TERRITORY DOSSIER

Martinique

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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Sugar cane harvest near the Saint-James distillery.

Foreword

This dossier describes Martinique 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 Martinique.

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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.

361 000
Inhabitants on 1 January 2022 (INSEE)

21,860 ha
Of agricultural area in 2020

4,400 ha
Irrigated in 2020, or 20% of the agricultural area

13.9 Mm³
Of irrigation water declared in 2023

5,580 ha
Of banana, the main crop by area

1.39 Mm³
Of irrigation water saved a year, central scenario

Key points

• **Drinking water dominates withdrawals.** In 2023, irrigation represents 22.9% of the 60.8 Mm³ declared; drinking water represents 74%.

• **An agriculture of small farms.** 2,658 farms for 21,860 ha in 2020, or 8.2 ha on average; 88% are micro or small farms.

• **Two export crops.** Sugar cane (4,030 ha) and banana (5,580 ha) occupy 44% of the agricultural area.

• **Irrigation is a targeted supplement.** 4,400 irrigated ha, or 3,170 m³ declared per irrigated hectare a year.

• **A modest water-saving scenario, honestly counted.** 1.39 Mm³ a year in the central scenario, enough to irrigate about 440 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 Martinique

Indicator	Value	Year	Source (level)
Population	361,019	2022	INSEE (A1)
Territory area	108,743 ha	2023	FAOSTAT (A5)
Agricultural area	21,860 ha	2020	Agreste (A2)
Farms	2,658	2020	Agreste (A2)
Irrigated area	4,400 ha	2020	SDES (A3)
Area equipped for irrigation	5,960 ha	2024	FAOSTAT (A5)
Declared irrigation water	13.9 Mm³	2023	Hub'Eau, BNPE (A4)
Declared drinking water	44.9 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 Martinique. 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.



A bunch of green bananas in Martinique.

2. Martinique in figures

Martinique is an island of 1,100 km² in the centre of the Lesser Antilles. More than 60,000 hectares of natural areas and a humid tropical climate favour rich vegetation (Agreste). It is a French overseas department: French and European law apply there. Martinique had 361,019 inhabitants on 1 January 2022 (INSEE, A1); the population has fallen by 15,500 since 2016, or 0.7% a year on average.

According to the 2020 agricultural census, the territory has 2,658 farms on 21,860 ha of agricultural area; 55% of farms keep animals, for 23,140 livestock units (A2). FAOSTAT counts 16,934 ha of cropland in 2024 and 5,960 ha equipped for irrigation (A5).

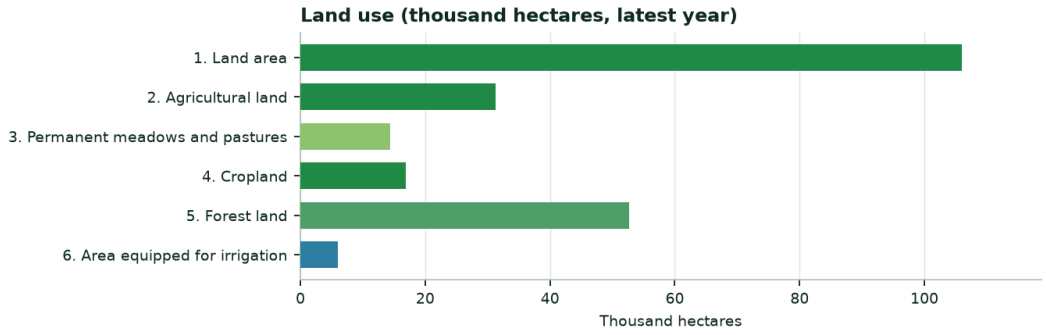


Figure 1. Land use, latest year published. Source: FAOSTAT (A5)



A sugar cane field.

3. Sunshine, rainfall and climate change

3.1 Sunshine

Global solar radiation reaches 1,936 to 2,062 kWh/m² a year depending on the zone. Energy is not the limiting factor: The distribution of rainfall determines the harvests.

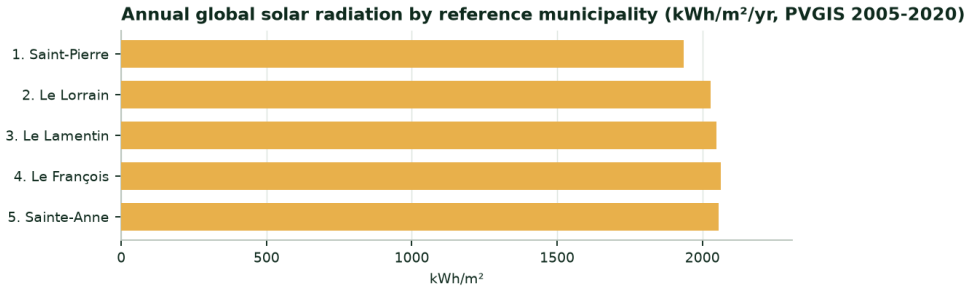


Figure 2. Annual global solar radiation in each reference municipality. Source: PVGIS (A7)

3.2 Rainfall and evapotranspiration

Annual rainfall is 1,174 mm at Le Lorrain, but 952 mm at Saint-Pierre, where reference evapotranspiration reaches 1,711 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
Saint-Pierre	50	36	36	44	60	72	99	112	126	135	119	61
Le Lorrain	65	48	54	58	79	93	120	135	141	161	143	77
Le Lamentin	51	37	39	48	63	77	106	117	131	141	124	65
Le François	54	38	43	51	69	82	111	126	138	151	133	68
Sainte-Anne	46	28	31	42	63	86	119	139	142	156	134	59

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

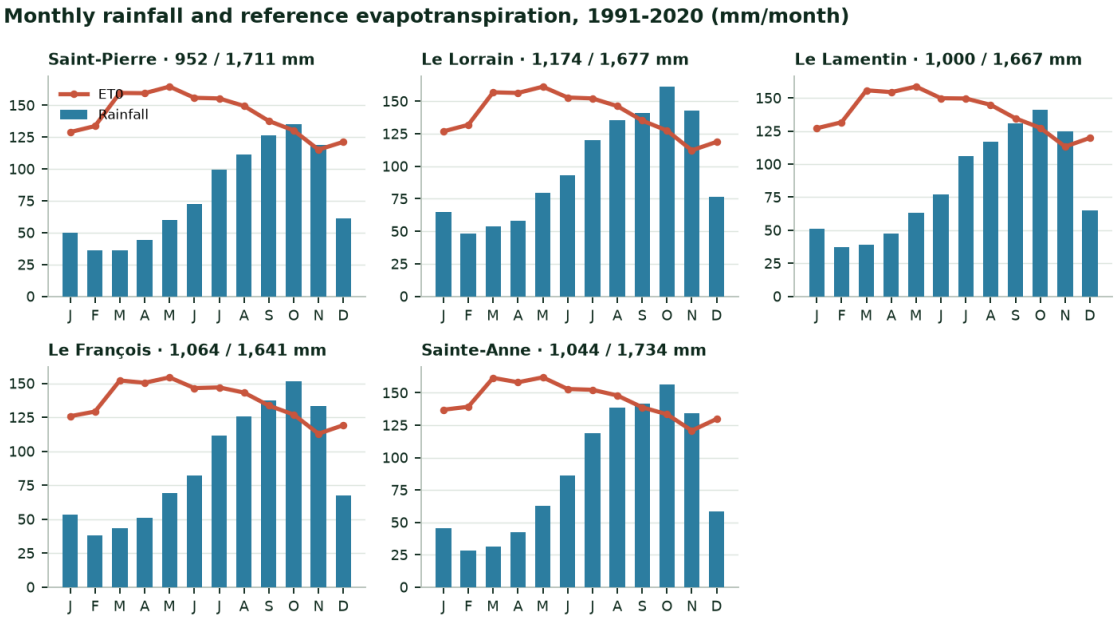


Figure 3. Monthly rainfall and reference evapotranspiration by municipality, 1991-2020. Source: ERA5 via Open-Meteo (A8)

3.3 Climate change

Mean annual temperature is rising. At Fort-de-France it went from 26.0 °C in 1981 to 26.9 °C in 2024, or 0.15 °C per decade; at Sainte-Anne the trend is 0.20 °C per decade, from 26.1 °C to 27.4 °C. Warmer air dries the soil faster between rainfall events.

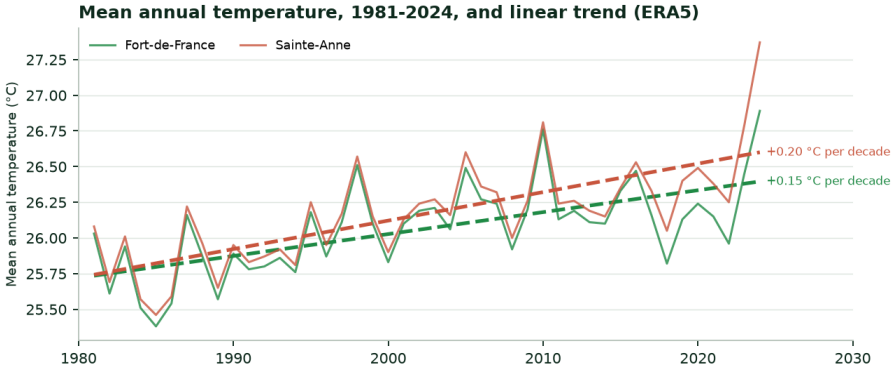


Figure 4. Mean annual temperature, 1981-2024, and linear trend. Source: ERA5 (A8)



The caldera of Mount Pelée.

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 60.8 Mm³ in total: 44.9 Mm³ of drinking water, 13.9 Mm³ of irrigation (22.9%) and 1.9 Mm³ for industry. Martinique had 4,400 irrigated hectares in 2020, or 20% of its agricultural area (A3). Export banana is, with cane and vegetables, one of the three crops that make up more than 70% of the irrigated area of the overseas departments, and most of the banana is in Martinique (A3). The irrigation volume declared covers only declared withdrawals (A4).

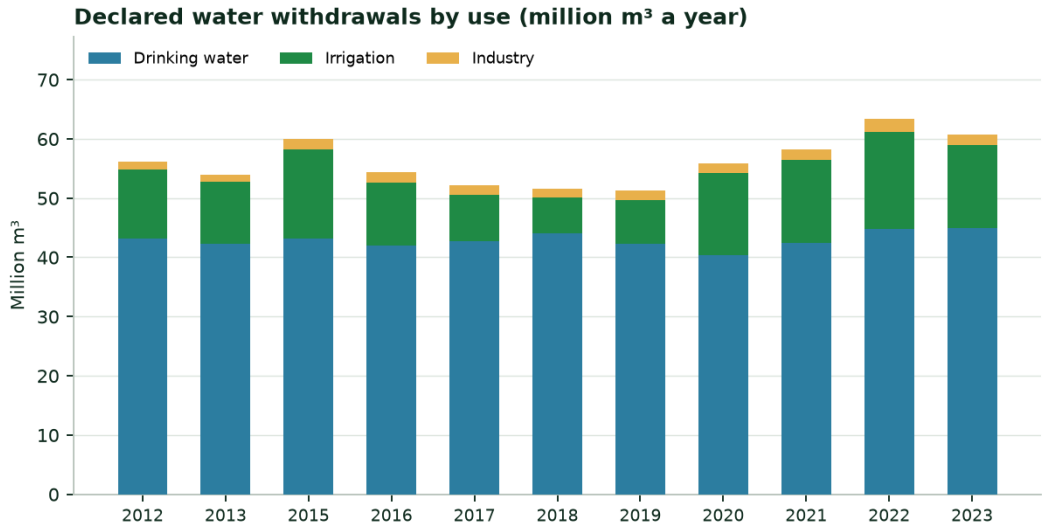


Figure 5. Declared water withdrawals by use. Source: Hub'Eau, BNPE (A4)

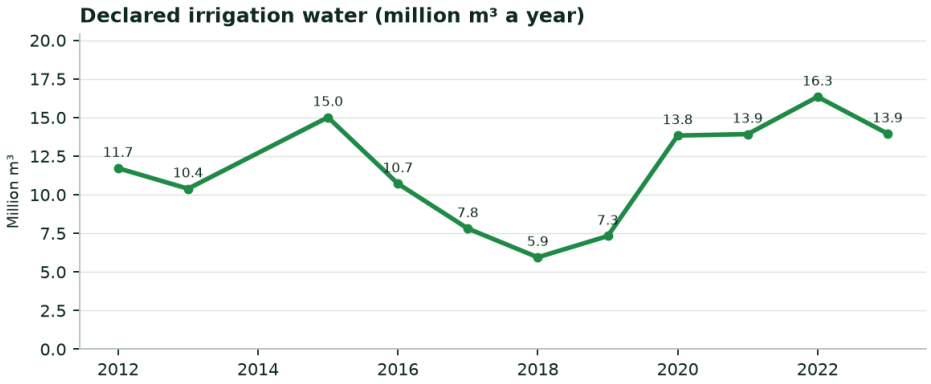


Figure 6. Declared irrigation water. Source: Hub'Eau, BNPE (A4)

4.2 Irrigated areas

The agricultural census counts 4,400 irrigated ha in 2020 (A3), while FAOSTAT gives 5,960 ha equipped for irrigation (A5): An equipped area is not always irrigated. Relative to the irrigated area, the declared volume is 3,170 m³ per hectare a year. The dossier uses the irrigated area.



The Didier waterfall.

5. Crops and sectors

Banana (5,000 ha according to Agreste, 5,580 ha in the census) and sugar cane (4,000 ha) are the two main crops. With 132,200 tonnes produced in 2021, Martinique is the leading overseas department for dessert banana; in ten years the banana area fell by 13% and production by almost 30% (A2).

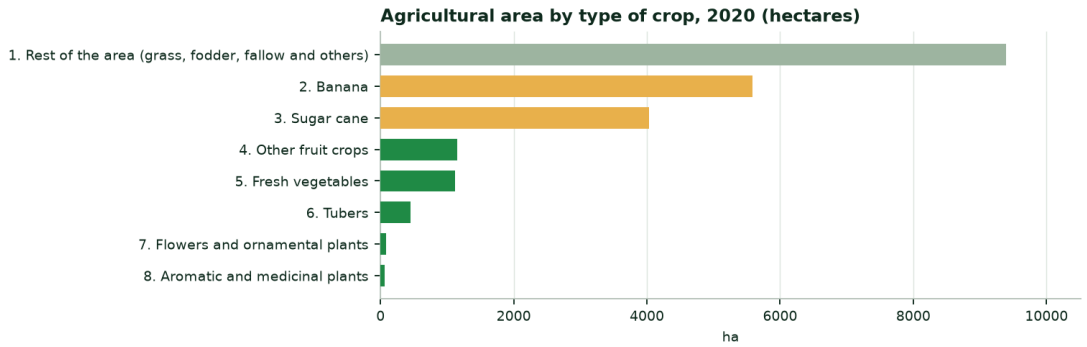


Figure 7. Agricultural area by type of crop, 2020. Source: Agreste, 2020 agricultural census (A2)

Livestock matters too: 55% of farms keep animals, mostly cattle, for 23,140 livestock units (A2). The 2020 census figures are provisional and the areas by crop count the farms that declare them.



A banana tree in Martinique.

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).



Cacti before the Morne des Pétrifications, southern savanna.

7. A study of each zone

The table compares five reference zones of the island, 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)
Northern Caribbean coast (Saint-Pierre)	952	1,711	10	1,936	26.6
Northern Atlantic coast (banana) (Le Lorrain)	1,174	1,677	9	2,027	26.3
Centre (Lamentin plain) (Le Lamentin)	1,000	1,667	10	2,048	26.5
Central Atlantic coast (Le François)	1,064	1,641	9	2,062	26.3
Dry south (Sainte-Anne)	1,044	1,734	9	2,055	26.2

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).

Northern Caribbean coast (Saint-Pierre)

North, flanks of Mount Pelée: Vegetable growing and fruit trees, often in "Creole gardens" combining yam, dasheen, sweet potato, chayote, chilli, plantain and papaya (Agreste).

Northern Atlantic coast (banana) (Le Lorrain)

Northern Atlantic coast: A trade-wind-facing slope, where banana and food crops occupy the slopes and valley floors.

Centre (Lamentin plain) (Le Lamentin)

Plains of the centre: Better suited to mechanisation, they carry the island's two main crops, banana and sugar cane (Agreste).

Central Atlantic coast (Le François)

Foothills near the Atlantic coast: Banana and sugar cane, with agricultural rum distilleries, such as Simon (Agreste).

Dry south (Sainte-Anne)

South: The island's large savannas, drier and less favourable to unirrigated crops, are home to ruminant farming, including Brahman cattle (Agreste).



The former distillery of the Habitation Clément.

8. Water savings: Scenarios

8.1 Method

Method in brief

• **Agricultural water.** The irrigation volume declared in 2023 (13.9 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	5,580	2,958	67.2%	0.938
Fresh vegetables	1,120	594	13.5%	0.188
Other fruit crops	1,150	610	13.9%	0.193

Crop group	Census area (ha)	Irrigated area assigned (ha)	Share of water	Water saved (Mm³/yr)
Tubers	450	239	5.4%	0.076

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	0.70	220	5%
Central	1.39	440	10%
High	2.79	880	20%

Source: Author's calculation (Annex B).

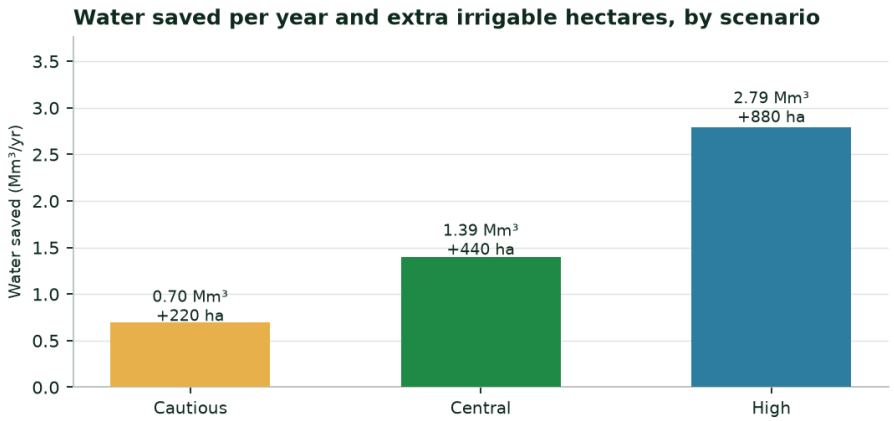


Figure 8. Water saved per year and extra irrigable hectares. Source: Author's calculation

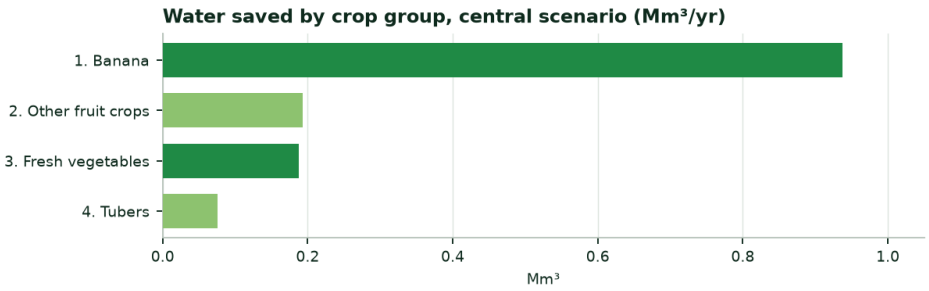


Figure 9. Water saved by crop group, central scenario. Source: Author's calculation

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

Scenario	0.10 $/m³	0.22 $/m³	0.45 $/m³
Cautious	0.07	0.15	0.31
Central	0.14	0.31	0.63
High	0.28	0.61	1.26

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

Key points

• Irrigation weighs little in the declared water (22.9%): 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 Martinique
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 Martinique

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 972, 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: 13.95 Mm³, out of 60.8 Mm³ declared in total (22.9%). Only declared withdrawals are counted: The real volume may be higher.

2. Irrigated area. 4,400 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 (8,300 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 Martinique is concentrated on banana, vegetables 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 (3,170 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. For Saint-Pierre, the PVGIS point is shifted a few hundred metres inland (14.75° N; 61.17° W), because the exact point is over the sea for this model.

Annex C. Photo credits

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Diamant beach and Diamond Rock.

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