Food and Agriculture Organization of the United Nations

Online administered training

# WATER PRODUCTIVITY

## AquaCrop model and its evolution

### Background

AquaCrop is the crop water productivity model developed by FAO to assess the effects of environment and management on crop production. The model simulates the yield response of herbaceous crops to water and is particularly well suited to conditions in which water is a key limiting factor in crop production. AquaCrop distinguishes itself from all other models for an optimum balance between simplicity, accuracy and robustness. These features have made it possible to be used worldwide under different agro-ecological conditions and to be particularly useful for practitioners working as a planning tool to assist management decisions in both irrigated and rainfed agriculture.

To further promote its use, and in line with the objectives of the FAO "Building Forward Better" Initiative, an administered e-training effort on the use of AquaCrop for national professionals, technicians, and researchers in the relevant domains should be important to enhance capacity for: (1) optimizing the use of water for increased crop productivity; (2) maximizing the performance and sustainability of irrigation schemes; (3) assist in the design of new irrigation schemes according to sustainable criteria; and (4) applying farming practices to enhance crop water productivity at any irrigation condition.

A step-by-step presentation of the AquaCrop tool, moreover, will allow participants to thoroughly apprehend how to tailor this approach to local contexts to boost crop productivity through the implementation of enhanced and integrated farm management practices. Particular emphasis will be devoted to the water-nutrient interactions, leading to the design of optimal fertilization plans.

### Training goals and objectives

The overall objective of this training is to develop the capacity of participants in the use of AquaCrop. On this basis, the specific objectives are to:

- Introduce the participants to AquaCrop, its operation, inputs requirements and potential applications;
- Achieve a skilled management of AquaCrop by the participants towards enhancing their capacity to improve water management and crop water productivity;
- Serve as a platform for the exchange of views among participants about the main water management constraints in their areas, and the potential applications of AquaCrop to solve water-related problems.

### Approach

In accordance with the objectives above mentioned, a 3-day administered e-training has been designed. The training is oriented towards organized in three different blocks every day. The first block, of three hours duration, is devoted to learning how to use the model through several short sessions, alternating theoretical and practical sessions on a specific topic. During the practical sessions, the trainer will demonstrate how to work with the model through clear and simple applications. The second block is centered on the use of AquaCrop for irrigation management and salinity applications, and the third block focuses on water-nutrient relations in AquaCrop, and mineral fertilization. In every block, short videos illustrating model applications, providing tips and sending key messages from experts are inserted within the different sessions. After each morning block, there will be afternoon sessions where the participants will carry out further work with additional practical exercises, bringing issues that might come up to be resolved with the trainers and discussed during Open Desk sessions.

## Trainers

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## Contributors

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## Collaborators

- Youssef Bizri, FAO-Lebanon
- Robert Baluku, National Agricultural Research Organisation (Uganda)

## Hardware and software requirements

Participants must have access to a broadband Internet connection and a personal computer with the last version of AquaCrop, i.e., v6.1 and AquaCrop Plug-in installed (http://www.fao.org/aquacrop/en/). Also, participants should download freely and install the following software:

### Soil Water Characteristics software

Available here:

https://www.ars.usda.gov/research/software/nload/?softwareid=492&modecode=80-42-05-10%20?

### Fertilicalc

Available here:

http://www.uco.es/fitotecnia/fertilicalc.html

# SCHEDULE

## Introduction to the AquaCrop model

3 NOV

| | | |
|---|---|---|
| 10.00-10.05 | **Introductory overview of e-learning nugget** | *Presentation* |

### Session 1. Introduction to AquaCrop

| | | |
|---|---|---|
| 10.05-10.35 | **Introduction to AquaCrop model** | *Presentation* |
| 10.35-10.40 | **AquaCrop – FAO crop water productivity model** | *Video interview* |
| 10.40-10.45 | **Q&A session** | |

# SCHEDULE

## Session 2. AquaCrop climate module

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|---|---|---|
| 10.45-10.55 | Climatic input variables in AquaCrop | *Presentation* |
| 10.55-11.00 | Innovative application of agro-meteorology data linked to AquaCrop in South Africa | *Case study video* |
| 11.00-11.25 | Creation of climate input files | *Drill* |
| 11.25-11.30 | Q&A session | |

## Session 3. AquaCrop soil module

| | | |
|---|---|---|
| 11.30-11.40 | Soil profile characteristics in AquaCrop | *Presentation* |
| 11.40-11.45 | Tips for soil sampling and analysis | *Video training* |
| 11.45-12.10 | Creation of soil input file | *Drill* |
| 12.10-12.15 | Q&A session | |

## Session 4. AquaCrop crop module

| | | |
|---|---|---|
| 12.15-12.25 | Crop parameters in AquaCrop | *Presentation* |
| 12.25-12.30 | Facing parametrization and calibration of AquaCrop | *Video interview* |
| 12.30-12.35 | Tips for canopy cover determination | *Video training* |
| 12.35-12.50 | Adjusting of crop file | *Drill* |
| 12.50-12.55 | Q&A session | |

## Session 5. Personal assignment

| | | |
|---|---|---|
| 12.55-13.00 | Indications for the personal work on assignment | *Presentation* |
| 13.00-14.00 | Lunch break | |
| 14.00-16.00 | Personal work on assignment. Individual support to participants in the last hour | *Personal work* |
| 16.00-16.30 | Moderated open discussion | *Open desk* |

# SCHEDULE

4 NOV

## Performing AquaCrop simulations

### Session 1. Simulation period and initial conditions

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|---|---|---|
| 10.00-10.05 | Role of AquaCrop in water resources management | *Video interview* |
| 10.05-10.15 | Simulation period and initial conditions in AquaCrop | *Presentation* |
| 10.15-10.25 | Setting the simulation period and initial conditions in AquaCrop | *Drill* |
| 10.25-10.30 | Q&A session | |

### Session 2. Irrigation management

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|---|---|---|
| 10.30-10.35 | Applications of AquaCrop in water management and policy | *Video interview* |
| 10.35-10.45 | Irrigation module in AquaCrop | *Presentation* |
| 10.45-10.50 | Improving the irrigation management in Mubuku irrigation scheme (Uganda) | *Case study video* |
| 10.50-11.50 | Generation and assessment of irrigation schedules with AquaCrop | *Drill* |
| 11.50-11.55 | Q&A session | |

### Session 3. Soil salinity

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|---|---|---|
| 11.55-12.00 | Soil salinity in Aquacrop | *Video interview* |
| 12.00-12.15 | Soil salinity module in AquaCrop | *Presentation* |
| 12.15-12.20 | Managing soil salinity in irrigated agriculture | *Video interview* |
| 12.20-12.50 | Optimization of irrigation management under saline conditions | *Drill* |
| 12.50-12.55 | Q&A session | |

### Session 4. Personal assignment

| | | |
|---|---|---|
| 12.55-13.00 | Indications for the personal work on assignment | *Presentation* |
| 13.00-14.00 | Lunch break | |
| 14.00-16.00 | Personal work on assignment. Individual support to participants in the last hour | *Personal work* |
| 16.00-16.30 | Moderated open discussion | *Open desk* |

# SCHEDULE

## INTEGRATION WITH ADDITIONAL PLATFORMS AND TOOLS

5 NOV

### Session 1. Water-nutrient interactions: soil fertility module

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|---|---|---|
| 10.00-10.05 | Importance of integrated water and nutrient management | *Video interview* |
| 10.05-10.25 | Water-nutrient interactions and Soil fertility module | *Presentation* |
| 10.25-10.30 | Improving the fertilization plans for zucchini in Lebanon | *Case study video* |
| 10.30-11.10 | Calibration of the soil fertility and irrigation management based on the fertility level | *Drill* |
| 11.10-11.15 | Q&A session | |

### Session 2. Ferticalc

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|---|---|---|
| 11.15-11.20 | Fertilicalc – A decision support system for fertilizer management | *Video interview* |
| 11.20-12.00 | Optimization of the fertilization plans | *Drill* |
| 12.00-12.05 | Q&A session | |

### Session 3. Projects and AquaCrop plug-in

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|---|---|---|
| 12.05-12.30 | Generation of projects | *Drill* |
| 12.30-12.50 | Simulating projects. AquaCrop Plug-in | *Drill* |
| 12.50-12.55 | Q&A session | |

### Session 4. Personal assignment

| | | |
|---|---|---|
| 12:55-13:00 | Indications for the personal work on assignment | *Presentation* |
| 13:00-14:00 | Lunch break | |
| 14:00-16:00 | Personal work on assignment and individual support to participants in the last hour of this period | *Personal work* |
| 16:00-16:30 | Moderated open discussion and final remarks | *Open desk* |

## The Building Forward Better Initiative

Conflict and fragility are at the core of some of the biggest challenges today – they are able to hinder development progress and reverse any development gains. Environmental factors are rarely, if ever, the sole cause of conflicts and vulnerability. However, the exploitation of natural resources and related environmental stresses can be implicated in all phases of the conflict cycle from contributing to the outbreak and perpetuation of violence to undermining prospects for peace.

A fundamental problem in fragile contexts is the loss of human capital. Without the contribution of knowledgeable professionals, the re-building process becomes even more complicated. Local capacities should be at the base of any re-building planning and investments, as they provide access to local knowledge and information and can guarantee the sustainability of the program in the long-term.

Indeed, effective institutions are central to address both the “capacity deficit” and “legitimacy deficit” faced in fragile contexts. Recognizing the importance to invest in human capital, the “Building Forward Better” Initiative of FAO promotes a blended training methodology, composed of administered and self-administered online and face-to-face training, addressing a series of topics in the domain of natural resources management.

The Initiative aims to reduce the knowledge gap and strengthen national institutions to enhance agricultural productivity, improve food security and, ultimately, contribute to peaceful societies for sustainable development

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