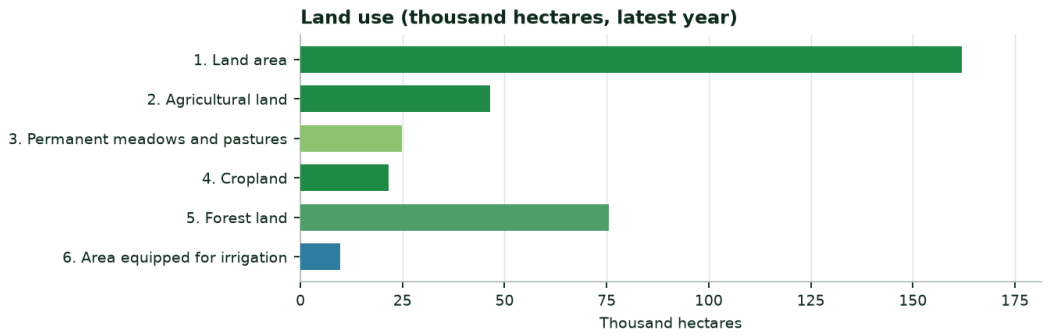



*Figure 1. Land use, latest year published. Source: FAOSTAT (A5)*



*A sugar cane field on Marie-Galante.*

# 3. Sunshine, rainfall and climate change

## 3.1 Sunshine

Global solar radiation reaches 1,938 to 2,076 kWh/m² a year depending on the zone. Energy is not the limiting factor: The distribution of rainfall determines the harvests.

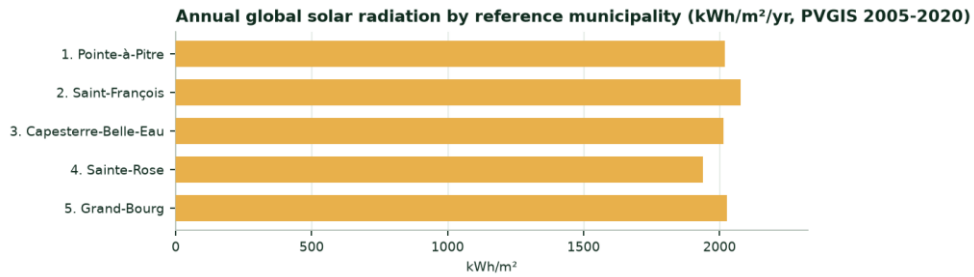



*Figure 2. Annual global solar radiation in each reference municipality. Source: PVGIS (A7)*

## 3.2 Rainfall and evapotranspiration

Annual rainfall is 1,296 mm at Saint-François, but 731 mm at Sainte-Rose, where reference evapotranspiration reaches 1,729 mm. The climate is tropical: A drier season and a wetter season, the latter with cyclone risk; the figures in the table show how rain is really spread over the year.

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

| Municipality | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pointe-à-Pitre | 60 | 43 | 40 | 57 | 79 | 77 | 98 | 116 | 135 | 143 | 123 | 76 |
| Saint-François | 70 | 47 | 46 | 73 | 99 | 101 | 132 | 151 | 160 | 170 | 150 | 98 |
| Capesterre-Belle-Eau | 70 | 53 | 50 | 63 | 88 | 88 | 124 | 132 | 147 | 149 | 137 | 87 |
| Sainte-Rose | 44 | 31 | 27 | 35 | 50 | 46 | 62 | 84 | 103 | 111 | 86 | 51 |
| Grand-Bourg | 61 | 40 | 38 | 62 | 85 | 89 | 125 | 137 | 147 | 154 | 142 | 87 |

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

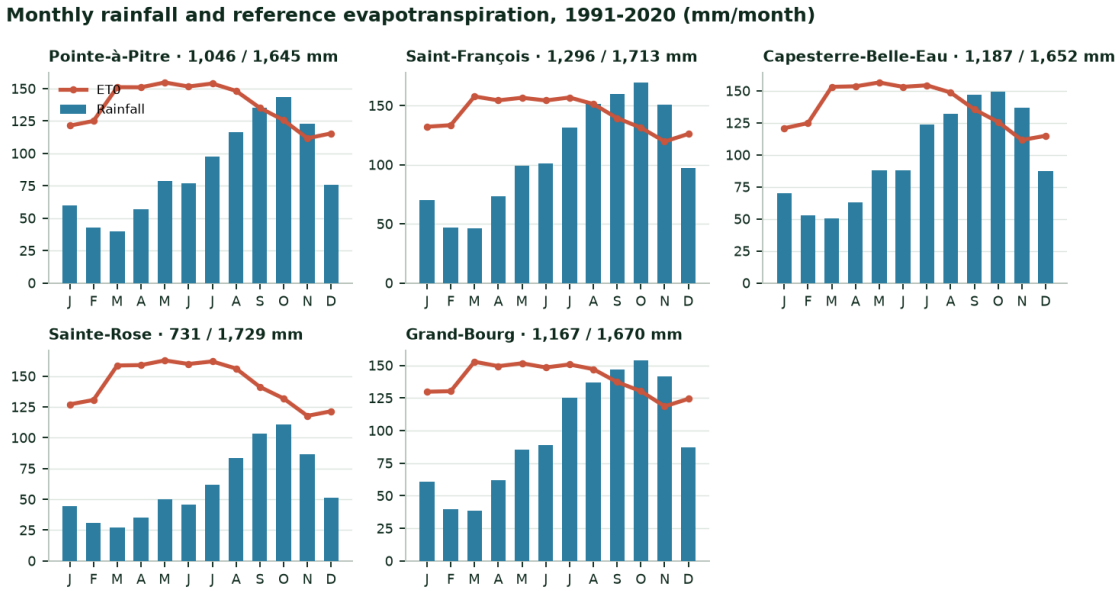



*Figure 3. Monthly rainfall and reference evapotranspiration by municipality, 1991-2020. Source: ERA5 via Open-Meteo (A8)*

## 3.3 Climate change

Over 1981-2024, the ERA5 trend is 0.26 °C per decade at Pointe-à-Pitre and -0.12 °C per decade at Capesterre-Belle-Eau: The two grid cells do not move in the same direction. An ERA5 cell covers a mix of sea and land: These series do not allow a conclusion at the scale of the territory, and the dossier draws no conclusion about warming.

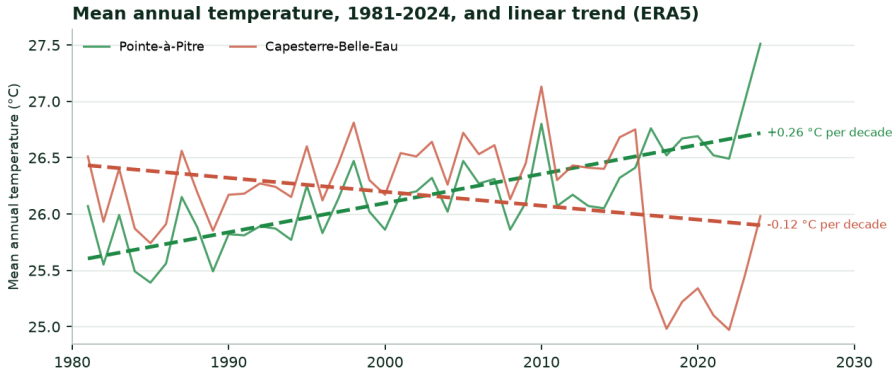



*Figure 4. Mean annual temperature, 1981-2024, and linear trend. Source: ERA5 (A8)*



*The Grand Étang, in the humid tropical forest at Capesterre.*

# 4. Water: Uses and irrigation

## 4.1 Declared withdrawals

The national quantitative water withdrawals database, kept by the French Biodiversity Agency, records declared volumes by use (A4). In 2023, it gives 103.8 Mm³ in total: 87.9 Mm³ of drinking water, 12.2 Mm³ of irrigation (11.8%) and 3.7 Mm³ for industry. Guadeloupe had 4,000 irrigated hectares in 2020, or 13% of its agricultural area (A3). The irrigation volume declared in the national withdrawals database covers only declared withdrawals: It may be lower than actual use (A4).

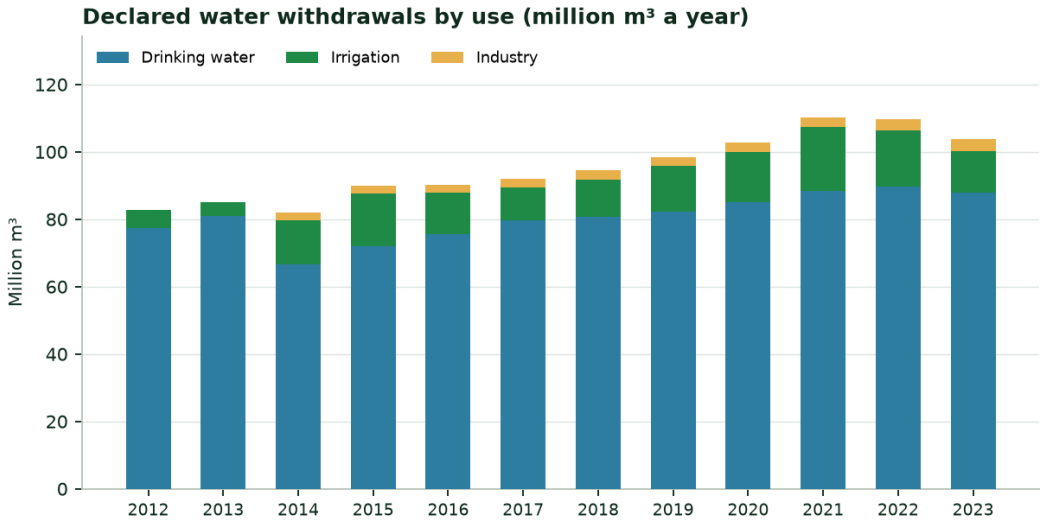



*Figure 5. Declared water withdrawals by use. Source: Hub'Eau, BNPE (A4)*

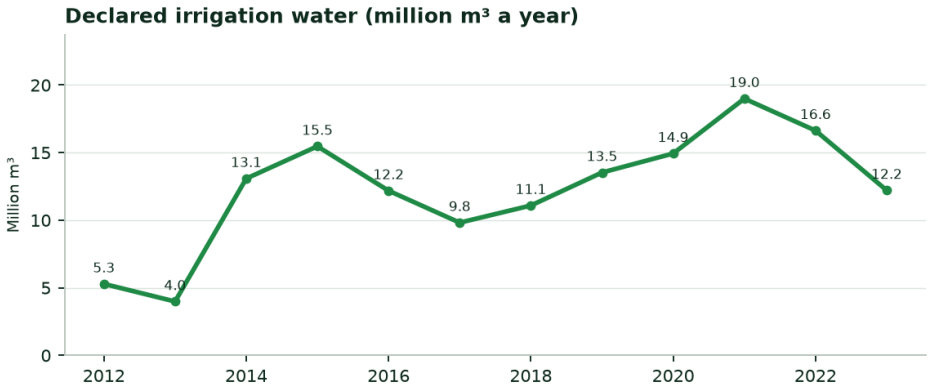



*Figure 6. Declared irrigation water. Source: Hub'Eau, BNPE (A4)*

## 4.2 Irrigated areas

The agricultural census counts 4,000 irrigated ha in 2020 (A3), while FAOSTAT gives 9,700 ha equipped for irrigation (A5): An equipped area is not always irrigated. Relative to the irrigated area, the declared volume is 3,051 m³ per hectare a year. The dossier uses the irrigated area.



*The Écrevisses waterfall, in Guadeloupe National Park.*

# 5. Crops and sectors

Agriculture is dominated by two export crops, sugar cane (12,430 ha, 2,982 farms growing cane for industry) and banana (2,100 ha). They occupy 38% of the agricultural area and receive nearly 90% of public aid, according to the chamber of agriculture (A2, A12).

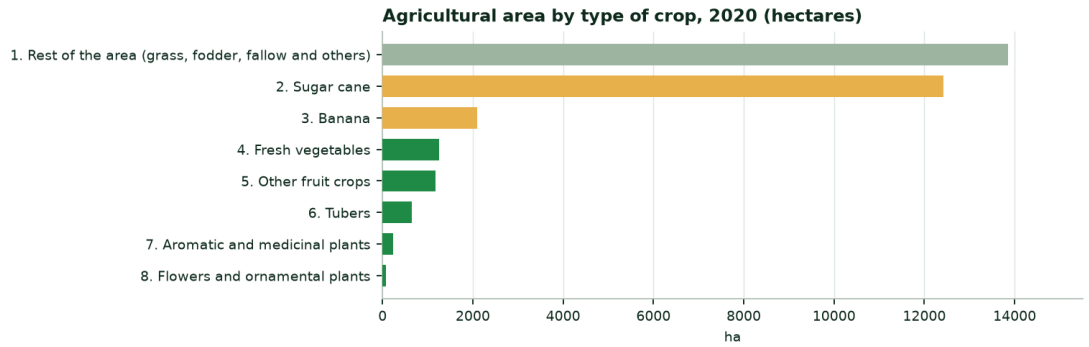



*Figure 7. Agricultural area by type of crop, 2020. Source: Agreste, 2020 agricultural census (A2)*

Livestock matters too: 60% of farms keep animals, mostly cattle, for 37,680 livestock units (A2). The 2020 census figures are provisional and the areas by crop count the farms that declare them.



*A banana plantation after hurricane Maria.*

# 6. Fertilisers and regulatory framework

## 6.1 Data available

FAOSTAT publishes mineral fertiliser series for the territory, but they are zero or repeated from one year to the next: They do not measure actual use, so the dossier counts neither the quantity of fertiliser nor the spending. This data is missing; it could come from cooperatives and chambers of agriculture (A6).

## 6.2 Regulatory framework

French and European law apply. To place a fertilising material, an adjuvant or a growing medium on the market in France, a file is submitted to ANSES, which issues the marketing authorisation after assessment (article L. 255-7 of the rural and maritime fishing code); European regulation 2019/1009 also defines the fertilisers that carry the CE marking (A11). ECOFERT® is EU Bio certified: It falls under organic farming (A20).



*The leeward coast at the Porte d'Enfer, in Grande-Terre.*

# 7. A study of each zone

The table compares five reference zones of the archipelago, each represented by one municipality. Climate figures are 1991-2020 averages, except radiation (2005-2020).

**Climate of the reference municipalities, 1991-2020 means**

| Zone (municipality) | Rainfall (mm/yr) | ET0 (mm/yr) | Months with ET0 > rain | Radiation (kWh/m²/yr) | Temperature (°C) |
|---|---|---|---|---|---|
| Southern Grande-Terre (Pointe-à-Pitre) | 1,046 | 1,645 | 10 | 2,020 | 26.2 |
| Eastern Grande-Terre (Saint-François) | 1,296 | 1,713 | 9 | 2,076 | 26.2 |
| Eastern Basse-Terre (banana) (Capesterre-Belle-Eau) | 1,187 | 1,652 | 9 | 2,014 | 26.3 |
| Northern Basse-Terre (sugar cane) (Sainte-Rose) | 731 | 1,729 | 12 | 1,938 | 26.5 |
| Marie-Galante (Grand-Bourg) | 1,167 | 1,670 | 9 | 2,026 | 26.1 |

*Source: ERA5 via Open-Meteo (A8); PVGIS (A7); author's calculation. ERA5 has a grid of several kilometres: It does not capture rainfall differences due to relief (Annex B).*

## Southern Grande-Terre (Pointe-à-Pitre)

Grande-Terre: Dry plains dominated by low hills, with farms focused on sugar cane and cattle (Agreste).

## Eastern Grande-Terre (Saint-François)

Eastern Grande-Terre: The municipality stands out, with 31% of its agricultural area held by farms specialised in vegetable growing (Agreste).

## Eastern Basse-Terre (banana) (Capesterre-Belle-Eau)

South and east of Basse-Terre: The south holds more than half of the Guadeloupe farms specialised in fruit, mainly export banana (Agreste).

## Northern Basse-Terre (sugar cane) (Sainte-Rose)

Northern Basse-Terre: Sugar cane fields shape the landscape of the northern municipalities (Agreste).

## Marie-Galante (Grand-Bourg)

Marie-Galante: 1,470 farms, half of them specialised in sugar cane, which occupy 50% of the agricultural area (Agreste).



*The water wheel of the Domaine Séverin distillery, Sainte-Rose.*

# 8. Water savings: Scenarios

## 8.1 Method

**Method in brief**

• **Agricultural water.** The irrigation volume declared in 2023 (12.2 Mm³) is shared between the irrigated crop groups (banana, fresh vegetables, other fruit crops and tubers), in proportion to their areas in the 2020 agricultural census.

• **Effect adopted.** No trial of our products exists in a humid tropical climate: The calculation applies the generic assumption of 5, 10 and 20% of water saved (cautious, central, high), with no yield gain.

• **Extra hectares.** Water saved divided by the water declared per irrigated hectare.

## 8.2 Results

**Irrigated area assigned and water saved (central scenario)**

| Crop group | Census area (ha) | Irrigated area assigned (ha) | Share of water | Water saved (Mm³/yr) |
|---|---|---|---|---|
| Banana | 2,100 | 1,622 | 40.5% | 0.495 |
| Fresh vegetables | 1,260 | 973 | 24.3% | 0.297 |
| Other fruit crops | 1,170 | 903 | 22.6% | 0.276 |
| Tubers | 650 | 502 | 12.5% | 0.153 |

*Source: Author's calculation (Annex B).*

### Water saved and extra irrigable hectares, by scenario

| Scenario | Water saved (Mm³/yr) | Extra irrigable hectares | Share of irrigation water |
|---|---|---|---|
| Cautious | 0.61 | 200 | 5% |
| Central | 1.22 | 400 | 10% |
| High | 2.44 | 800 | 20% |

*Source: Author's calculation (Annex B).*

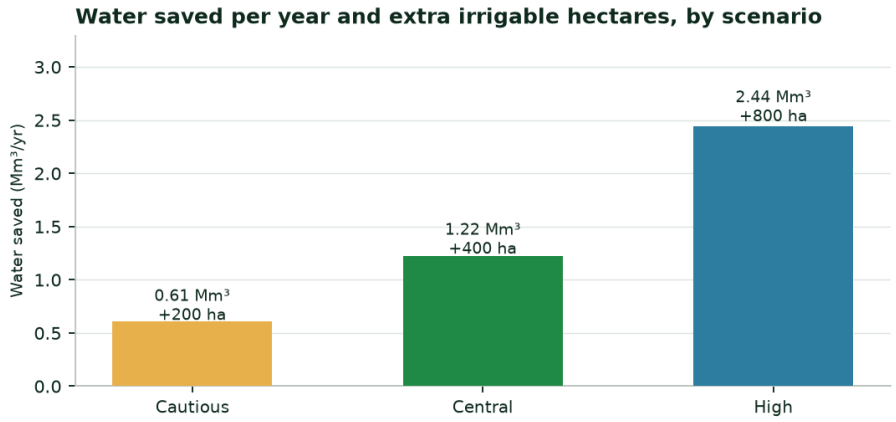



*Figure 8. Water saved per year and extra irrigable hectares. Source: Author's calculation*

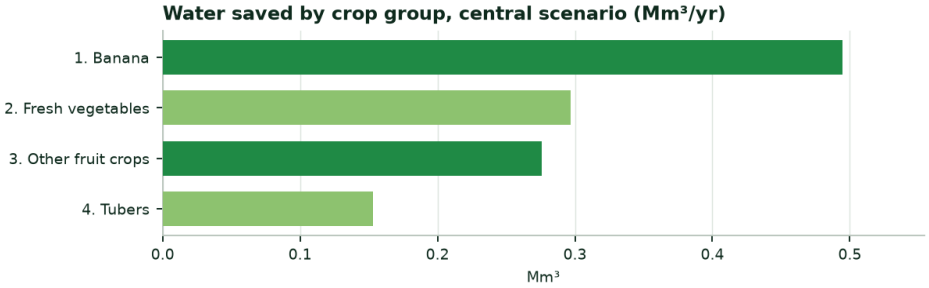



*Figure 9. Water saved by crop group, central scenario. Source: Author's calculation*

### Annual value of the water saved, by price assumed (million dollars)

| Scenario | 0.10 $/m³ | 0.22 $/m³ | 0.45 $/m³ |
|---|---|---|---|
| Cautious | 0.06 | 0.13 | 0.27 |
| Central | 0.12 | 0.27 | 0.55 |
| High | 0.24 | 0.54 | 1.10 |

*Source: Author's calculation; prices assumed, no local tariff.*

### Key points

• Irrigation weighs little in the declared water (11.8%): The agricultural water gain is a little over one million cubic metres a year, not tens of millions.

• The interest is local: Where irrigation falls short in the drier season, a few more centimetres of water stored in the soil delay the next irrigation.

• A local trial, on banana or vegetables, is the only way to replace the assumption with a measurement.

# 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 A17 (B, C) | Trials outside the humid tropics; none in Guadeloupe |
| Yield | Maize +17.1%; potato +31.4%; watermelon +30%; date palm +20%; soybean +11.2 to +11.4% | A13 to A17 (B, C) | No trial on banana, cane or tropical vegetables |
| Organic farming (ECOFERT®) | Certified by SOHISCERT and EU Bio | A20 (A) | Valid for the certified product |
| Safety: Acrylamide (ECOSORB®) | Below 3.0 µg/g | A18 (B) | One laboratory, one date |
| REACH compliance (EVERGREEN®) | ≤ 0.1% of substances of very high concern in 233 substances tested | A19 (B) | Screening, not an approval |
| Agroforestry (Paulownia ALTIFOLIA®) | 13 to 15 m in 6 to 8 years (website) | A21 (C) | No trial in Guadeloupe |

*Source: Annex A.*

# 10. Importing water-retention polymers into the overseas departments

**What to know**

• **Customs duty:** A product from the European Union is not subject to customs duty; a product from a third country comes under the Union's common customs tariff, whose rate for subheading 3906.90 is to be checked in the TARIC database. This rate was not confirmed in the sources consulted.

• **VAT:** 8.5% at the standard rate and 2.1% at the reduced rate in the overseas departments, against 20% in mainland France (A9).

• **Octroi de mer:** A local tax on goods entering the territory, including from mainland France; rates are voted by the local authority and vary by product, with a cap of 60% (A10, level C). To be checked product by product with customs.

• **Registration:** Marketing authorisation from ANSES, or CE marking under European regulation 2019/1009 (A11). No text specific to water-retaining polymers was found: The classification of a water-retaining polymer is to be confirmed with ANSES.

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

# Annex A. Sources and confidence levels

| Ref. | Source | Level |
|---|---|---|
| A1 | INSEE, legal populations 2022: Guadeloupe 383,569 inhabitants, Martinique 361,019 inhabitants on 1 January 2022 | A |
| A2 | Agreste, Primeur no. 4, February 2022, "Overseas departments: Number of farms and agricultural area", 2020 agricultural census (provisional results), tables 1 and 3 | A |

| Ref. | Source | Level |
|---|---|---|
| A3 | SDES, "Irrigation of agricultural land: Change between 2010 and 2020", Datalab Essentiel, February 2024, box on irrigation in the overseas regions | A |
| A4 | French Biodiversity Agency, national quantitative water withdrawals database (BNPE), via the Hub'Eau Withdrawals API, department 971, 2012-2023 | A |
| A5 | FAOSTAT, land use: Territory area, cropland, area equipped for irrigation | A |
| A6 | FAOSTAT, mineral fertilisers by nutrient (zero or repeated series for the territory) | A |
| A7 | PVGIS (European Commission Joint Research Centre), radiation, 2005-2020 | B |
| A8 | ERA5 (Copernicus), via Open-Meteo: Rainfall, reference evapotranspiration, temperature, 1981-2024 | B |
| A9 | French customs, "VAT in the overseas departments" sheet: Standard rate 8.5% and reduced rate 2.1% | A |
| A10 | Calcunet, "Octroi de mer rates 2026": Cap of 60%, rates voted by the local authority | C |
| A11 | Ministry of the Economy, "Fertilising materials and growing media": ANSES authorisation and regulation (EU) 2019/1009 | A |
| A12 | Chamber of agriculture, key figures of agriculture (website) | C |
| A13 | Soybean trial, China (yield), manufacturer's website | C |
| A14 | Date palm trial, UAE (ICBA, 2021), manufacturer's website | B |
| A15 | Watermelon trial, Mexico (2023), manufacturer's website | C |
| A16 | Potato trial, South Africa (2025), manufacturer's website | C |
| A17 | Maize trial, Türkiye (TIGEM, Konya, 2025), manufacturer's website | B |
| A18 | ECOSORB® acrylamide analysis (Polymex laboratory, 2024) | B |
| A19 | EVERGREEN® REACH / SVHC screening (SGS, 2023) | B |
| A20 | ECOFERT® certificate (SOHISCERT, EU Bio) | A |
| A21 | Paulownia ALTIFOLIA® sheet figures (website) | C |

# Annex B. Calculation method

**1. Agricultural water.** Irrigation volume declared in the BNPE in 2023: 12.20 Mm³, out of 103.8 Mm³ declared in total (11.8%). Only declared withdrawals are counted: The real volume may be higher.

**2. Irrigated area.** 4,000 ha in the 2020 agricultural census (A3), shared between the irrigated groups (banana, fresh vegetables, other fruit crops and tubers) in proportion to their census areas (5,180 ha), without exceeding each group's area. Our sources provide no irrigation statistics by crop. Sugar cane is treated as a rainfed crop: It receives no irrigation water in the calculation, because irrigation in Guadeloupe is concentrated on vegetables, banana and fruit. No trial of our products exists in a humid tropical climate: The calculation is limited to water, with the generic assumption.

**3. Scenarios.** Water saved = group water × generic assumption: 5% (cautious), 10% (central), 20% (high). No yield gain is counted.

**4. Extra hectares.** Water saved ÷ water declared per irrigated hectare (3,051 m³/ha).

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

**6. Crops.** The agricultural census gives no yield by crop: No yield or production by crop is calculated. The group "other fruit crops" is the difference between fruit crops and banana. FAOSTAT publishes no crop statistics for the territory after 2006, and its fertiliser series are zero or repeated: They are not used.

**7. Climate.** Rainfall, reference evapotranspiration (FAO-56) and temperature: 1991-2020 means of the ERA5 grid cell containing each municipality; radiation: PVGIS, 2005-2020. An ERA5 cell covers several kilometres: It does not capture the heavy orographic rainfall of the volcanoes. Temperature trends are linear regressions over 1981-2024.

# Annex C. Photo credits

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*Panorama over the forest and the Petit Cul-de-sac Marin.*

# Green Solutions

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