

Yara Water Sensor - Irrigation scheduling protocols based on plant water status



Summary

Agriculture sector is accountable for 30% of the total water consumption in Europe, but reaches up to 70% of total water consumption in several European southern countries. In recent years, most of the efforts have been focused on water efficiency, but without taking care of energy aspects, resulting - in some cases - on a significant increase in energy consumption, combined with a scenario of increasing energy costs throughout Europe.

The **WEAM4i** project has addressed these challenges by developing an on-line crop water demand projection ICT tool that combines crop water demand (quantified by satellite observation) with a weather forecast to project future crop water needs to determine the

optimal irrigation time balancing crop water needs and energy costs.

WEAM4i project has covered many case studies at the local irrigation level during the development of the **WEAM4i Smart Irrigation tool** including the use of Yara Water-Sensor for Irrigation scheduling protocols based on plant water status.

Irrigation scheduling

There is a need for the irrigation scheduling in order to achieve effective and well-timed irrigation which is critical for sustainable and profitable production with high yields, good fruit quality and optimum fertilizer efficacy.

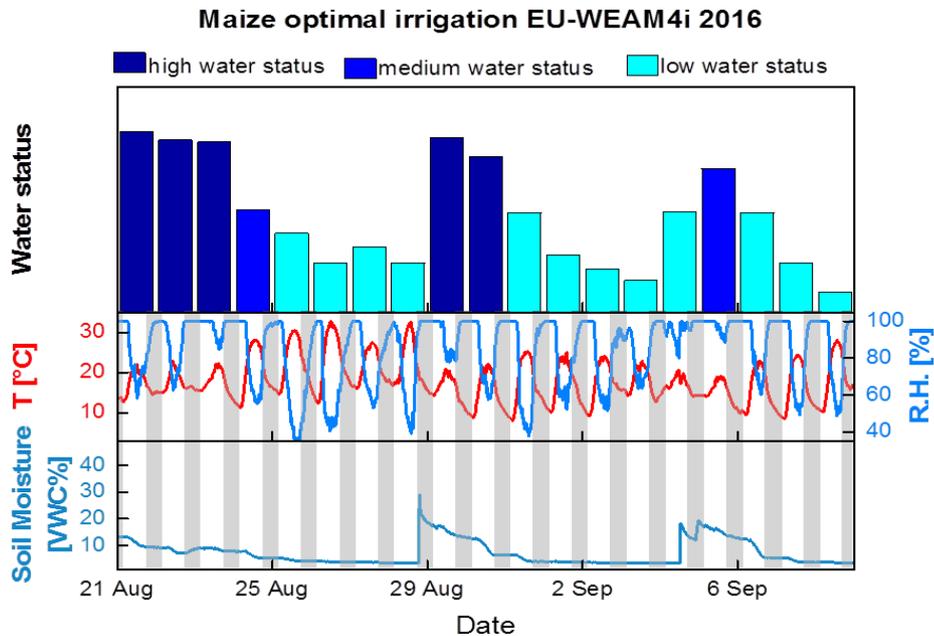
The Challenge:

- The amount and timing for irrigation.
- Deciding what to measure/which combination in terms of:
 - Atmospheric demand
 - Soil moisture
 - The plant response

Description of the case study

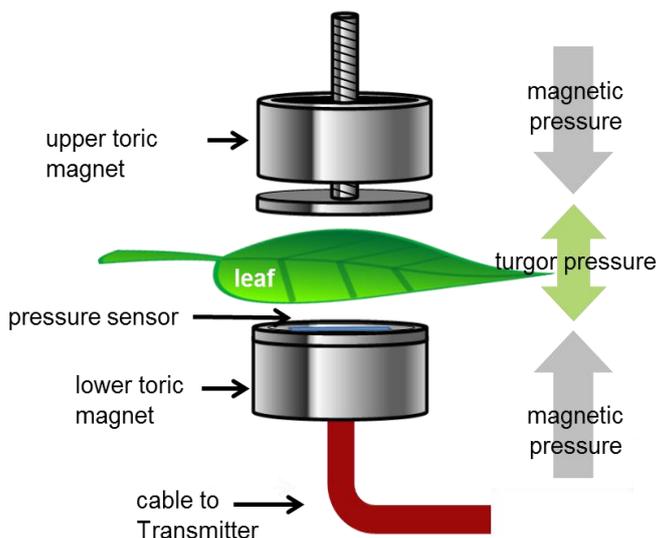
The Yara Water-Sensor was tested within this project on persimmon, citrus, maize and potato crops under different environmental conditions. The tests on Potato and Maize took place on the German test-site located in Lower Saxony.

Advantages and limitations for the use of these technologies have been identified and algorithms for the interpretation of sensor outputs were derived.



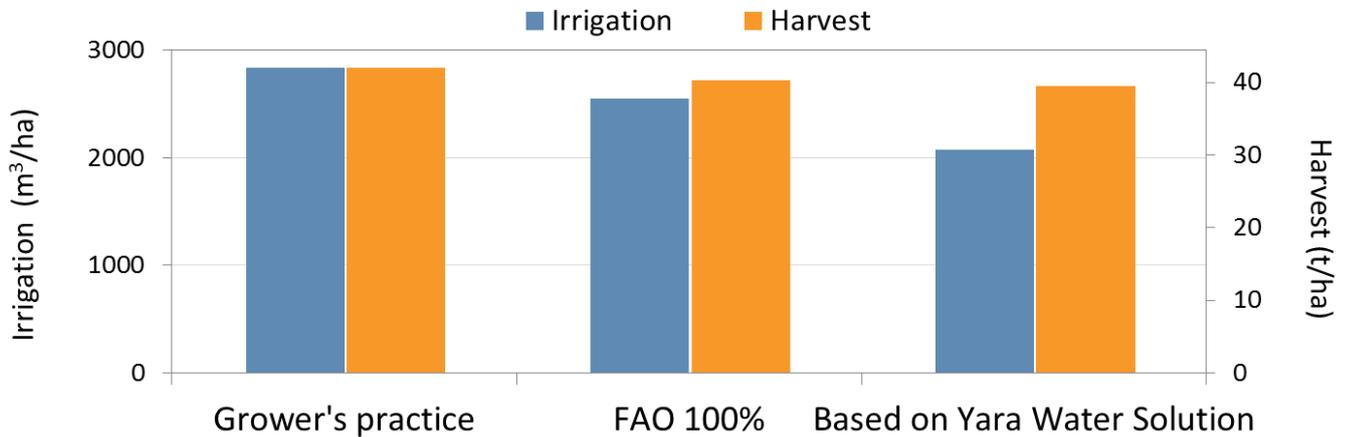
Description of the Solution

The Yara Water-Sensor measures the difference between magnetic pressure and turgor pressure. Turgor pressure is lost during the day due to water loss by transpiration and recovered during the night. The Yara Water Sensor detects these changes.



Results

- ➔ Changes in plant water status were detectable for all plants.
- ➔ Based on independent internal Yara open field trials, algorithms for detection of the plant water status was developed and automatic irrigation recommendation for Olive and Citrus can be now created and used to help scheduling irrigation.



Drip irrigated commercial orchard of Navelina orange in Murcia, Spain. (Averaged data from 2015 and 2016)

Learned lessons and market perspectives

Overhead-irrigated broad acre crops and areas with positive evapotranspiration are out of scope for now. Creating fully automatic irrigation scheduling from readings made with Yara Water-Sensor needs further integration with other data streams (soil, weather, imagery etc.).

Based on that the following segmentation, the Yara Water-Sensor could be best applied in:

Crop coverage:

The Yara Water-Sensor is currently calibrated for **Olives** and **Citrus**. Work is ongoing for additional crops – such as **Grapes, Almonds, Pome Fruits, Stone Fruits, Coffee**, etc.

Focus countries:

Spain, Portugal, US, Brazil, South-Africa, Australia.

Farm Size/Type:

- ➔ Micro Irrigation
- ➔ Large and with business rationale and high tech focus
- ➔ Professional Growers who invest in technology; Interested in utilizing technology

- Irrigation Associations driven by optimization of water use and irrigation infrastructure.

By implementing the Yara Water Solution, it is possible to:

- Save water consumption up to 20%
- Save energy
- Reduce tree maintenance
- Sustain maximum yield
- Improve crop quality

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Knowledge grows

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WEAM4i
Water & Energy Advanced
Management For Irrigation

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