Food and Agriculture Organization
of the United Nations

AQUACROP ON THE GROUND – CASE STUDIES FROM WORLDWIDE EXPERIENCES

Maher Salman
Land and Water Division (NSL), FAO

Tunis, 12 December 2022

Regional gathering
Tunis, 12 – 16 December 2022

ITALIAN AGENCY FOR DEVELOPMENT COOPERATION

MODELLING CROP YIELD RESPONSE TO WATER FOR ENHANCING WATER PRODUCTIVITY

A new model was needed?

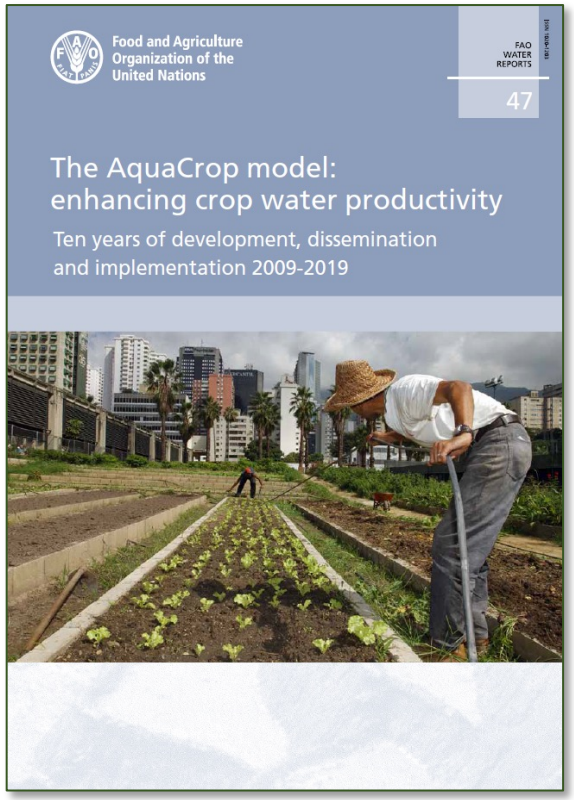
AQUACROP

Training and dissemination

Model improvements

New apps

Projects



2002 **2009** **2019**

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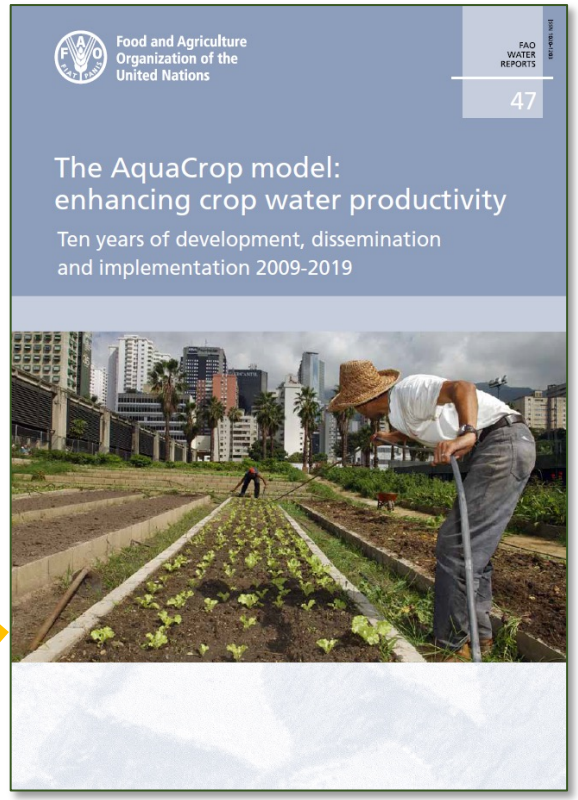
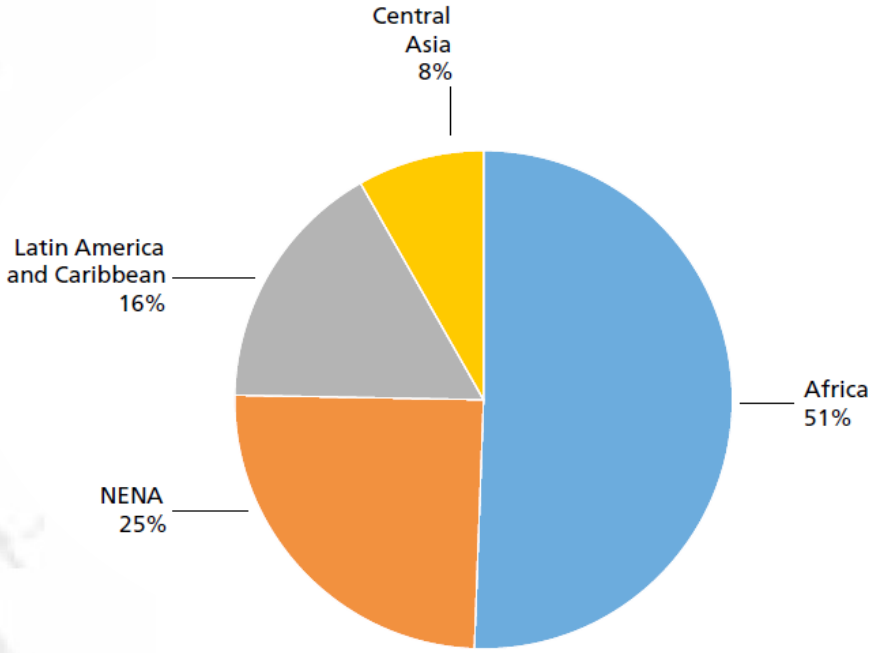


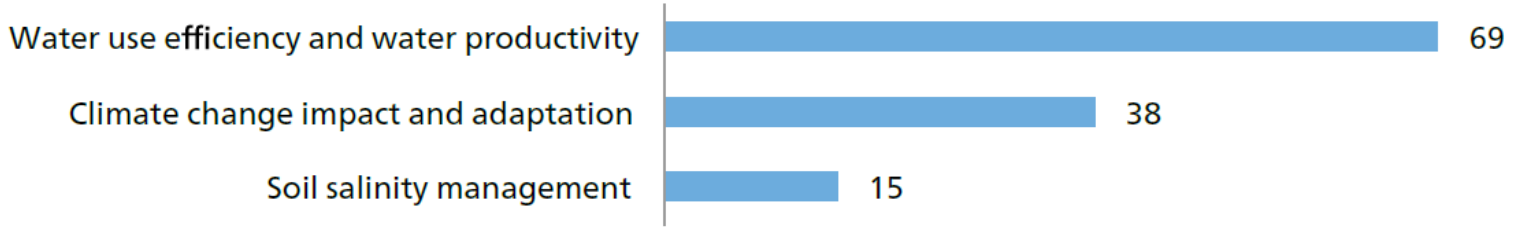
2002

2009

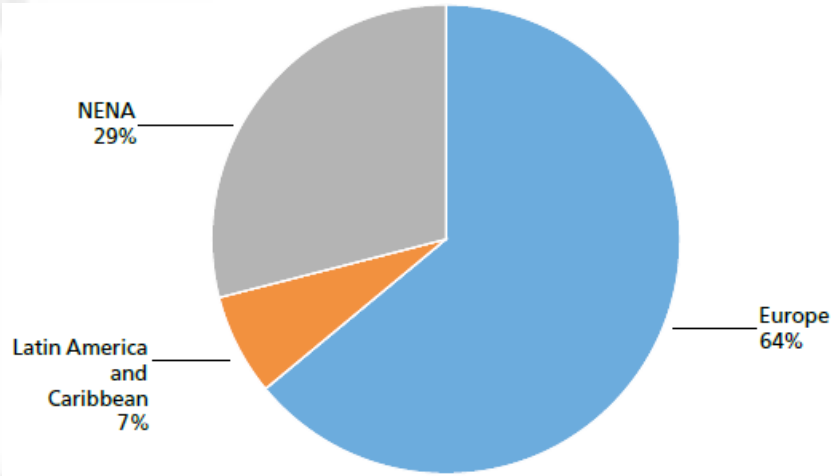
2019

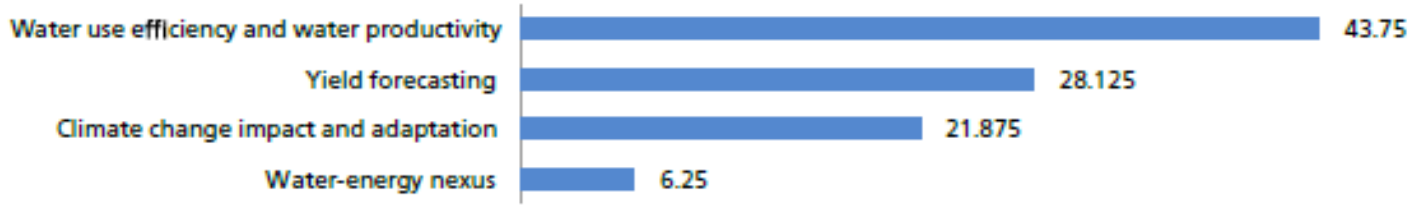
PROJECTS LED BY FAO AND THE JOINT FAO/IAEA CENTRE OF NUCLEAR TECHNIQUES



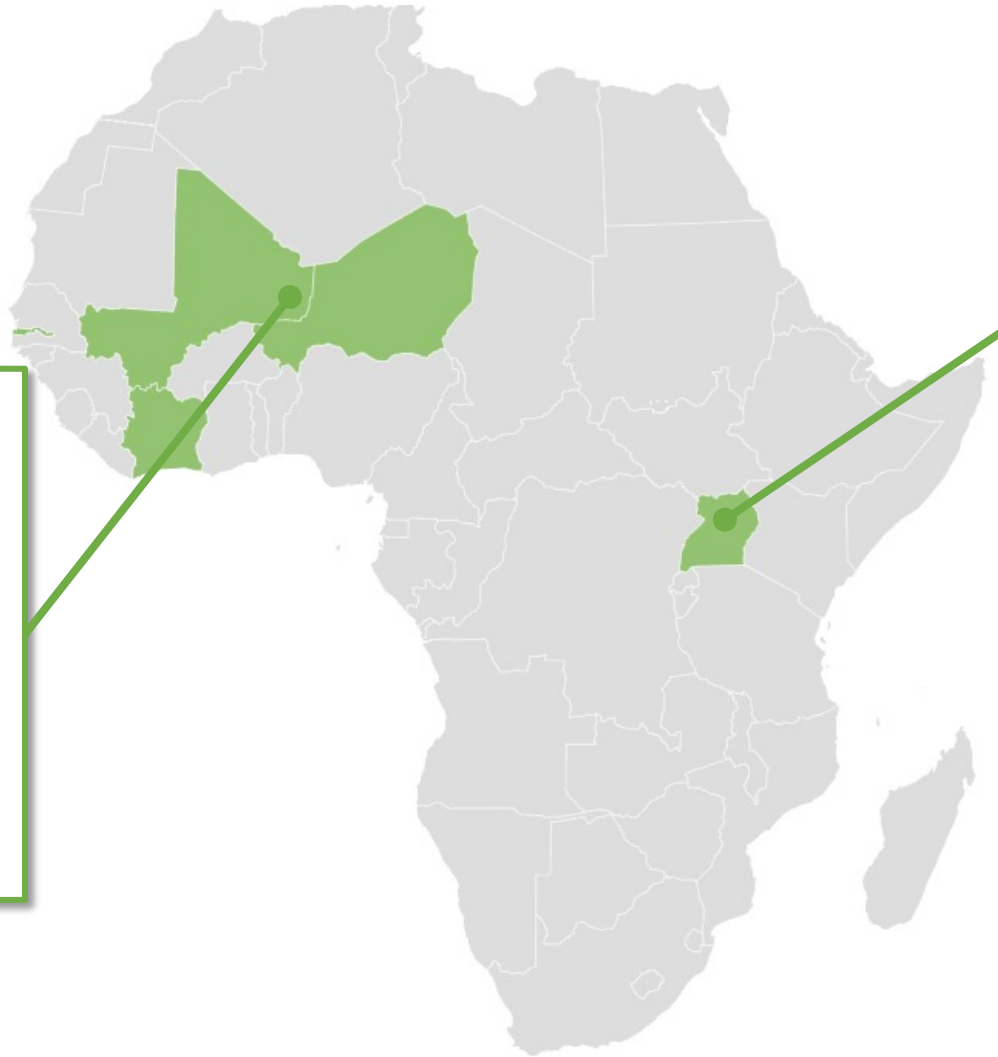


PROJECTS LED BY INSTITUTIONS OTHER THAN FAO





CASE STUDIES



AICCA project

Adapting Irrigation to Climate change

FAO-IFAD

AgWA project

Strengthening agricultural water productivity

FAO–Swiss Agency for Development and Cooperation

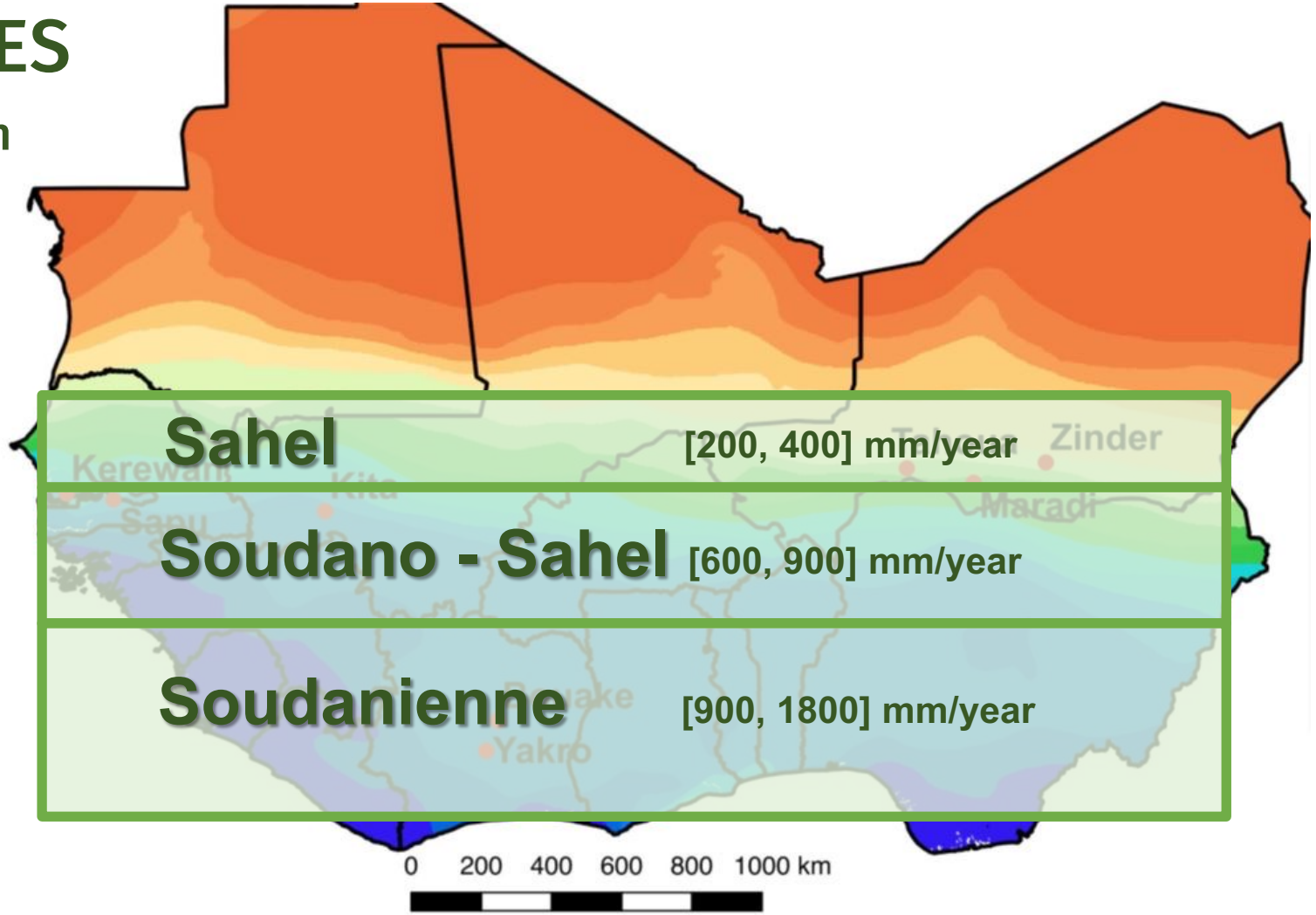
AICCA Project

ADAPTING IRRIGATION TO CLIMATE CHANGE

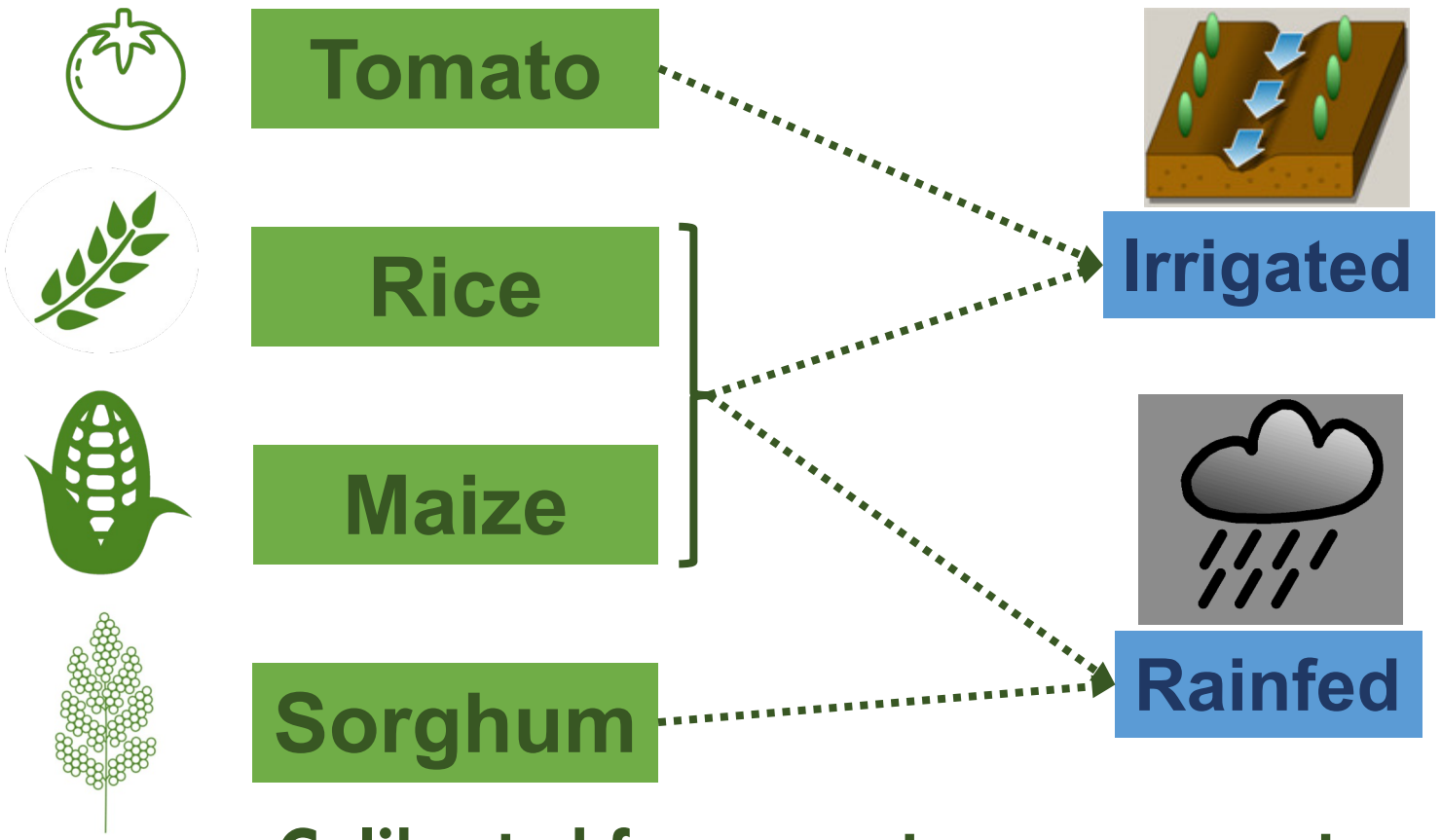
Raes, D., Waongo, M., Vanuytrecht, E., Mejias Moreno, P. 2021
Improved management may alleviate some but not all of the adverse effects of climate change on crop yield in smallholder farms in West Africa
Agriculture and Forest Meteorology, 108563, 308-309

PROJECT SITES

Rainfall Distribution

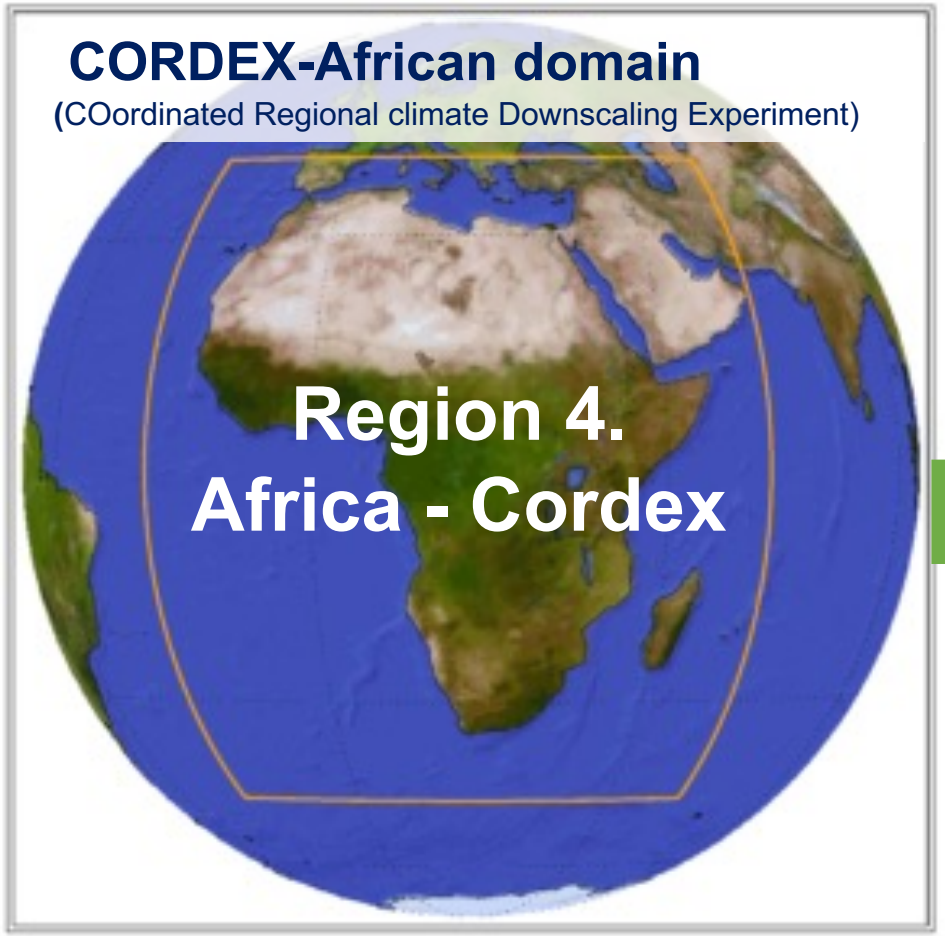


CROPS AND CULTIVATION METHODS



Calibrated for current management

REGIONAL CLIMATE MODELS (RCM)



Collect 10 RCM

Generate sets of daily data for 20 years

❑ Historical data	1986 – 2005
❑ Horizon 2030 (RCP 4.5)	
❑ " (RCP 8.5)	2021 – 2040
❑ Horizon 2050 (RCP 4.5)	
❑ " (RCP 8.5)	2041 – 2060

RCP: Representative Concentration Pathways

CLIMATE PROJECTIONS

Scenario	RCP 4.5 Moderate		RCP 8.5 Pessimistic	
Horizon	2030	2050	2030	2050
Precipitation ~	-5 .. +5 %	-10 .. +10 %	-8 .. +8%	-16 .. +16%
Temperature ↑	0.9 .. 1.5 °C	1.3 .. 2.2 °C	1 .. 1.7 °C	1.7 .. 3 °C
ETo ↑	2 .. 4.5 %	3 .. 6.5 %	2.5 .. 5.5 %	4.5 .. 8.0 %

SCENARIOS SIMULATED

Crop

Irrigation

Soil

10 considered combinations of crops, cultivation method and sites

Manage-ment

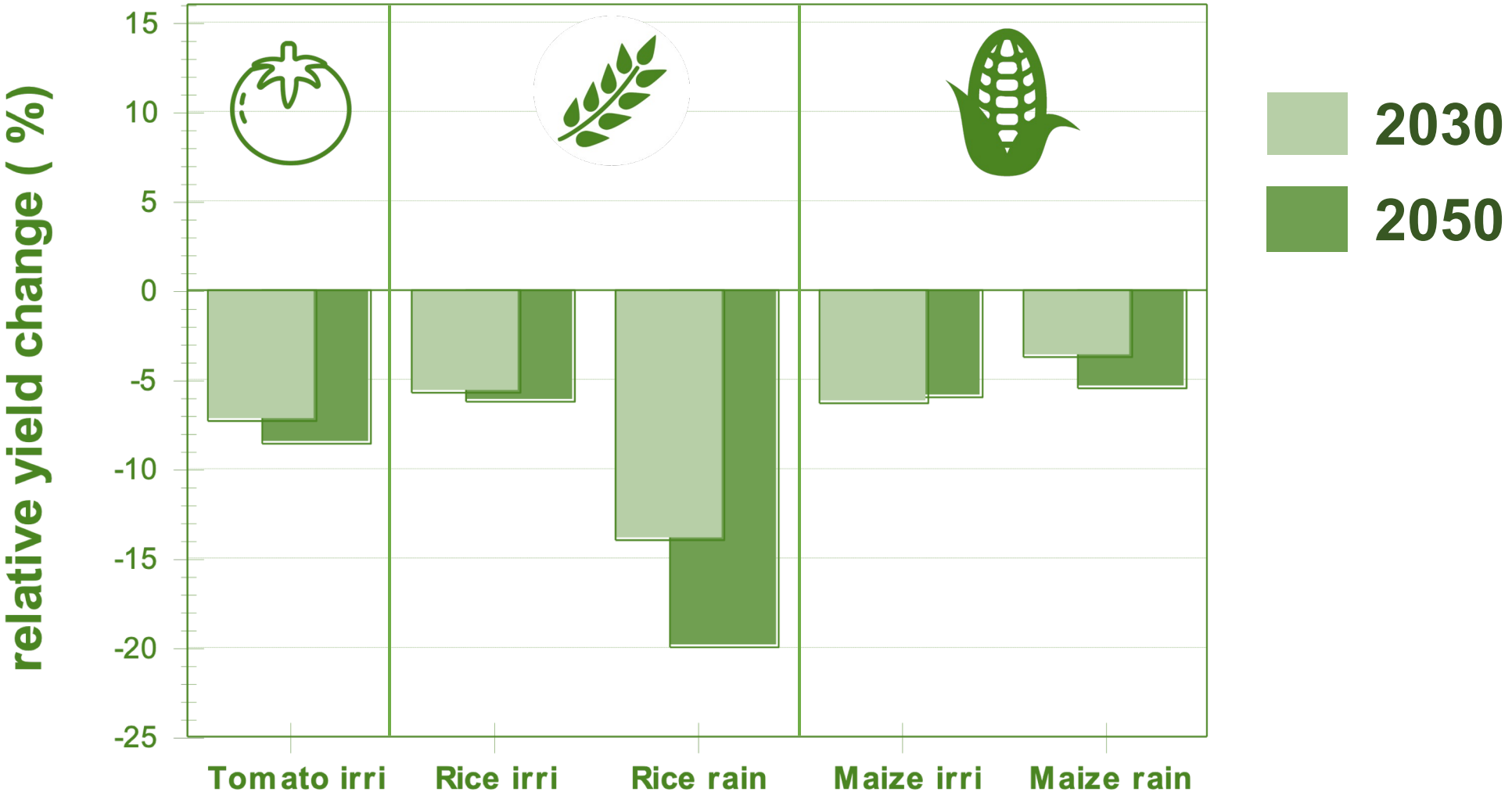
1. Current conditions
2. Adaptation strategies

Climate

5 scenarios + 3 RCM

AQUACROP

CURRENT SOIL FERTILITY



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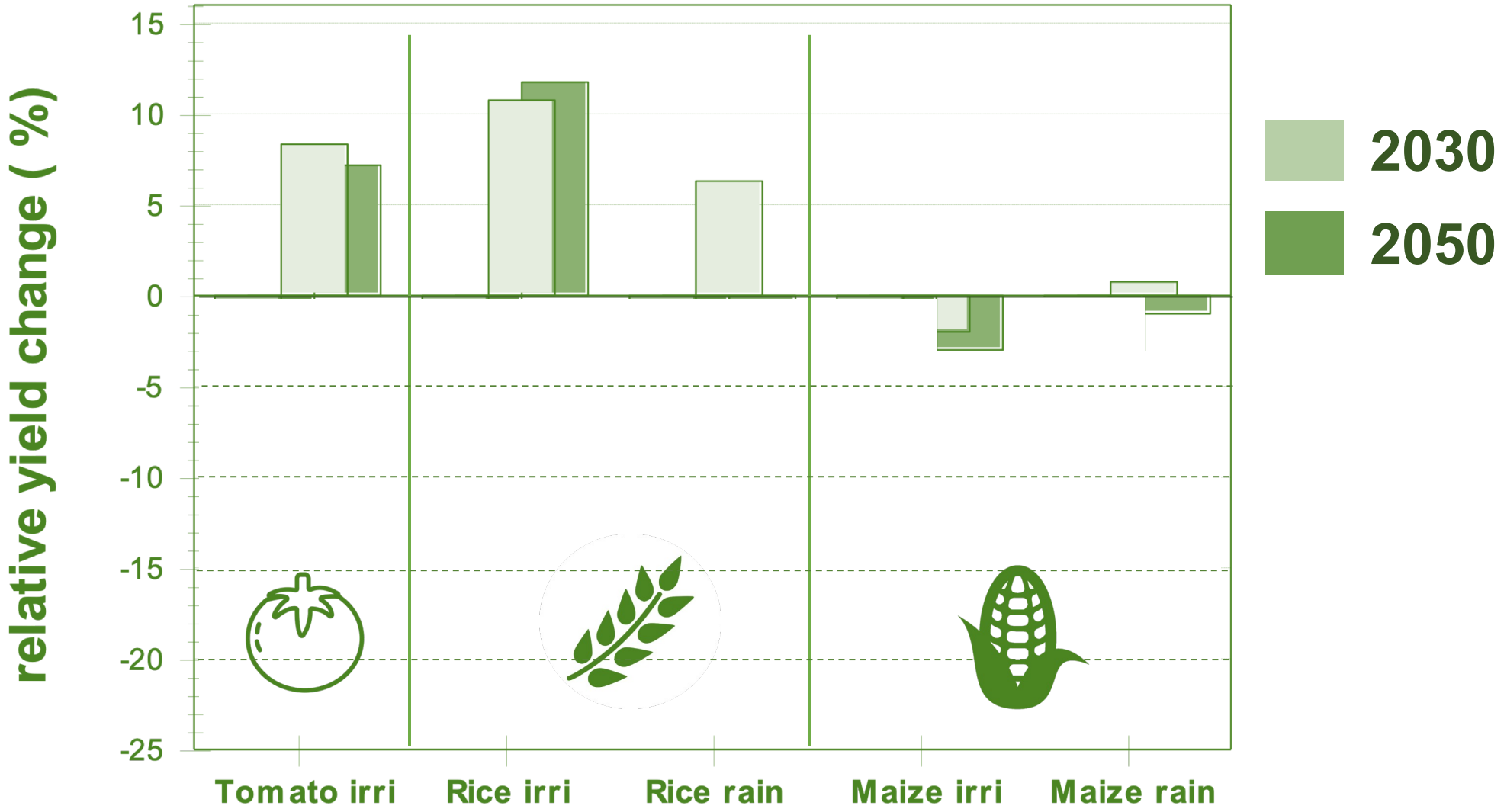
IMPROVED SOIL FERTILITY

~ + 5 … 25%
more soil
fertility



AgWA Project

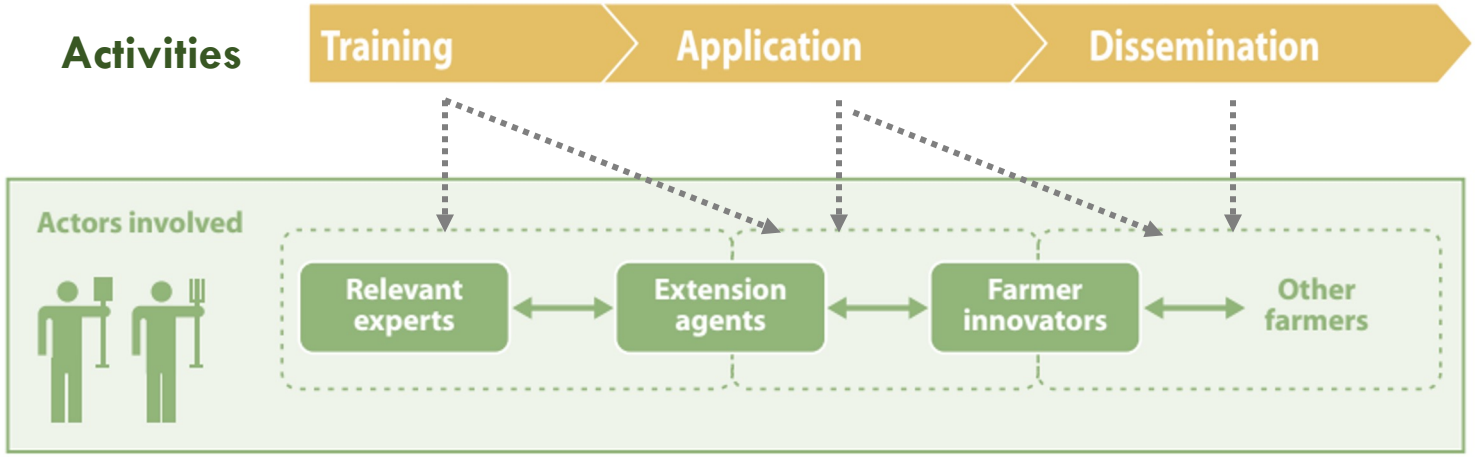
STRENGTHENING AGRICULTURAL WATER PRODUCTIVITY

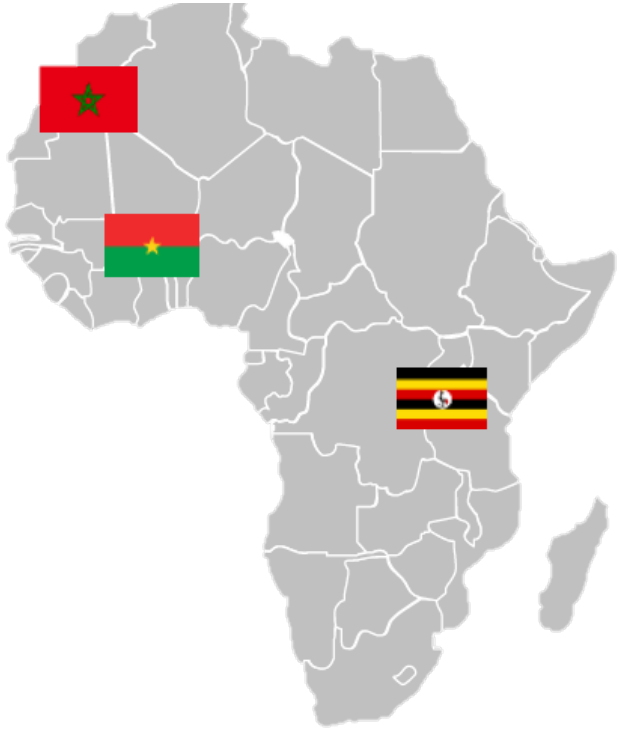
Salman, M., Pek, E., Fereres, E., Garcia-Vila, M. 2020
Field guide to improve crop water productivity in small-scale agriculture
The case of Burkina Faso, Morocco and Uganda
FAO, Rome

OUR TARGET

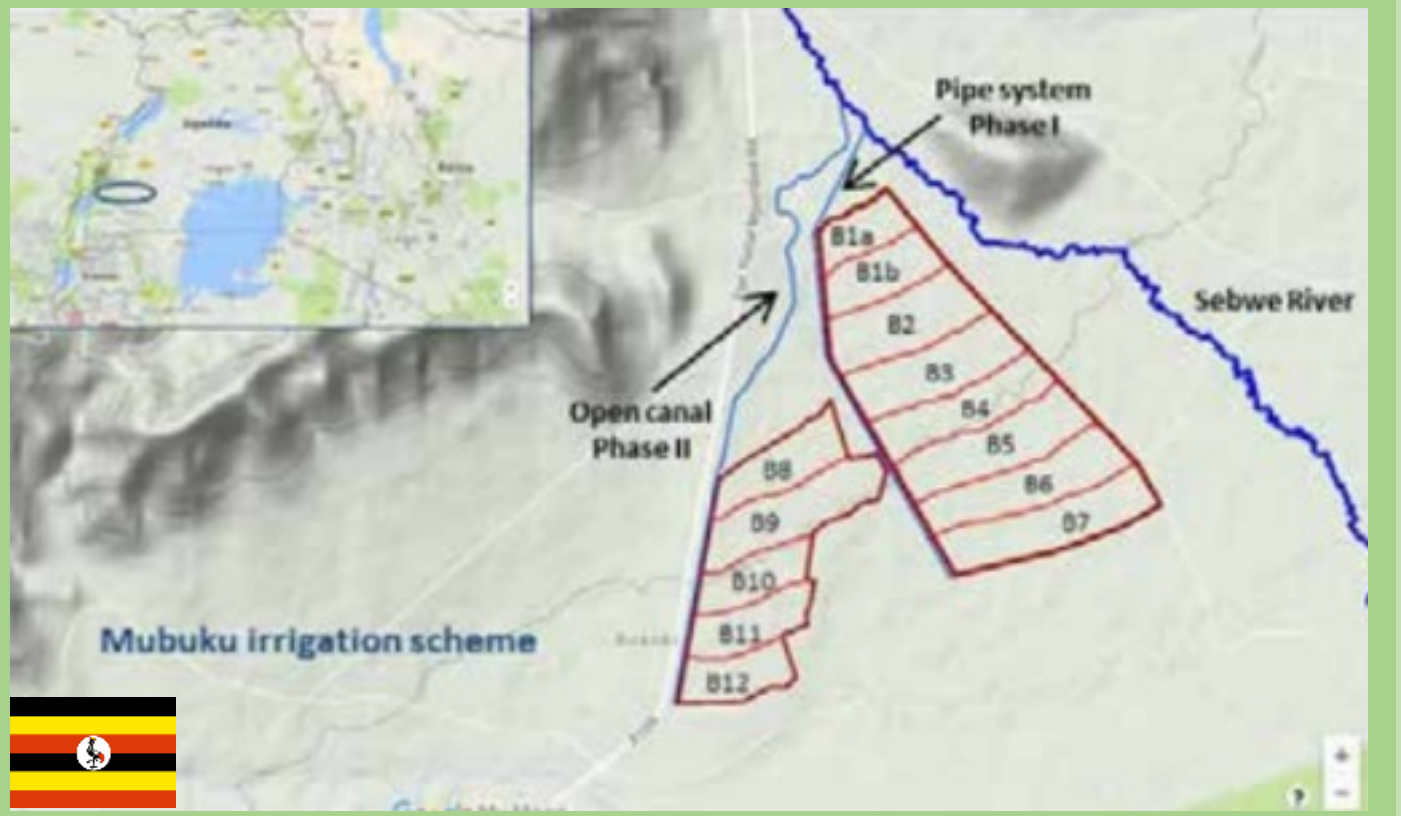
Assessing and improving on-farm crop water productivity in small scale agriculture

- To determine the WP gaps
- To identify the causes of the WP gaps
- To propose management strategies to close the gaps
- To delineate and propose policies that will enable the closure of WP gaps





MUBUKU IRRIGATION SCHEME



Area: 587 ha

Farmers: 160

Main crops: maize, rice, horticultural crops

Irrigation: furrow, surface

NARO

Water User Association - Cooperative

GUIDING QUESTIONS

Irrigation management

Agronomic practices

Where are farmers at?

Actual water productivity and yield

Where do they need to be?

Attainable water productivity and yield

How will they get there?

Good agricultural practices

THE PATH FOR ACTION

Training for capacity development

Diagnosis and benchmarking

- General data collection
- Farmers interviews
- Irrigation systems evaluations

Evaluation of attainable WP

- Monitoring farms for parametrization/validation of AquaCrop
- Design and simulation of management scenarios

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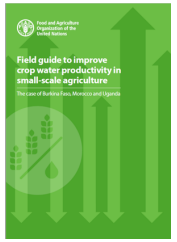
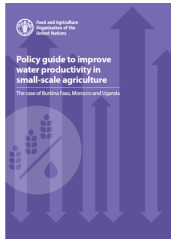
Identification of good agricultural practices

- Design of agricultural practices guidelines
- Demonstration and control plots for implementation and dissemination

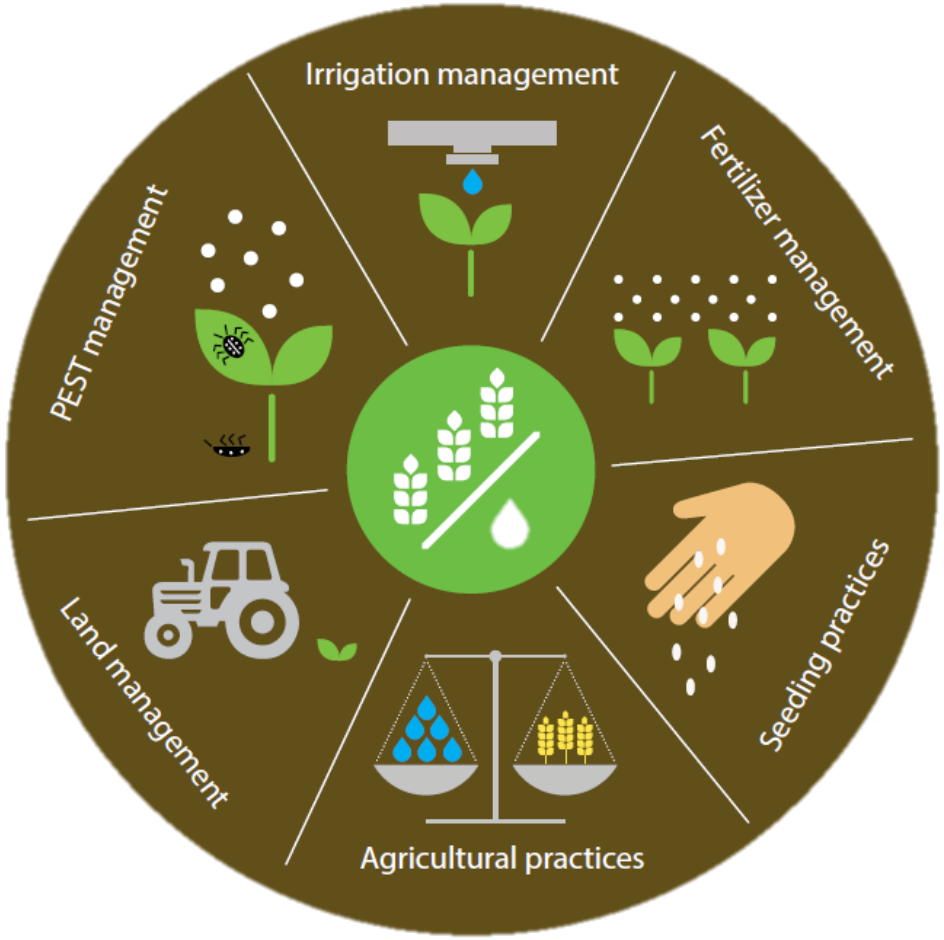
Promoting change in agricultural practices

- Design of capacity building strategies
- Implementation of dissemination activities





GOOD AGRICULTURAL PRACTICES GUIDELINES



Irrigation management

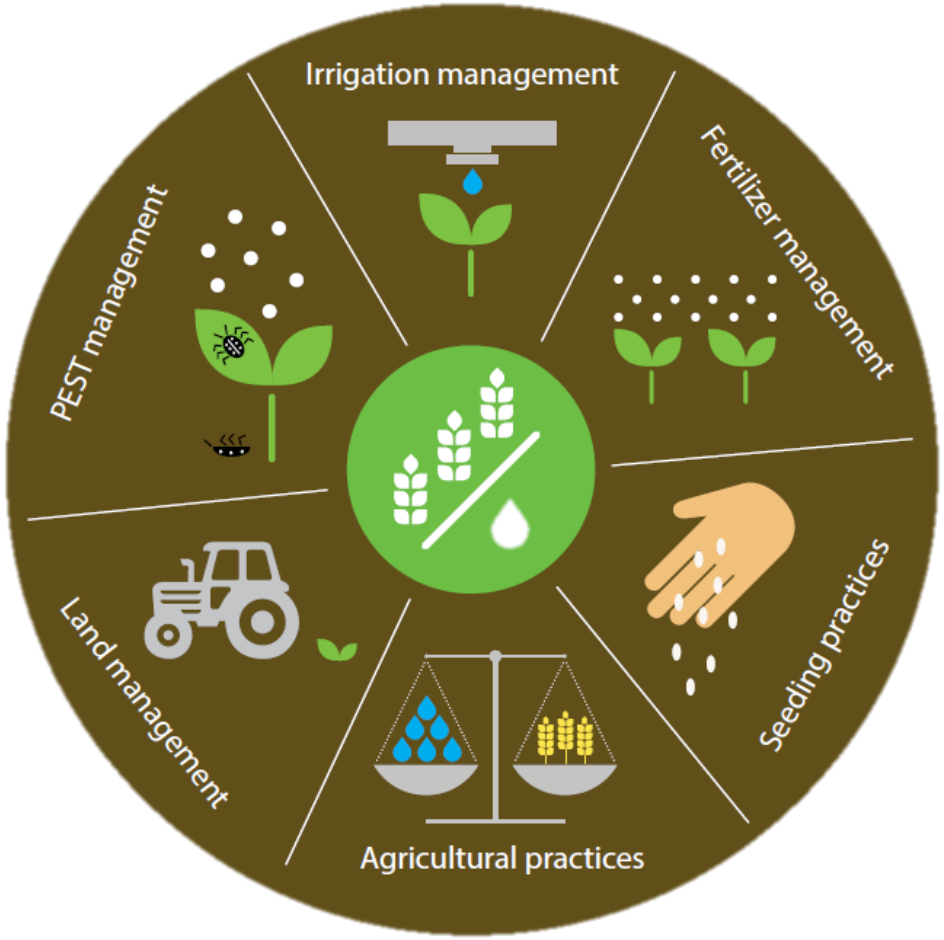
	Irrigation frequency	Critical stages
	Current	Flowering and grain filling
	Current	Flowering and grain filling
	Once a week	Bulb formation

Optimal irrigation scheduling

AQUACROP

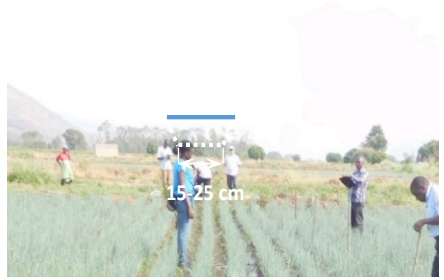
Siphon tubes for better control of furrow discharge flow

GOOD AGRICULTURAL PRACTICES GUIDELINES



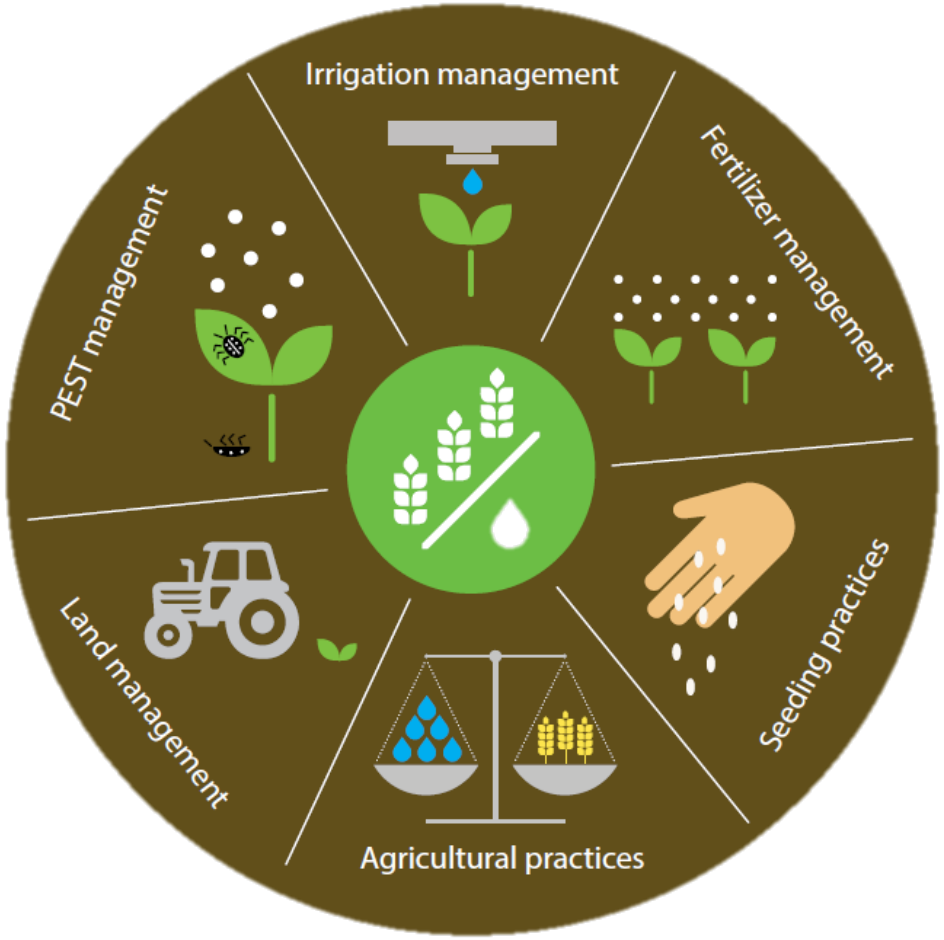
Irrigation water supply

Proper maintenance of the hydraulic infrastructures at quaternary level

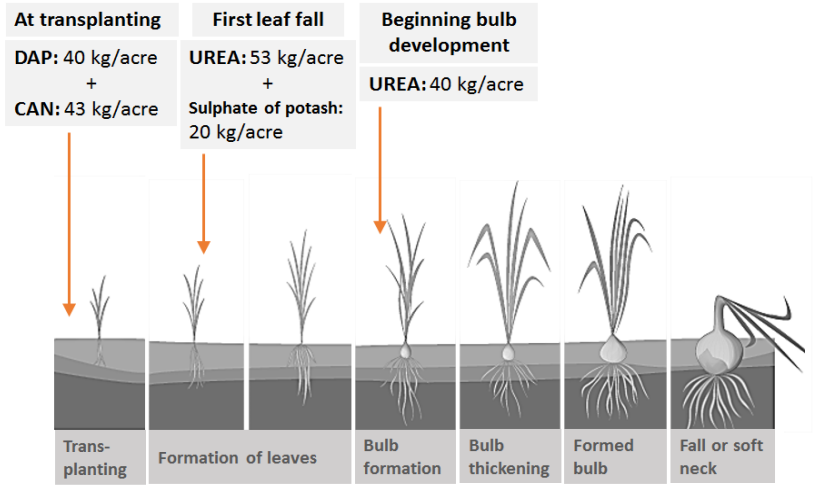


Appropriate ridging

GOOD AGRICULTURAL PRACTICES GUIDELINES



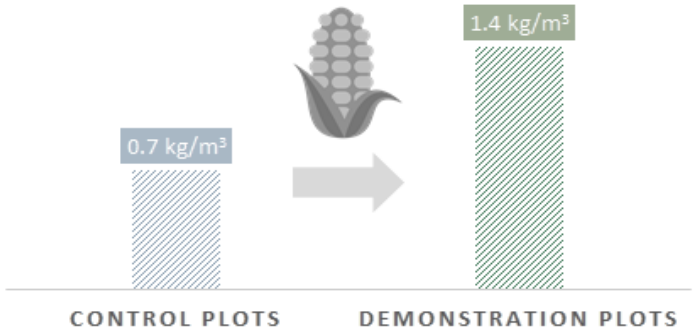
Other agricultural practices

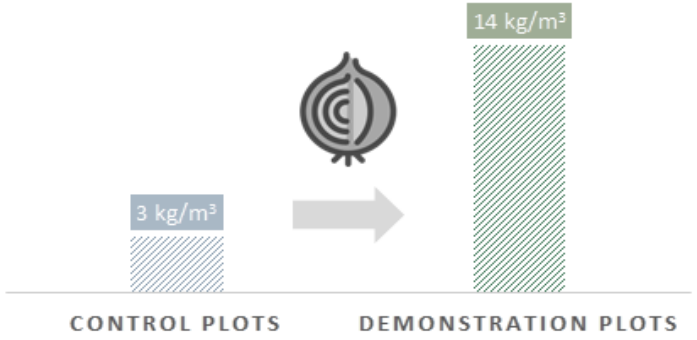


Adapted fertilization planning

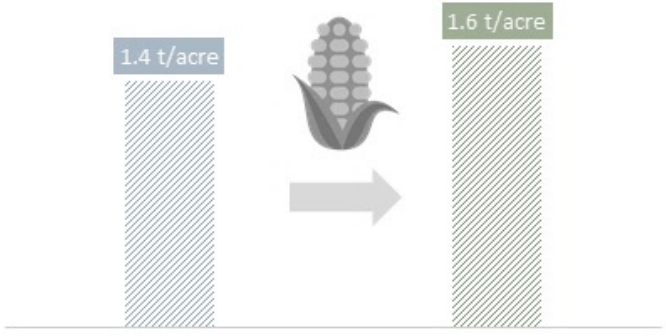
OUTCOMES

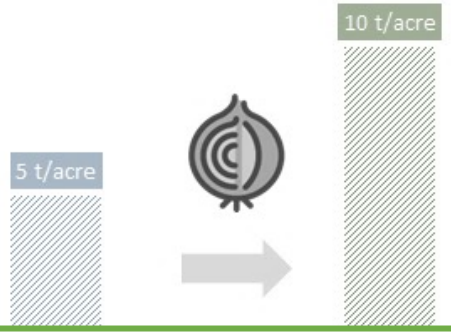
Water Productivity



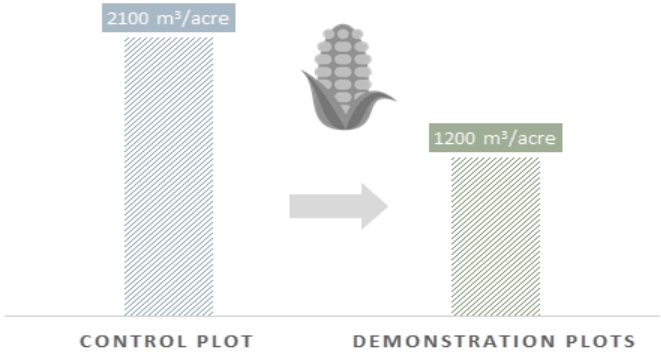


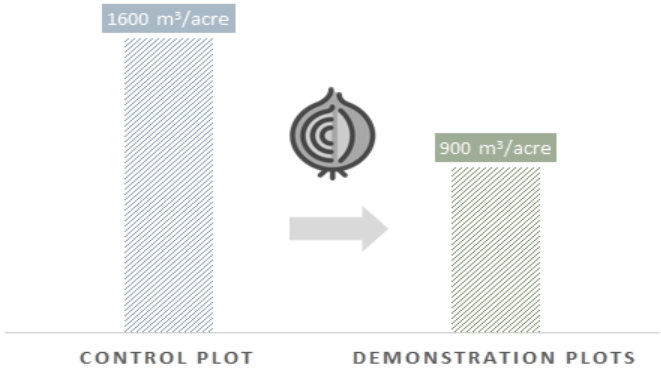
Crop Production





Applied Irrigation Water





Multiple applications for enhancing crop water productivity

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Irrigation scheduling

Climate change
Impacts and adaptation