

DEMONSTRATION ON COTTON MİSTİKOĞLU TARIM - HATAY REGION



EXECUTIVE SUMMARY

The Green Solutions® demonstration conducted on cotton cultivation in the Hatay region represents one of the most remarkable results achieved to date by Green Solutions Technologies. Conducted in an area suffering from chronic water stress, extreme heat, and a severely degraded irrigation system, the experiment demonstrated an exceptional agronomic yield increase of **+93%** compared to the control area. The objective of this demonstration was to assess Green Solutions® ability to reduce the effects of water stress and improve agronomic and economic performance under limited or irregular irrigation conditions. The product was precisely applied below the root zone using Green Solutions® injection tools, ensuring uniform distribution and optimal product activation.

The results observed during the 2025 season are particularly significant:

- Cotton treated with Green Solutions® maintained higher growth and biomass under water stress.
- Yield increased from **2.53 t/ha** (control) to **4.88 t/ha** (Green Solutions®).
- Gross income rose from USD **1,710/ha** to **USD 3,300/ha**, representing a net gain of **+USD 1,590/ha**.

After factoring in the product and application costs, the net economic benefit remains strongly positive, at +USD 1,181/ha.

This demonstration confirms that Green Solutions® is a true game changer for Turkish agriculture, as the increase in Water Productivity (WP) was once again verified to exceed 90%.

This result proves that it is technically possible to double agricultural production across the more than 75% of non-irrigated farmland in the country under a moderate average water stress of about 50%.

Already established locally through its subsidiary Tarım Teknolojileri A.Ş, the company now has the operational structure required to rapidly deploy its technology throughout Türkiye, sustainably transforming the national agricultural landscape and strengthening the sector's contribution to the country's GDP.

PRESENTATION

Teknik Tarım On 11 February 2025, representatives from 'Green Solutions®' travelled to Izmir to meet with the management of 'Teknik Tarım'. Teknik Tarım is a major agricultural cooperative in Turkey, specialising in maize production in partnership with several European and American companies, including PepsiCo, which plays a leading role in the Turkish agricultural sector. For example, Lay's crisps produced by PepsiCo are manufactured locally using potatoes grown in Turkey. During this meeting, the PepsiCo representative in Turkey was contacted directly to seek authorisation to use the Evergreen® solution on certain crops. Interested in the initiative, he asked to be kept informed of the results, adding that, if successful, the Evergreen® solution could also be rolled out in other regions where the group operates. This interaction highlights the strategic importance and wide-reaching scope of cooperation between key players in the agricultural sector. Teknik Tarım's network extends across the country, with partnerships in several regions. It was decided to conduct a demonstration on cotton cultivation at the Mistikoğlu Tarım farm, located in the Hatay region.

Mistikoğlu Tarım

Mr Bülent Mistikoğlu, owner and manager of the farm that bears his name and chief agronomist at Teknik Tarım, welcomed us to his estate on Thursday 13 February 2025 to prepare for the demonstration of Evergreen® for cotton cultivation.

The Evergreen® demonstration for cotton cultivation took place against a backdrop of particularly critical water conditions in the Hatay region, located in southern Turkey.

This region, once supplied by the Asi River and the Reyhanlı and Dostluk dams, has been facing an unprecedented water shortage for several years.

The irrigation infrastructure, already weakened by the 2023 earthquake, no longer guarantees a regular water supply, forcing farmers to dig trenches by hand in clay soils to irrigate their crops.

In this region, irrigation is carried out by successive flooding via open channels, generally at a rate of five to six irrigations per season for cotton, and seven to eight for maize. In neighbouring, less favoured areas,

only a single irrigation per season is possible due to the lack of regular access to water.

According to Mr Mistikoğlu, several farms located about an hour's drive from his estate are currently in a critical situation, deprived of direct access to the river and therefore heavily dependent on rainfall.

As a result, crop yields vary considerably.

Due to irregular and approximate irrigation, caused by infrastructure limitations and the flood irrigation method, yields generally fluctuate between 550 and 600 kilograms per dönüm (1,000 m²). The theoretical maximum yield could reach 800 kilograms per dönüm, whereas in farms most exposed to water stress, yields can drop to 200–250 kilograms per dönüm. Irrigation decisions are made empirically, based on visual observation of the foliage to detect signs of water stress.



The objective of the Evergreen® demonstration was to measure its impact on chronic water stress and to verify its ability to improve the agronomic and economic yields of cotton grown under water-stress conditions.

The protocol included the installation of soil moisture and temperature sensors, designed to monitor the frequency and intensity of water stress and to evaluate their influence on the yields observed.

Implementation of the demonstration

Three site visits were required for Green Solutions' technicians to adapt the tool and specific protocol to enable the application of Evergreen® in the pre-formed ridges prepared for cotton sowing.

The work involved in this demonstration was considerable, as both the profile and the injection process had to be modified to adapt to the very clayey soil, which adhered strongly to the components entering the ground, thereby complicating field operations.

Nevertheless, on 25 April, several plots were treated, and the details of the operations were recorded in an initial report submitted on 17 May to the various stakeholders.

In total, 50 kg of Evergreen® was injected at optimal depths per linear metre, according to several application configurations:

Control rows before the start of application,

- 12 rows at 58 kg/ha,
- 6 rows at 48 kg/ha,
- 6 control rows,
- 12 rows at 62 kg/ha,
- 12 rows at 55 kg/ha,



making a total of 42 rows of 180 linear metres each, with control areas placed between the treated rows.

The design of the operational plan is presented in **Appendix EK3**.

CHRONOLOGICAL PROGRESS

General Overview

Communication with local stakeholders proved challenging, even though it was maintained through a WhatsApp group.

Language barriers and local constraints, such as issues related to irrigation water access, made it difficult to ensure close and systematic monitoring of the experiment, as was previously achieved at the TİGEM facilities.

Nevertheless, two notable updates were recorded during the period:

- **Photographs of the test plots** taken by Mr. Mistikoğlu on June 24, showing that the Raincatcher® plots had already promoted better agronomic development of the cotton

Photographs of the test plots taken by Mr. Mistikoğlu on June 24, showing that the Raincatcher® plots had already promoted better agronomic development of the cotton crops.

- **A site visit by Mr. Muhammet Bilal Okcu**, General Manager of Raincatcher Tarım Teknolojileri Anonim Şirketi, on August 13, to perform agronomic observations and attempt to reactivate the malfunctioning sensors.

Sensor Analysis

Several technical issues occurred with the sensors during the demonstration period. Communication losses with the router prevented the real-time transmission of soil moisture and temperature data.

In addition, inconsistent relative humidity readings were observed several times, likely due to the high clay content of the soil, whose low porosity interferes with the accuracy of certain measurements.

However, since the sensors stored all data internally, it was possible to retrieve the readings at the end of the cycle via Bluetooth technology, allowing for post-cycle data recovery and the preparation of **Annex EK1**.

Results from 24 June: Photographs by Mr Mistikoğlu

Visually, a noticeable difference was observed in the development of the cotton across the different plots.

From an agronomic perspective, the photograph taken five weeks after sowing indicates that the crop in the control area had already experienced water stress and had therefore likely suffered stress during the early vegetative stage (before the emergence of the first true leaf).

This suggests that higher yields can be expected under the influence of Evergreen®, as this early stage is crucial in determining the future yield potential of the cotton crop.



Results from 13 August: Visit by Mr Okcu

The areas observed included three control plots and several plots treated with Evergreen® (48, 55, 58, and 62 kg).

Measurements showed a notable difference depending on the distance from the irrigation canals (see table below, comparing the control and the 55 kg dose): plants treated with Evergreen® maintained visibly stronger growth under water stress:

DISTANCE FROM THE	CANAL PLANT HEIGHT (cm)	
	Control	EVERGREEN® Dose 55 kg
Close to the canal	110 / 115	110 / 115
Medium distance	98	105
Far from the canal	60 / 70	95

Mr. Muhammet Bilal Okcu visually observed a higher plant density in the Raincatcher®-treated areas, confirming the effectiveness of the product.

The harvest was then scheduled for mid-September.

Sensor connectivity was restored, with one sensor already back in operation



Heat and Water scarcity

In July, the Amik Plain, located in the Hatay province, was facing an unprecedented water crisis, marked by extreme temperatures ($>35^{\circ}\text{C}$) and an increasing scarcity of water.

Local newspapers, such as Antakya Toplumcu Halk Gazetesi and Hatay Internet TV, have reported the anger of farmers deprived of irrigation, describing what they call a true “water revolt” (su isyanı) and the transformation of Lake Amik into the “Amik Desert” (Amik ölü).

More than 100,000 dönüms, nearly 10,000 hectares, of agricultural land are said to have become unfit for cultivation, as a direct consequence of persistent drought, poor water distribution from the Asi River, and insufficient dam refilling.

See local press article: <https://www.hataygazetesi.com/ekonomi/amik-ovasi-ciftcilerindenyetkililere-cagri>



It was in this context of extreme water stress that the Raincatcher® demonstration was conducted, gaining major scientific and agronomic significance by proving the product's ability to maintain, and even improve, productivity where conventional agriculture becomes nearly impossible. Additional articles are provided in **Annex EK2**.

RESULTS

Results on Agronomic Yields In order to carry out the weighing of the harvested results, located 17 kilometers from the demonstration site, logistical adjustments had to be made to align with the trailer's loading capacity during rotations.



In order to facilitate the weighing of the harvests, which took place 17 kilometres from the demonstration site, logistical adjustments had to be made to accommodate the loading capacity of the trailer, which can carry approximately 3.5 tonnes of cotton per trip.

For the Evergreen® plot, the harvest was taken from 30 rows with an average length of 160 metres, distributed as follows:

- 12 rows at a rate of 55 kg
- 12 rows at a rate of 62 kg
- 6 rows at a rate of 48 kg

This corresponds to an average application rate of 56.4 kg, which does not significantly affect the results, given the small range of variation (only 14 kg between the minimum and maximum doses).

For the control plot, due to the layout of the field, 32 rows with an average length of 150 metres were harvested in order to maintain a comparable area of 3,400 m².

During weighing, carried out on two identical plots of 3,400 m² each (control vs. Evergreen®), the results were as follows:

- Control zone: 860 kg (i.e. 2,529 kg/ha)
- Evergreen® zone (average application rate of 56.4 kg): 1,660 kg (i.e. 4,882 kg/ha)

This represents a 93% increase in agronomic yield.

The official weighing records can be found in **Appendix EK4**.



Economic Results

The farm-gate price of cotton, as reported by Mr Mistikoğlu, was 28,000 TL per tonne (approximately 676 USD).

Based on the observed yields:

- **The control area** would generate a gross revenue of **70,812 TL** ($\approx$ **1,710 USD/ha**).
- The Evergreen®-treated area would reach **136,696 TL** ($\approx$ **3,300 USD/ha**).

This represents a **net economic gain of +1,590 USD** per hectare, confirming the **significant impact of Evergreen® on the economic profitability of cotton cultivation**.

Economic Results Including Evergreen® Application Costs

On clay soils such as those found at the Hatay site, under the 2025 field conditions and based on verified data available to date, the net economic gain, including the full cost of Evergreen® application using our expertise and proprietary injection tools, amounts to **+1,181 USD per hectare**.

COTON	Irrigation Cost/ha	Turnover Coton/ ha	
Without Evergreen	\$	\$ 1 710,00	
With Evergreen	\$	\$ 3 300,30	
Additional profit with Evergreen	\$	\$ 1 590,30	\$ 1 590,30
Net extra profit without cost of Evergreen application	93,0 %		
Net extra profit with cost of Evergreen application	69,1 %	+\$ 1 181,00	

Based on our experience and the numerous trials conducted over several years in different regions of the world, we estimate that this net economic yield can increase by approximately **+30%** on loamy soils and by **+50%** on sandy soils.

COTON ON SILTY SOILS	Irrigation Cost/ha	Turnover Coton/ ha	
Without Evergreen	\$ -	\$ 1 710,00	
With Evergreen	\$ -	\$ 3 777,39	
Additional profit with Evergreen	\$ -	\$ 2 067,39	\$ 2 067,39
Net extra profit without cost of Evergreen application	93,0 %		

Net extra profit with cost of Evergreen application	69,1 %	+\$ 1 659,00	
COTON ON SANDY SOILS	Irrigation Cost/ha	Turnover Coton/ ha	
Without Evergreen	\$ -	\$ 1 710,00	
With Evergreen	\$ -	\$ 4 095,45	
Additional profit with Evergreen	\$ -	\$ 2 385,45	\$ 2 385,45
Net extra profit without cost of Evergreen application	93,0 %		
Net extra profit with cost of Evergreen application	115,6%	+\$ 1 977,00	

Analysis of the Increase in Water Productivity

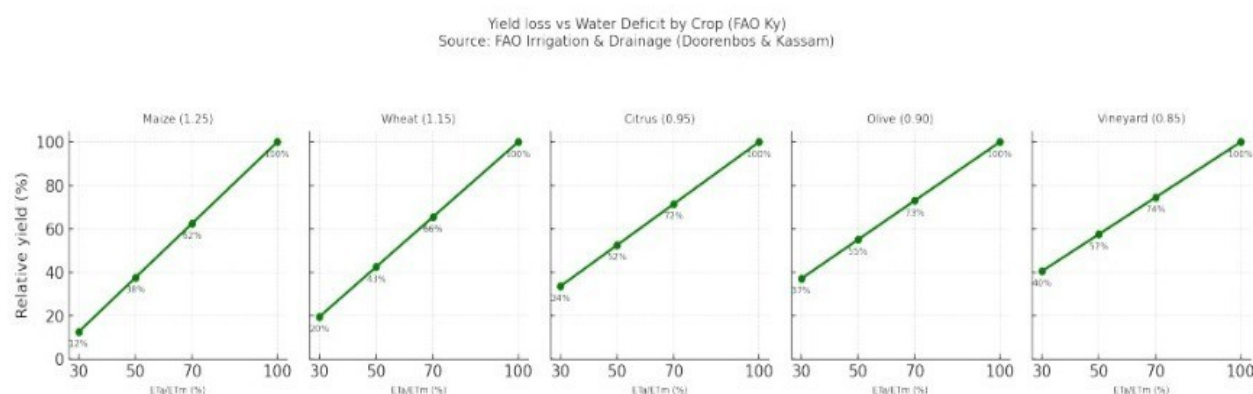
We did not receive precise data on the quantities of water used this year for irrigation or on the costs associated with its delivery to the crop. This information is not critical for this report, since in all cases, regardless of the level of annual water stress, the irrigation between the control and Evergreen® zones was identical.

However, since the exact volume of water used per kilogram of production is unknown, it is not possible to define the valuable indicator of Water Productivity (WP) in kg/m³.

Conversely, the increase in WP is straightforward to determine, as the irrigation volume was identical across all demonstration zones : the WP increase is **93%**, corresponding directly to the yield improvement under equal irrigation conditions.

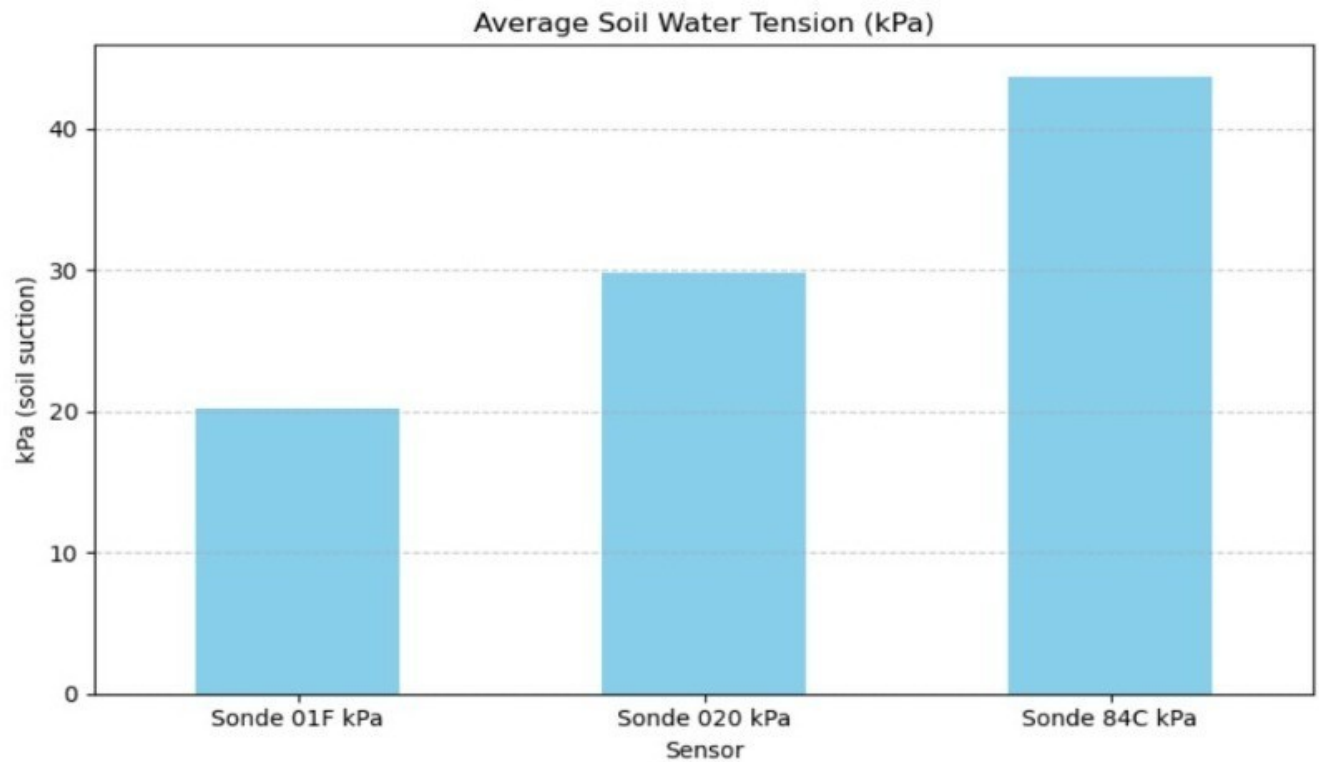
The WP increase coefficient is highly significant and generally consistent across different crops, as it primarily reflects Evergreen® performance in producing more with the same amount of water. During a previous experiment on maize conducted in the Konya region under irrigated conditions, we calculated a **91%** increase in WP.

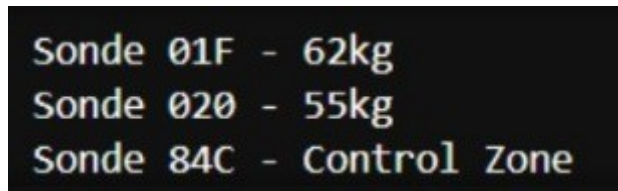
This serves as further confirmation that it is technically possible to double agricultural production on non-irrigated farmlands in Türkiye, which represent more than **75%** of all cultivated lands. This, of course, applies under a theoretical water stress level of around **50–60%** for most crops and is in perfect alignment with the FAO's crop yield response to water (Ky) models :



Annex EK1 : Sensor analysis Analysis

Sensor Analysis





Sonde 01F - 62kg
Sonde 020 - 55kg
Sonde 84C - Control Zone

The research was carried out from 25 April to 2 October. The first graph shows the average soil water potential (in kPa) recorded by the three sensors (Sensor 01F, Sensor 020 and Sensor 84C).

Probe 01F (62 kg of Evergreen) recorded the lowest average tension (approximately 20 kPa), followed by Probe 020 (55 kg of Evergreen) (approximately 30 kPa).

The highest value (well over 40 kPa) was recorded by Probe 84C (control area), indicating relatively drier soils. This suggests that both Probe 01F and Probe 020 benefited from improved soil moisture availability for crops during the monitoring period.

The second graph shows a time-series comparison of the performance of the three sensors from 27 April to early October.

Sonde 01F and Sonde 020 both recorded stable and moderate kPa values during the early season, indicating consistent water availability.

Sonde 020 performed best initially, with more sustained lower levels of soil suction, before it began to show variation in mid-June.

Sensor 01F exhibited the same trend with steady performance and was less stressed than Sensor 84C.

On the other hand, Sensor 84C recorded highly positive kPa values throughout its readings, indicating drier conditions and a more rapid depletion of available water.

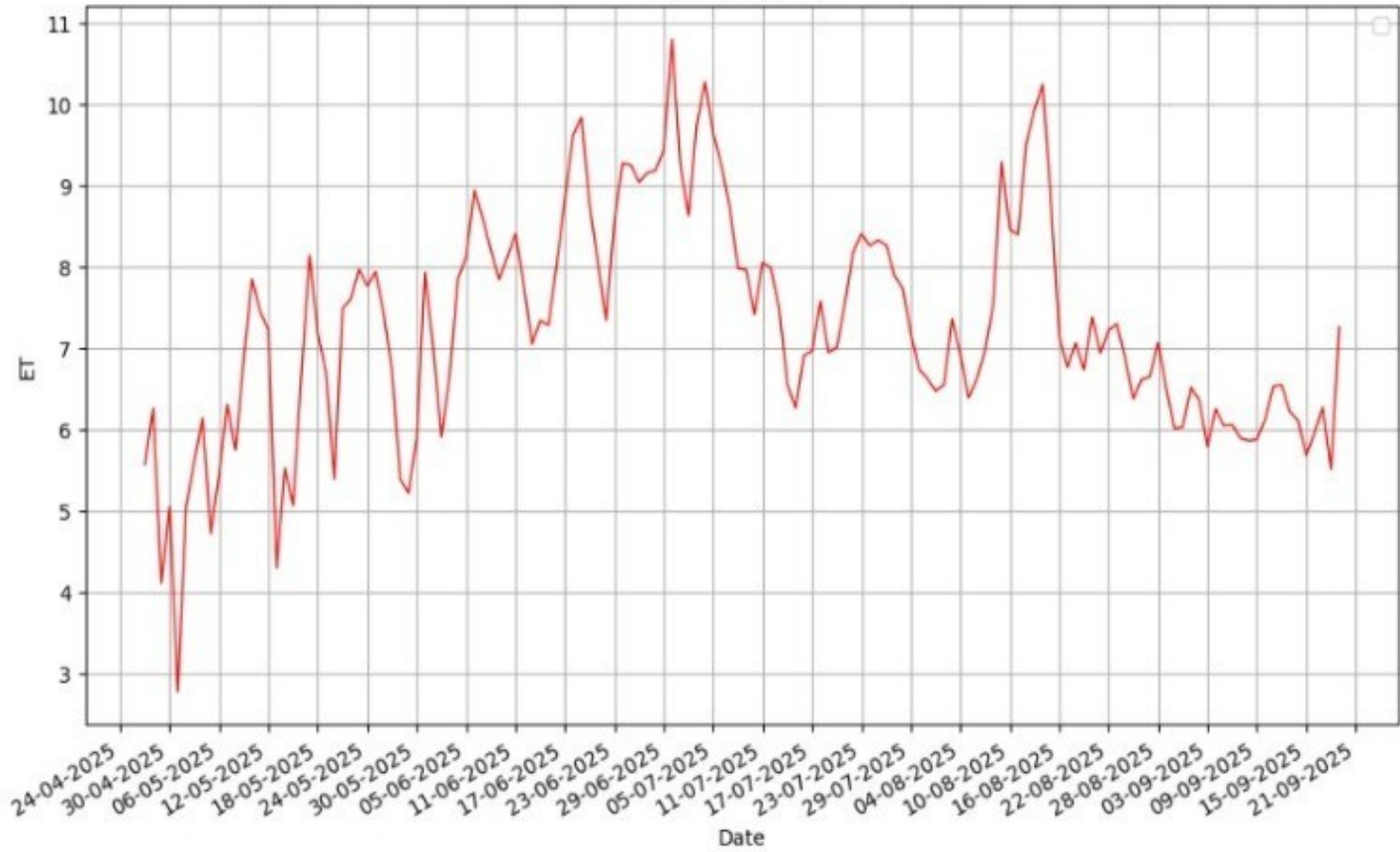
Steeper declines after each irrigation cycle indicate poorer water retention compared to 01F and 020.

Additional information is that we must note severe sensors malfunctions, for periods of time, sensors did not provide data so it had to be retrieved manually.

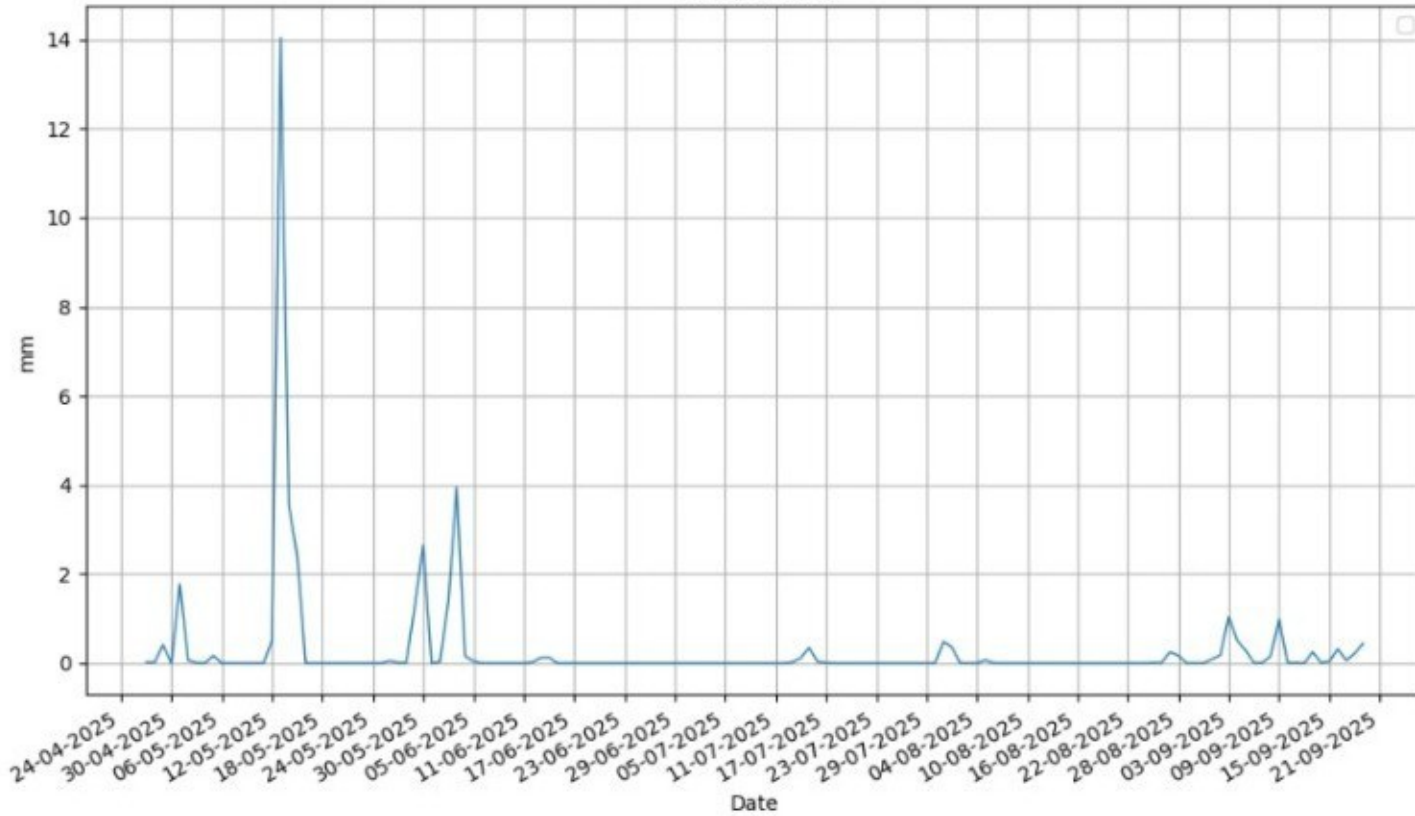
After that, each sensor stopped answering on different dates. 84C stopped working on 19.09, Sensor 020 stopped working on 23.07 and 01F stopped working on 25.06, which can be observed on the graph.

ET & Precipitation Analysis

ET Fluctuation



Precipitation



The ET (evapotranspiration) graph shows clear seasonal fluctuations between late April and late September 2025.

ET values started moderately (around 5–6 mm/day) in late April, rising steadily throughout May and June. A distinct peak occurred in early July, where ET values reached above 10 mm/day, reflecting the period of highest atmospheric water demand.

After mid-July, ET values declined gradually, stabilizing between 6–7 mm/day during August and September.

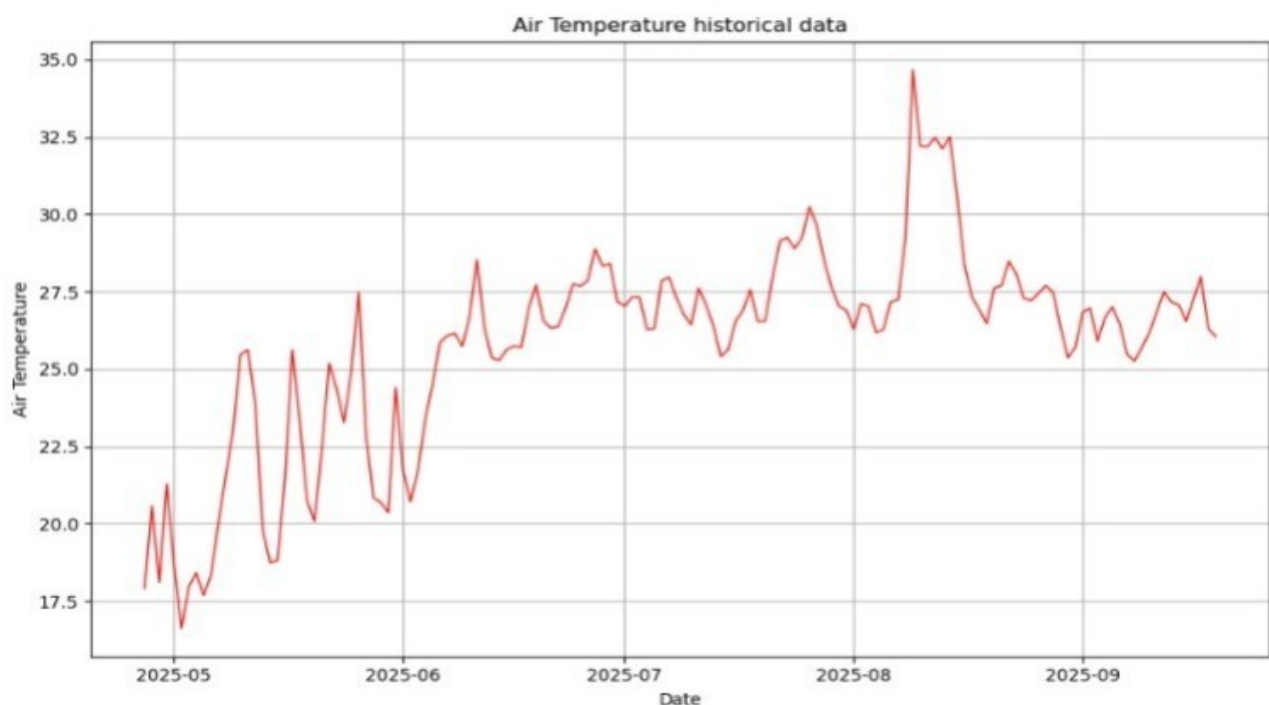
When considered in relation to soil water potential, the rising ET values in June and early July coincide with an increase in the suction levels measured by the sensors, indicating a more rapid depletion of soil moisture due to higher evaporation demand.

This phenomenon was particularly evident at Probe 020, which showed a strong response to increases in ET, with marked fluctuations during periods of high demand.

Probe 01F also maintained relatively stable performance despite high ET, suggesting better moisture retention or access compared to Probe 84C, which consistently displayed the driest conditions.

Precipitation, although notable in May, did not play a crucial role as, for the most part, its values remained at 0, which allowed Evergreen to excel.

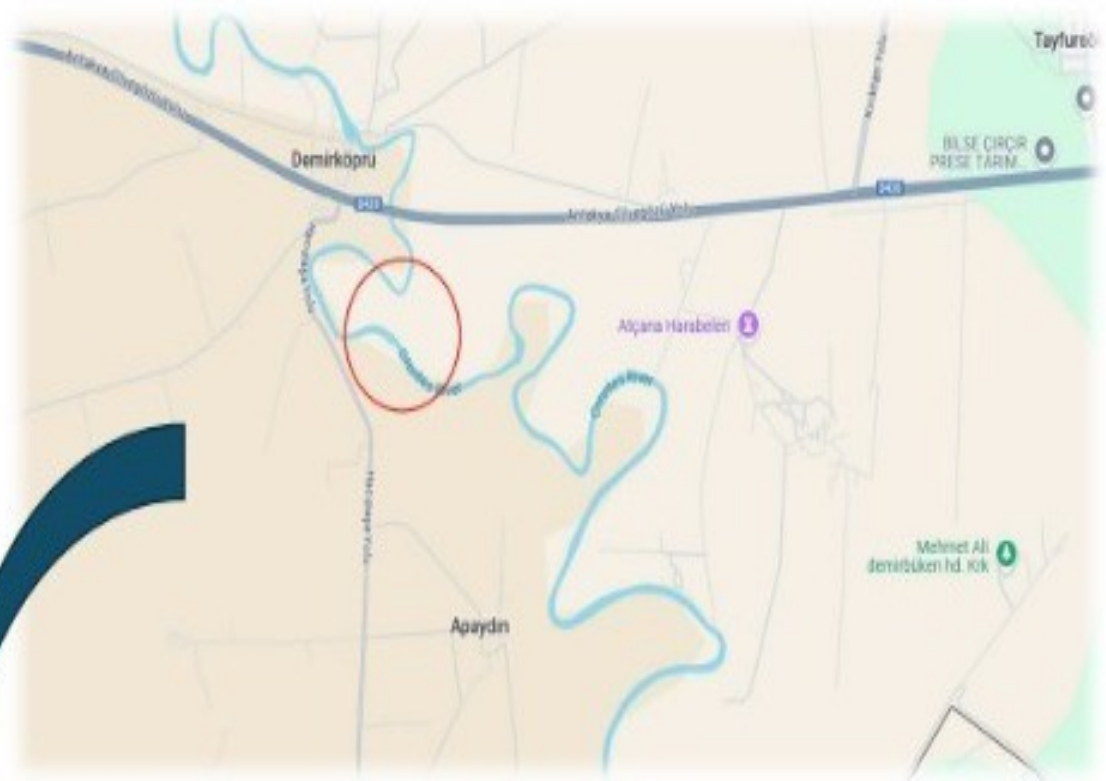
Air Temperature Graph (Average Temperature Daily)



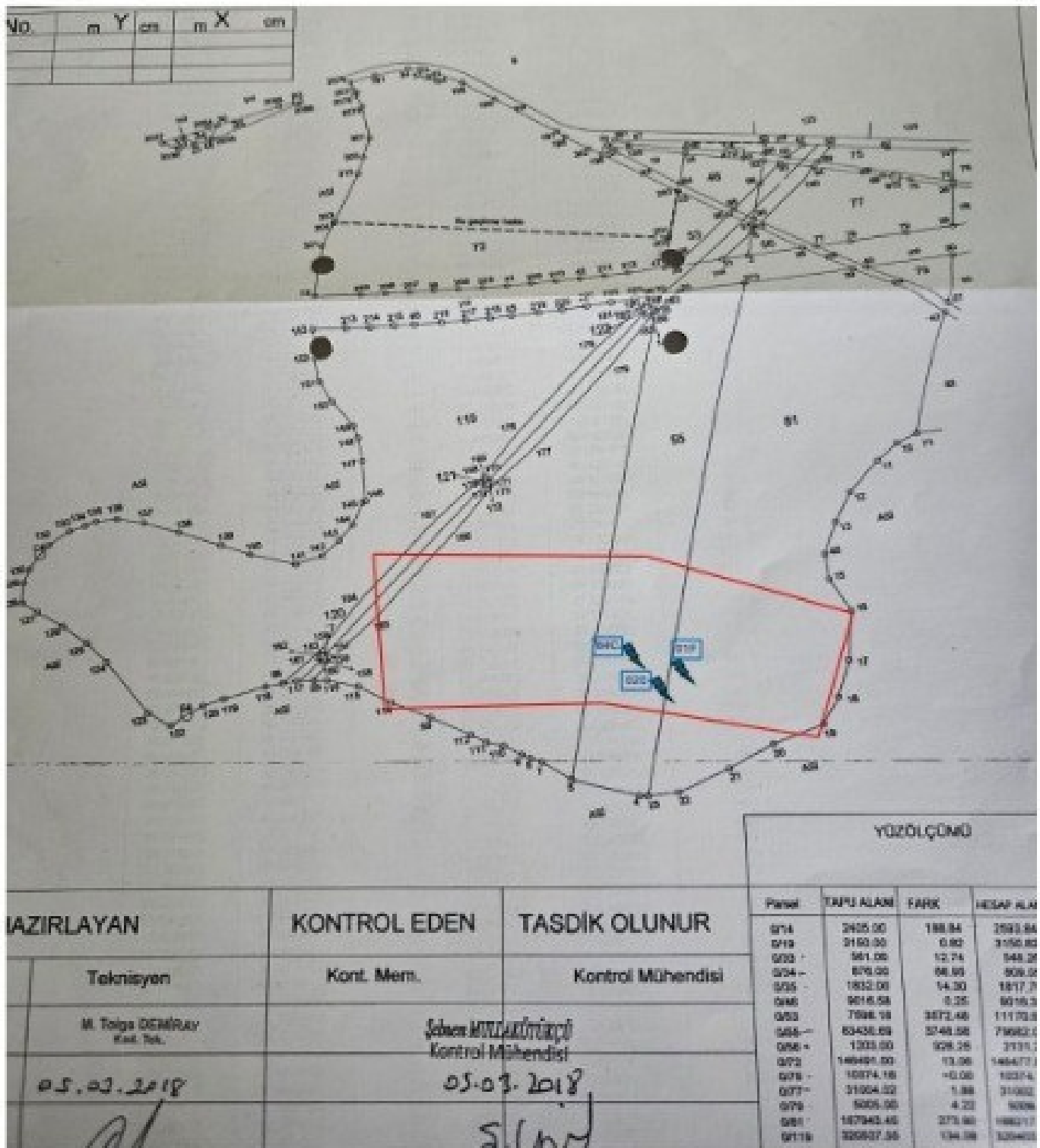
Annex EK 3

SITE OVERVIEW AND EVERGREEN® DEPLOYMENT DETAILS





TEST AREA SCHEMATIC LAYOUT



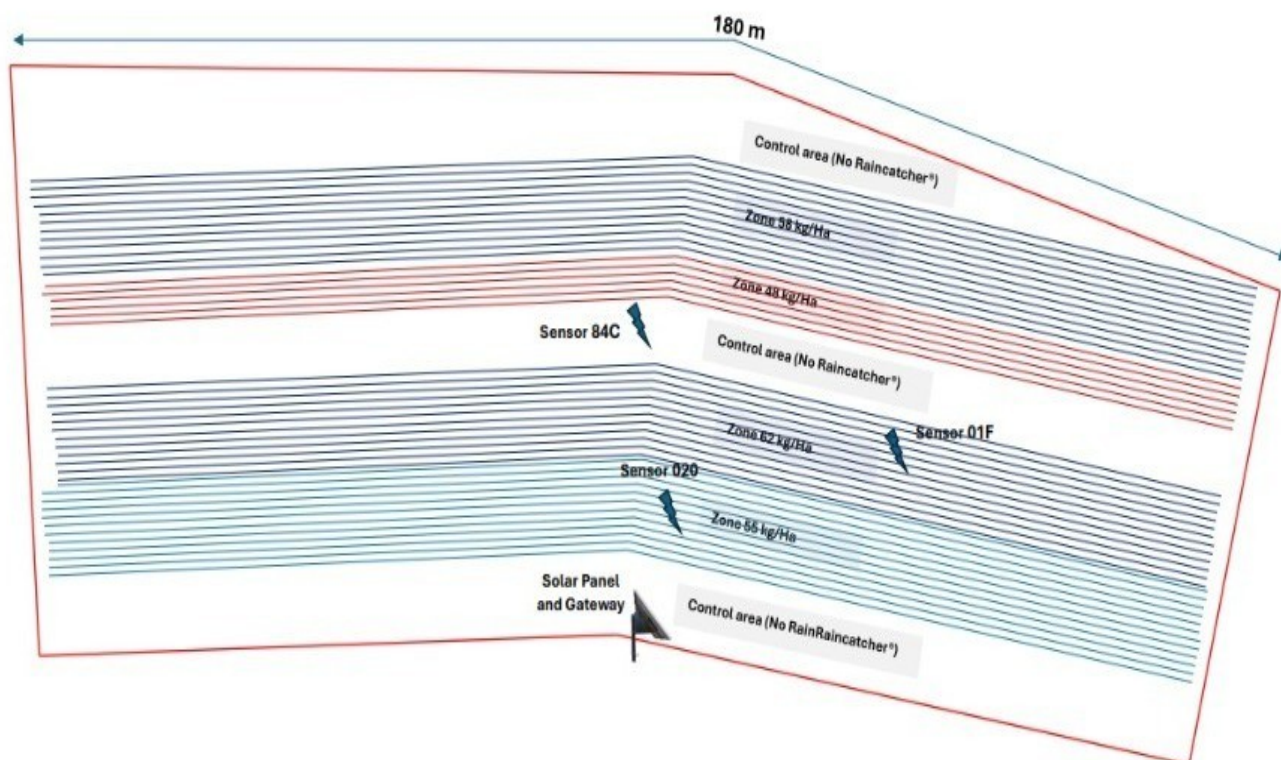
Sensors coordinates:

Sensor 020: 36°14'19.5"N 36°21'39.2"E

Sensor 01F: 36°14'20.3"N 36°21'39.9"E

Sensor 84C : 36°14'20.5"N 36°21'38.6"E

DETAILED VIEW OF THE TEST AREA

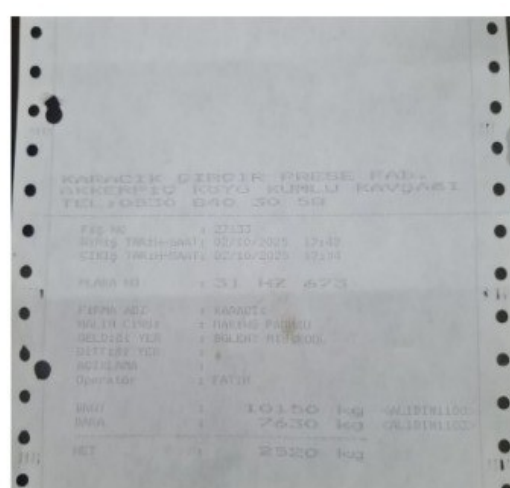
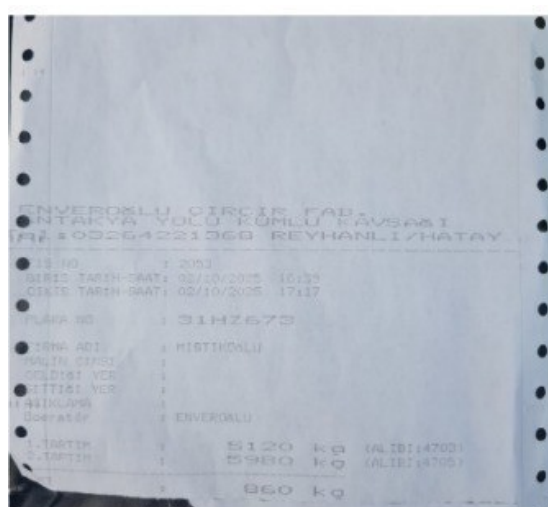


Annex EK 4 : Official Weighing Certificates

5,120 kg: trailer weight + harvested cotton (Evergreen® zone)

5,980 kg: trailer weight + harvested cotton (Evergreen® zone) + harvested cotton (control zone)

860 kg: harvested cotton (control zone)



Weighing of cotton from the combined harvests (Evergreen® zone + control zone) = 2,520 kg 2,520 kg – 860 kg = 1,660

CONCLUSION

The results obtained with on cotton cultivation in the Hatay region, an area exposed to chronic water stress for several years, **demonstrated an exceptional agronomic yield increase of +93%.**

Our report dated September 18, 2025, concerning the demonstration conducted on maize in partnership with TIGEM in Konya, concluded that **Evergreen® is a true game changer for crops facing irrigation shortages**, and more broadly for the **75%** of Türkiye's non-irrigated lands.

The Hatay demonstration provides undeniable confirmation of that conclusion.

Whenever a plant is subjected to water stress and Evergreen® is applied precisely beneath its roots using our protocols and technicians, it is possible to double the crop yield, even on clay soils that naturally retain water.

Agronomic and economic gains can be even higher when soils have greater drainage capacity, when evapotranspiration rates are elevated, or in conditions where water interception normally limits irrigation efficiency. Under pivot irrigation, for example, a portion of the water is usually intercepted by the canopy before reaching the soil. By reducing irrigation volumes, Evergreen® decreases interception, improves water-use efficiency, and amplifies the positive physiological effects on the crop.

Evergreen® therefore provides a concrete, measurable, and reproducible solution to the challenges of climate change across Türkiye's diverse agricultural regions. We are highly confident in the scalability of the Evergreen® Solution, as demonstrated during our visit to the cotton processing plant in Hatay where the harvest was weighed.

We met with its director, Mr. Ahmet Karaçık, and his son, who expressed strong interest in the technology given the outstanding results obtained during a difficult period for the region due to water restrictions.

Already established locally, Green Solutions Technologies possesses the structure and operational capacity required to rapidly deploy its solution nationwide, thereby transforming Türkiye's agricultural landscape and strengthening the sector's contribution to the national GDP.

Report prepared on October 5, 2025

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