

Irrigation Scheduling Advice: Tunisia

The challenge

The Irrigation Reference to Enhance Yield Smart Irrigation Application (IREY app) was designed by Tunisia’s National Field Crops Institute (*Institut National des Grandes Cultures*, INGC) to help farmers enhance irrigation efficiency in wheat-growing areas. However, the second-generation application used generic FAO56¹ crop coefficients and standard reference evapotranspiration (RET), which did not accurately capture actual crop growth and development.

The solution

The International Water Management Institute (IWMI) worked with the INGC team to improve the app, using Water Productivity through Open access of Remotely sensed derived data (WaPOR) to develop an advanced irrigation algorithm that provides farmers with plot-level customized irrigation alerts based on actual and anticipated water demand (Figure 1). The third-generation IREY app delivers near real-time, high-resolution measurements of actual evapotranspiration and interception (AETI) and precipitation (P), accurately reflecting net crop water consumption.

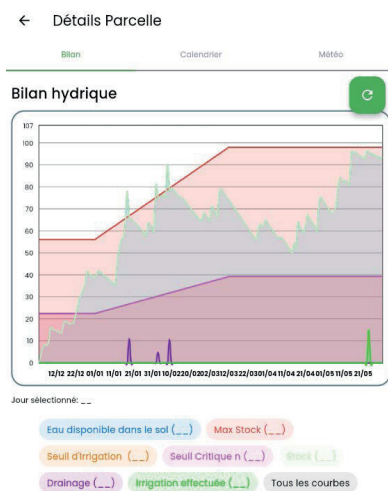


Figure 1: The Irrigation Reference to Enhance Yield Smart Irrigation Application (IREY app) interface showing the water balance at plot level.

Key technical features

The new IREY app integrates an advanced irrigation algorithm that optimizes water use by refining the AETI data, integrating real-time weather forecasts, and dynamically assessing soil moisture and root depth. It triggers irrigation when soil moisture depletion reaches 50% of readily available water, ensuring precise and adaptive water management for improved irrigation efficiency. The app uses Level 3 WaPOR data at 20 m spatial resolution to provide users with detailed information on the exact irrigation dosage and timing according to irrigation system specifications. The third-generation IREY app also has a more user-friendly interface than the previous version. The tool is accessible in French.

Current use and main users

INGC and its lead farmer network are the main users of the tool.

Key stakeholders and beneficiaries

The key stakeholders are INGC and its lead farmer network, wheat farmers and the local agriculture department, which uses IREY alerts in Jendouba, northwestern Tunisia. The tool is hosted by INGC.

The co-creation process

The co-creation process involved meetings to discuss challenges and needs regarding datasets, outputs, methodology and the algorithm’s features. A field trial monitoring experiment conducted from November 2023 to July 2024 validated AETI data and rooting depth, as well as biomass from WaPOR, using capacitive soil moisture sensors and biomass sampling. Joint observation of key growth stages helped validate the phenology and rooting dynamics formalism. As part of ongoing capacity building, two technical workshops were held in 2023, followed by a farmers’ field day in May 2024. A Technology Transfer Workshop on the core code of the third-generation IREY app was conducted in December 2024.

¹ Allen, R.G.; Pereira, L.S.; Raes, D.; Smith, M. 1998. *Crop Evapotranspiration – Guidelines for Computing Crop Water Requirements*. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO). (FAO Irrigation and Drainage Paper No. 56).

Key outcomes and impacts

Integration of actual, high-resolution data allows the IREY app to disseminate real-time and anticipated irrigation alerts to users across the Bouheurtma Irrigation Scheme.

Sustainability and scaling potential

The IREY app has significant scaling potential as it could be applied across the 2 million ha of wheat-producing lands in Tunisia, though sustainability features would have to be upgraded. Application to other strategic crops, such as olives, date palm, grapes, stone fruit and vegetables, requires further customization and development. To ensure the long-term sustainability and scalability of the IREY app, an AI-driven downscaling approach has been developed to generate high-resolution data.

The WaPOR portal

The publicly accessible Water Productivity through Open access of Remotely sensed derived data (WaPOR) portal of the Food and Agriculture Organization of the United Nations (FAO) supports agricultural water productivity monitoring at continental, national and basin scales. With new information produced every 10 days, the portal helps users make informed policy and investment decisions.

Authors

Mr. Makram Belhaj Fraj, Consultant – Agriculture Water Management and Rural Development, International Water Management Institute (IWMI), Cairo, Egypt (m.fraj@cgiar.org)

Mr. Karim Bergaoui, Consultant – Climate and Water Modeling, IWMI, Cairo, Egypt (k.bergaoui@cgiar.org)

Mr. Anis Bouselmi, Deputy Director, National Field Crops Institute (*Institut National des Grandes Cultures*, INGC), Jendouba, Tunisia (bousselmianis@gmail.com)

Dr. Petra Schmitter, Research Group Leader – Climate Mitigation & Adaptation Pathways, IWMI, Colombo, Sri Lanka (p.schmitter@cgiar.org)

Dr. Moctar Dembélé, Researcher – Spatial Hydrologist, IWMI, Accra, Ghana (moctar.dembele@cgiar.org)

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International Water Management Institute (IWMI)

Headquarters

127 Sunil Mawatha, Pelawatte, Battaramulla, Sri Lanka

Mailing address:

P. O. Box 2075, Colombo, Sri Lanka

Tel: +94 11 2880000

Fax: +94 11 2786854

Email: iwmi@cgiar.org

www.iwmi.org