



**HAL**  
open science

## Multi-criteria evaluation of the AquaCrop model in a Mediterranean rainfall context

Mariem Dhouib, Rim Zitouna, Insaf Mekki, Laurent Prevot, Jérôme Molenat, Frédéric Jacob

### ► To cite this version:

Mariem Dhouib, Rim Zitouna, Insaf Mekki, Laurent Prevot, Jérôme Molenat, et al.. Multi-criteria evaluation of the AquaCrop model in a Mediterranean rainfall context. IAHS-AISH Scientific Assembly 2022, May 2022, Montpellier, France. hal-03753549

**HAL Id: hal-03753549**

**<https://hal.inrae.fr/hal-03753549v1>**

Submitted on 18 Aug 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



IAHS2022-154

IAHS-AISH Scientific Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Multi-criteria evaluation of the AquaCrop model in a Mediterranean rainfall context

**Mariem Dhouib**<sup>1</sup>, Rim Zitouna-Chebbi<sup>2</sup>, Insaf Mekki<sup>2</sup>, Laurent Prévot<sup>3</sup>, Jérôme Molénat<sup>3</sup>, and Frédéric Jacob<sup>4</sup>

<sup>1</sup>L'institut Agro | Montpellier SupAgro, France (mariem.dhouib@supagro.fr)

<sup>2</sup>UCAR / INRGREF, University of Carthage

<sup>3</sup>INRAE / UMR LISAH, University of Montpellier

<sup>4</sup>IRD / UMR LISAH, University of Montpellier

The spatial organization of crops at the landscape scale is a promising solution to be explored within Mediterranean hilly agrosystems, for agroecological transition and adaptation to climate change. In this perspective, it is necessary to ensure the capacity of crop models to simulate a range of agro-hydrological processes within these agrosystems. The objective of this study is to perform a multi-criteria assessment of the FAO AquaCrop model to simulate crop functioning for a diversity of plant and soil combinations, by considering several hydro-climatic years. This multi-criteria assessment includes canopy cover (CC), dry above-ground biomass (biomass), soil water content (SWC), actual evapotranspiration (ET<sub>a</sub>) and runoff (non-infiltrated rain). The study area is the small rainfed watershed of Kamech located within the Lebna regional watershed, Cap Bon Peninsula, North-eastern Tunisia. The data, collected in the framework of the OMERE Observatory, are derived from ten measurement campaigns between 2001 and 2013 that focus on (1) predominant soils (Cambisols, Luvisols, Vertisols), and (2) representative crops of the region (wheat and barley as grain cereals, oats as fodder and faba bean as legume). Except ET<sub>a</sub>, which simulations are quite poor ( $R^2$  of 0.3, RMSE of 0.9 mm/d and NRMSE of 44%), AquaCrop correctly simulates the water transfer within the soil-plant continuum along with crop growth, for the ten aforementioned campaigns. First, CC is correctly simulated ( $R^2$  of 0.6, RMSE of 3% and NRMSE of 9%), as is runoff ( $R^2$  of 0.5 and RMSE of 0.7) mm. Second, SWC is well simulated ( $R^2$  of 0.88, RMSE of 8.34 mm and NRMSE of 2.34%), as is above-ground dry matter ( $R^2$  of 0.83, RMSE of 0.17 ton/ha and NRMSE of 5.9%). These results indicate that AquaCrop is relevant for characterizing the water use efficiency under the influence of intra-plot runoff.