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WATDEV CONSORTIUM

The project consortium is comprised of:

EGYPT	Heliopolis University (HU)
ETHIOPIA	Water and Land Resources Centre (WLRC)
FINLAND	Finnish Environment Institute (SIKE)
ITALY	Agenzia Italiana per la Cooperazione e lo Sviluppo (AICS – Cairo)
ITALY	Centro Internazionale di Alti Studi Agronomici Mediterranei di Bari (CIHEAM-Bari)
ITALY	Italian Research Council (CNR-IPSP)
KENYA	Kenya Agricultural & Livestock Research Organization (KALRO)
SUDAN	Water Research Centre (WRC)
THE NETHERLANDS	International Soil Reference Centre (ISRIC)
UGANDA	Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)

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Authors (Partner)	CIHEAM Bari			
Responsible Authors and contributors	**Name**	Gaetano Ladisa Silvia Lecci;	**Email**	ladisa@iamb.it lecci@iamb.it
	Partner	CIHEAM Bari	**Phone**	039 0804606421

Abstract (for dissemination)	From December 2023 to February 2025, the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM Bari), as technical and scientific lead partner of the WATDEV project, organized a three-module training course titled "Water, Soil, and Crop Management in a Climate-Smart Agriculture", hosted on its campus in Bari, Italy. The course aimed to strengthen the skills of researchers, technicians, and local authorities from Kenya, Ethiopia, Egypt, and Sudan in promoting sustainable and climate-resilient agriculture. The **first module** (December 2023) focused on Best Management Practices (BMPs) and innovations for soil, water, and crop management. Participants explored techniques such as manuring, agroforestry, intercropping, crop rotation, improved seeds, and the role of Water Users' Associations. The module included hands-on exercises and field visits to assess the feasibility and sustainability of selected practices in the four target countries. The **second module** (September 2024) addressed cutting-edge technologies in agriculture and water management through a blended format—online sessions and in-person training. The course covered remote sensing, satellite imagery, drones, precision farming, digital water management, and plant phenotyping. Field visits to innovative farms and processing units illustrated the integration of advanced practices and circular economy models. The **third module** (February 2025) focused on networking, project design, and access to funding opportunities. Participants engaged with European and international frameworks such as Horizon Europe, Erasmus+, DeSIRA, and the Marie Skłodowska-Curie Actions. High-level interventions from EU officials and experts enriched discussions on international cooperation, sustainability, and science diplomacy. Workshops on proposal writing, budgeting, and communication tools, including video storytelling, prepared participants to design and disseminate impactful projects. Conceived as a training-of-trainers program, the course enabled participants to replicate knowledge-sharing activities in their countries. The initiative supported regional cooperation and built a community of practice for climate-smart and innovation-driven agriculture in East Africa and Egypt.
Keywords	Climate-Smart Agriculture, Innovation & Technology, Capacity Building, International Cooperation.

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Acronyms and Abbreviations

AICS	Italian Agency for Development Cooperation
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa, Uganda
AU-EU	African Union – European Union
CIHEAM	Centre International de Hautes Etudes Agronomiques Méditerranéennes, Italy
CNR	Consiglio Nazionale delle Ricerche, Italy
DG INTPA	Directorate General for International Partnership
DG RTD	Directorate General Research and Innovation
EU	European Union
HRC	Hydraulics Research Center- Ministry of Water and Irrigation- Gezira, Sudan.
HU	Heliopolis University, Egypt
ISRIC	International Soil Reference Center, The Netherland
KALRO	Kenya Agricultural & Livestock Research Organization, Kenya
KU	Khartoum University, Sudan
NRC	National Research Council, Sudan
R&I	Research and Innovation
SERI	Sustainable Europe Research Institute
SYKE	Finnish Environment Institute, Finland
WATDEV	Climate Smart WATer Management and Sustainable DEVelopment for Food and Agriculture in North and East Africa
WLRC	Water and Land Resources Center, Ethiopia
WRC	Water Research Centre, Sudan

Executive Summary

The Climate Smart WATer Management and Sustainable DEVelopment for Food and Agriculture in East Africa (WATDEV) aims to enhance the sustainability of agricultural water management and resilience of agroecosystems to climate change in Easter Africa and Egypt. AICS (Agenzia Italiana per la Cooperazione e lo Sviluppo) is the executive agency, CIHEAM-BARI is leading scientific institution working with ASARECA (Strengthening Agricultural Research in Eastern and Central Africa), KALRO (Kenya Agricultural and Livestock Research Organization), WLRC (Water, Land Resources Centre - Ethiopia), WRC (Water Research Centre, Sudan) and HU (Heliopolis University, Egypt). The project aims to develop an in-depth understanding of small to large-scale water and agricultural resource dynamics and management and people's resilience to climate through innovative research, modelling, and capacity-building approaches.

The overarching objective of the project is to enhance the sustainability of agricultural water management and resilience of agroecosystems to climate change in East Africa and Egypt. The specific objectives are: (1) National Ministries and Research Institutions improve their knowledge and management of water in agriculture; and (2) Farmers and local actors, cooperatives, and Water Users' Associations implement innovative/sustainable solutions and skills on water management.

The A2.2 Training and Capacity Building activity aims to empower local stakeholders in effectively implementing Best Management Practices (BMPs) and Innovations within their respective regions and communities. Emphasis is placed on advocating for the adoption of targeted BMPs while nurturing sustainable development. The training Course "Water, Soil, and Crop Management in a Climate-Smart Agriculture" was hosted at the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) in Bari - Italy and comprises three modules:

- 1st Module: "Principles of the Best Management Practices and Innovations" (December 11th to 16th, 2023 - in person);
- 2nd Module: "Innovative Technologies in Agriculture and water Management" (September 9th to 13th - Online, September 16th to 20th, 2024 - in person);
- 3rd Module: "Networking for Cooperating, Project Design, and Funding Opportunities" (February 17th to 28th, 2025 – in person).

Twenty delegates from Kenya, Ethiopia, Egypt, and Sudan were selected by WATDEV project Partners to attend the Course. Participants included junior researchers, public officials from local authorities, and extension workers actively involved in the implementation of BMPs and innovation projects within their respective regions. In turn, given the specific topic of some Modules, the Organizers extended the possibility of participation to the four WATDEV PhD students, to representative of each African partner and to CIHEAM 2nd year's Master students.

The training featured remarkable contributions from European institutions, internationally renowned experts, researchers and officers from international organization.

Technical visits have been organised at important private companies and public authorities in Puglia.

After the training, participants collaborated closely with local partners to transfer the newly acquired knowledge to local farmers, thereby promoting sustainable development within their communities.

1. Introduction

1.1 Preamble

The Climate Smart WATer Management and Sustainable DEVelopment for Food and Agriculture in East Africa (WATDEV) aims to enhance the sustainability of agricultural water management and resilience of agroecosystems to climate change in East Africa and Egypt. Agenzia Italiana per la Cooperazione e lo Sviluppo (AICS) is the executing agency, while CIHEAM-BARI is the leading scientific institution, working closely with the Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), the Kenya Agricultural and Livestock Research Organization (KALRO), Water, Land Resources Centre – Ethiopia (WLRC), Water Research Centre (WRC), Sudan and Heliopolis University (HU), Egypt.

The project is aimed at developing an in-depth understanding of small to large-scale water and agricultural resource management and people's resilience to climate change through innovative research, modelling, and capacity-building approaches.

The overarching objective of the project is to enhance the sustainability of agricultural water management and the resilience of agroecosystems to climate change in East Africa and Egypt.

The specific objectives include: (1) National Ministries and Research Institutions improve their knowledge and management of water in agriculture; and (2) Farmers and local actors, cooperatives, and Water User Associations implement innovative/sustainable solutions and skills on water management.

1.2 Purpose, Context, and Scope of this Deliverable

The main objective of the activity A2.2 Training and Capacity Building is to provide support to local actors in effectively implementing Best Management Practices (BMPs) and Innovations in their respective territories and communities. The focus will be on promoting the adoption of selected BMPs and fostering sustainable development.

1.3 Structure and Content of the Deliverable

Deliverable D2.2.2 Final report on Training and Capacity Building in Pilot Areas.

The structure for the D2.2.2 report is as follows: (i) Executive Summary, (ii) Introduction, (iii) Course Structure, (iv) Methodology, (v) Conclusions, and (vi) Annexes.

This document (D2.2.2) provides information on the Training program, feedback received by the participants to the three Modules and how those contributes to the achievement of the Logical Framework indicators.

2. Course structure

The overall training course is structured into three (3) modules. These modules have been carefully designed to address the identified training needs and are outlined as follows:

Module 1: Introduction to BMPs and Innovations

- Comprehensive introduction to the selected Best Management Practices (BMPs) and Innovations, focusing on their technical aspects and providing participants with the knowledge necessary for successful implementation.
- Training on assessing the sustainability of BMPs, covering environmental, economic, and social dimensions. Participants will gain insights into evaluating the long-term viability and impact of BMPs in these key areas.

Module 2: Innovative Technologies in Agriculture and Water Management

- Exploration of cutting-edge technologies in agriculture and water management, equipping participants with an understanding of the latest advancements and their practical applications.
- Introduction to digital agriculture and decision-support tools, enabling participants to leverage technology for data-driven decision-making in agricultural practices and efficient water management.

Module 3: Networking for cooperating, Project design and Funding Opportunities

- Guidance on navigating the landscape of project design and funding opportunities. Participants will learn how to design or contribute designing a competitive and effective project idea to submit to international and local institutions for funding.
- Strategies for creating synergies at both the local and regional levels, fostering collaboration and knowledge sharing among stakeholders for enhanced outcomes.
- Training on techniques for accurate reporting and effective communication of results to end-users and decision-makers.

By structuring the training course in this manner, participants will acquire a comprehensive understanding of BMPs, innovations, sustainable practices, advanced technologies, project funding avenues, and effective communication strategies.

The course will provide participants with the necessary skills and knowledge to make meaningful contributions to the adoption and successful implementation of BMPs and innovations in their respective contexts.

2.1 Summary of Training courses contents

The training courses were strategically designed with a regional focus, aiming to have a broad impact on the target countries. They adopted the Training for Trainers (ToT) format, emphasizing the multiplier effect by equipping participants to disseminate knowledge and skills within their local communities. The training course programmes were designed based on the training needs identified during the A1.3 Multi-Actors' Regional Meeting that took place in Nairobi, Kenya, on 8th March 2023.

The primary beneficiaries of this training course are people from Egypt, Ethiopia, Sudan, and Kenya, who will play key roles in water management in food and agriculture through implementing relevant Best Management Practices (BMPs) and innovations within their respective regions.

The courses featured a combination of lectures and interactive works, providing participants with practical experiences and valuable insights.

To ensure the delivery of high-quality instruction, experienced international tutors facilitated the training sessions. Their expertise and diverse perspectives enhanced the learning experience and fostered knowledge exchange among participants. At the end of the courses, attendees were awarded attendance certificates issued by CIHEAM-Bari, acknowledging their active participation and successful completion of the training program (Annex 7.6). These certificates can serve as valuable credentials, highlighting the participants' commitment to advancing BMP implementation and innovation in their professional capacities.

Organizer and Contributing Partners

CIHEAM-Bari (Lead Partner)

CNR

ASARECA

HU

WLRC

WRC

KALRO

2.2 Beneficiaries

The A2.2 Training and Capacity Building Course targets a range of beneficiaries involved in the implementation of Best Management Practices (BMPs).

Targeted selected beneficiaries are end-users, extensionists, junior researchers, public officers, and young innovators engaged in BMPs implementation and innovation projects. By involving this diverse group of beneficiaries, the trainings aim at building a strong network of expertise with knowledge and skills able to enhance sustainable development in their respective fields.

Five participants for each country were selected by local partners (HU, KALRO, WRC, WLRC).

2.3 Participants' selection

The selection to enrol for the training and capacity building course on "Water, soil and crop management in a Climate-smart agriculture" was opened on 1st August 2023.

The timeline of the selection procedure is in the table here below.

Table 1 – Timetable for the selection procedure

Selection start	1st August 2023
Selection closure	1st September 2023
Consensus phase	10th September
Communication of the selected participants	up to 15th September 2023
Start of the Course	Mid-December 2023

Local Partners carried out the selection of participants to ensure the highest impact and enhance the capacity of local personnel to effectively disseminate the knowledge acquired during the training course. While the Local Partners primarily handled the selection process, CIHEAM-Bari played an advisory role, especially in establishing the minimum requirements for participants.

This collaborative approach helped identify individuals with the potential to maximize the benefits of the training and contribute significantly to BMP implementation and innovation in their communities.

2.4 Participants' profiles

The A2.2 Training and Capacity Building Course was open to individuals with diverse educational backgrounds and expertise. The course welcomed graduates in scientific disciplines such as agronomy, ecology, geology, civil engineering, and agricultural engineering. While participants with professional experience were preferred, the course recognized the value of inclusivity and encourages individuals at various stages of their careers to participate.

There was no age limit for participants, and special consideration was given to young people showing a strong commitment to making a positive impact in their fields. By prioritizing the involvement of young participants, the training aimed to empower and nurture the next generation of leaders in BMP implementation and innovation.

Proficiency in the English language is essential as the training is conducted entirely in English.

This requirement ensures effective communication and facilitates seamless knowledge sharing among participants from diverse backgrounds.

Overall, the participant profile was characterized by a blend of educational qualifications, professional experience (where applicable), and a shared enthusiasm for advancing sustainable practices in BMPs and innovations. The course values diversity and encourages participants to bring their unique perspectives, contributing to a dynamic learning environment that fosters collaboration and cross-disciplinary knowledge exchange.

Table 2 - Participant Profile Criteria

Criteria	Requirement
Professional Experience	Preferred, but not mandatory
Age limit	No age limit
Foreign language knowledge	Proficiency in English
University degree	Graduates in relevant scientific disciplines

2.5 The Modules' structure and Duration

The three Modules of the Course took place at CIHEAM-Bari Campus "Cosimo Lacirignola" (Valenzano, Bari- Italy): https://www.iamb.it/education/student-life/.

Each Module was thoughtfully divided into various components to provide a comprehensive learning experience:

- Theoretical Lessons:

Participants were engaged in in-depth theoretical sessions led by subject matter experts. These sessions covered the fundamental concepts, principles, and theoretical frameworks related to the Module's topics.

- Practical Exercises:

To reinforce the theoretical knowledge, participants actively participated in practical exercises. These exercises provided hands-on experience, allowing participants to apply their learnings in simulated scenarios or real-world situations.

- On-Field Technical Visits:

To provide a practical understanding of the course topics, participants had the opportunity to embark on on-field technical visits. These visits enabled them to observe and learn from real-life implementations of Best Management Practices (BMPs) and innovations.

The course structure ensures a balanced blend of theoretical knowledge, practical application, and real-world exposure. This approach aims to enhance participants' understanding and skills, enabling them to effectively implement BMPs and innovations in their respective contexts.

The overall duration of the course's modules was the following:

Table 3 - Dates and Duration of the modules

Module no.	Duration (hours/days)	Date	Venue
1	42 hours (6 days)	11-16 December 2023	CIHEAM-Bari Campus
2	20 hours (5 days) 35 hours (5 days)	9-13 September 2024 (online) 16-20 September 2024	CIHEAM-Bari Campus
3	60 hours (10 days)	17-28 February 2025	CIHEAM-Bari Campus

Language

The course was held in English.

3. Methodology

3.1. Abstract of the Module 1 "Introduction to BMPs and Innovations"

Module 1 of the training course focused on providing participants with a comprehensive understanding of selected Best Management Practices (BMPs) and innovations, as well as the technical aspects involved in their successful implementation. This module, led by experienced lecturers and experts in their respective fields, aimed to equip participants with the necessary knowledge and skills to promote sustainable agriculture and water management practices.

The module began with a deep dive into soil health, emphasizing the importance of manuring, crop rotation, and soil conservation techniques. Participants learned about soil properties, such as texture, structure, organic matter, and fertility, and how they contribute to ecosystem services. They also explored methods for producing quality manure, selecting appropriate crops, and implementing effective crop rotation strategies.

Next, the module explored the significance of improved seeds in agricultural practices. Participants gained insights into the process of seed selection, the production of improved-quality seeds, and the role of farmers' organizations in advocating for the use of high-quality seeds. They also delved into subsidy programs linked to improved seeds, fostering an understanding of the policies and support mechanisms that promote their adoption.

The module further explored the concept of agroforestry and intercropping, highlighting the vital role of vegetation in protecting soil. Participants learned about afforestation techniques, including species selection, site preparation, maintenance, and bio-engineering techniques for watershed maintenance. This knowledge will enable participants to leverage the benefits of agroforestry and intercropping in soil conservation, erosion control, and associated ecosystem services.

Additionally, participants explored the critical aspects of water management through the lens of Water Users' Associations. They gained insights into improving water use efficiency, managing irrigation schemes, automating irrigation operations, and enhancing drainage systems. The module also addressed water governance, focusing on equitable water allocation, participatory irrigation management, and market access considerations.

To reinforce the theoretical lessons, participants were engaged in practical exercises. They visited the Consorzio di Capitanata, Candelaro Irrigation Scheme, and Rignano Garganico's bio-engineering interventions to halt soil erosion (both locations are in the Puglia region, South Italy). These visits provided real-world exposure to irrigation schemes, modern technologies, and other relevant sites, allowing participants to observe and learn from on-the-ground implementations.

Overall, Module 1 sets the foundation for participants to understand and implement selected BMPs and innovations. By equipping them with theoretical knowledge, technical skills, and practical insights, this module aimed to empower participants to drive sustainable practices and make positive contributions to their respective fields and communities.

Table 4 - Module 1 contents

Module 1	**Introduction to BMPs and Innovations**
Title	*Contents*
Theoretical and technical aspects for selected BMPs/Innovation, implementation	**Soil health: Manuring and Crop rotation:** • Basics of Soil properties (Texture, structure, soil organic matter and soil fertility, soil water retention) and associated ecosystem services. • Soil conservation techniques. • Production of quality manure. • Crops selection. • Rotations (examples).
	Improved Seeds: • Basics of seeds selection. • Improved-quality seeds production. • Awareness on use improved seeds. • Role of farmers organizations on the use of quality seed • Subsidy programs linked to improved seeds.
	Agroforestry and Intercropping: • Role of vegetation in soil protection (erosion control, windbreaks, water retention, associated ecosystem services). • Afforestation techniques (species selection, site preparation, sowing, seedling, propagation material and forest nurseries, maintenance). • Basics of bio-engineering techniques for the watershed maintenance (terraces, rubble walls, gabions, …).
	Water Users' Association: • Water use efficiency. • Management of irrigation schemes. • Automation of irrigation operation. • Irrigation intervals. • Improve drainage system. • Water governance (conflict on resource use, equitable water allocation). • Participatory Irrigation Management (PIM). • Market access (marketing).
BMPs sustainability assessment	**Biophysical and socioeconomical sustainability of BMPs:** • Basics of sustainability. • Sustainability indicators/indices. • Techniques for feasibility study. • Practical exercise: feasibility study on the implementation of BMPs in the 4 pilot areas.
Technical visit	• Consorzio di Capitanata (Foggia) • Rignano Garganico (Foggia): bio-engineering interventions

3.2. Abstract of the Module 2 "Innovative Technologies in Agriculture and Water Management"

In the 2nd Module of the training course, participants will delve into the exciting realm of innovative technologies in agriculture and water management. This module is designed to equip participants with a comprehensive understanding of the latest advancements and their practical applications in these fields.

The **first week of the course (from 9 to 13 September)** was held online, jointly with the CIHEAM Bari Advanced Specialized Course: "Precision Agriculture for the Mediterranean Region". This first part led to an exploration of cutting-edge technologies in agriculture and water management, including the use of modern technologies in water resources management. Participants will be introduced to a wide range of innovative solutions that have the potential to revolutionize farming practices and water resource management.

One of the key areas covered in this module is precision agriculture and smart farming. Participants learned about the use of sensing technologies for precise monitoring and management of crops and soils. They discovered how remote sensing techniques, such as satellite imagery and drones, can provide valuable data for optimizing agricultural practices.

The participants attended in presence the **second week of the course (from 16 to 20 September)**. This session presented a mix between lectures and on-field technical visits, covering key areas ranging from precision agriculture and smart farming. Participants learned about the use of sensing technologies for precise monitoring and management of crops and soils. They discovered how remote sensing techniques, such as satellite imagery and drones, can provide valuable data for optimizing agricultural practices.

Throughout Module 2, participants will have the opportunity to engage with expert lecturers who specialize in innovative technologies in agriculture and water management. The module is designed to enhance participants' knowledge and skills, enabling them to leverage technology-driven approaches for sustainable and efficient agricultural practices and water resource management.

During a visit to the Valle Verde farm, in Gravina di Puglia, the participants can also see the benefits of the integration of automation and robotics in agriculture, exploring how autonomous systems and robotics can enhance efficiency and productivity in farming operations.

During the technical visit to the Andriani Spa Factory and ApuliaKundi farm, participants have a showcase of a successful experience of circular economy linking together the production of gluten-free pasta in a fully automatized plant, the reuse of water in the grown of Spirulina algae and the use of this one in the production of healthy food.

An in-depth analysis will be devoted to the recent advances in plant phenotyping to improve tolerance against abiotic stresses. This item will be afforded in the frame of an ad-hoc workshop organized under the umbrella of CNR-IPSP, during a technical visit to their experimental farm in Metaponto (Italy).

Another crucial aspect of Module 2 is digital water management systems. With the support of Acquedotto Pugliese (AQP) expertise, participants will gain insights into the role of digital technologies in water resource management. They will learn about the use of Internet of Things (IoT) applications, smart sensors, and real-time monitoring systems for efficient water utilization and conservation. The module will also cover the use of remote sensing techniques for water resources assessment, enabling participants to understand how satellite-based observations and data analysis can support effective water management.

By the end of this module, participants will have a solid understanding of the latest advancements in agriculture and water management. They will be equipped with the knowledge to identify and adopt appropriate technologies for optimizing farming practices, improving resource utilization, and addressing water management challenges.

The focus will be on understanding the principles and underlying concepts behind these technologies, as well as their benefits and applications in real-world scenarios.

Table 5 - Module 2 contents

Module 2	**Innovative Technologies in Agriculture and Water Management**
Title	*Contents*
Introduction to Precision Agriculture (Online part, joined with the CIHEAM Bari's Advanced Specialized Course in Precision Agriculture)	• Opening • Presentation of the advanced specialized course • General concepts of Precision Agriculture (PA) • Practical knowledge for an effective PA application • Mechanisation, robotics & Artificial Intelligence (AI) • Drivers and challenges of PA: a socio-technical perspective • The role of technology producers & service providers • The Southern Mediterranean context: the need of a tailored PA • Contribution of PA to sustainable water management • CIHEAM Bari innovations for precision pest surveillance & water management at landscape level
Innovative Technologies in Agriculture and Water Management	**Sensing Technologies and renewable energy integration** • Remote sensing techniques (satellite imagery, drones) • Sensor technologies for soil and crop monitoring • Data collection, analysis, and interpretation • Powering precision agriculture technologies with renewable energy. • Solar energy applications in agriculture • Irrigation systems, and farm operations
	Water resources management and monitoring • Integrated Water Resources Management approach • Hydraulic modelling • Flood Risk Management with Transboundary Conflict
Digital agriculture and decision-supporting tools	**Digital solutions for Water Management** • Overview of water management challenges • Role of digital technologies in water management • Integration of sensors and data in water monitoring
	Remote Sensing and IoT Applications • Remote sensing techniques for water and soil monitoring • Satellite-based observations of precipitation and evapotranspiration • Mapping and analysis of water availability, quality, and soil conditions • Smart sensors and network systems • Real-time monitoring and control of water resources
	Water Data Analysis and Decision Support • Data-driven approaches for water management • Water data analytics and modeling • Decision-support systems for efficient water allocation and conservation

Module 2	**Innovative Technologies in Agriculture and Water Management**
Title	*Contents*
Technical visit	• Digital Technologies for Agriculture & Smart farming: Installation of the base pack and monitoring practices and training with XFARM platform. • No-till seed drill with 4.0 technology La Valle Verde farm, Gravina di Puglia - Bari

3.3. Abstract of the Module 3 "Networking for Cooperating, Project Design, and Funding Opportunities"

Module 3 is designed to allow learners to examine in-depth the field of international funds and project management to develop the agronomic sector in East Africa and Egypt. Participants will acquire theoretical and technical knowledge of this strategic field to support the sustainable and competitive development of the agricultural sector. The importance of networking and multi-level cooperation will be examined through relevant policies, projects, and experiences carried out in the geographic area of interest. Participants will learn about how development cooperation has raised and evolved throughout the years, and which are the main international donors that can support development projects in their countries.

The Module will explore methodologies and techniques of project design so that it can address local needs, set a reliable activity plan to achieve long-term results, and be eligible for funding opportunities. Its program also examines the importance of involving relevant actors to identify problems, set relevant and appropriate project objectives, and establish a coherent work plan and project management structure. Participants will then delve into crucial aspects for smooth project management, they will get insights on reporting obligations, principles of good reporting, and the documentation needed to prove the expenditures incurred during the project implementation for each budget heading. Regarding the project implementation phase, this Module also provides knowledge on how to enhance project action and objectives to create impact and strengthen partnerships through the dissemination of results.

By the end of this module, participants will be more aware of the complexity of actors and policies around international project design and management, will identify potential funding opportunities for their business or territory, and conceive or contribute to formulating effective and relevant projects in cooperation with local and international stakeholders.

Table 6 - Module 3 contents

Module 3	**Networking for cooperation, project design, and funding opportunities**
Title	*Contents*
International cooperation and funding opportunities	• Keynote speech: The EU international cooperation policy in the African Union's countries in key thematic sectors
	• The EU research policy for development and cooperation in Africa in key thematic areas
	• Networking and cooperation in the agronomic sector at local and international level
Programmes for Research, Cooperation,	• European Commission Programmes for its external action and its calls for proposals • Working group: Examining an EU call

Module 3	**Networking for cooperation, project design, and funding opportunities**
Title	*Contents*
Mobility	• The Calls for proposals from national bodies for development cooperation
	• The Sustainable development approach
	• Science Diplomacy to overcome conflicts
	• The MSME and start-ups in cooperation development projects: funding opportunities and networking techniques.
Project design, Reporting, and communication of results	• Project cycle management: from the idea to the project formulation and evaluation • Working group: From the call to the project proposal
	• Logical Framework and Theory of Change: how to design a project to generate a long-lasting and sustainable change that is evident, assessable, quantifiable, and qualifiable. • Working group: The Logical Framework and the Theory of Change applied to calls for proposals
	• Reporting a project funded by the EU or international institutions: principles of transparency, traceability, and recording of documentation to provide evidence of financial expenditures
	• Communication of results: strategic planning, objectives, audiences, and channels of communication • Working group: How to define a good communication strategy for your project
Technical visit in CIHEAM Bari Tricase branch	Technical visit to the Tricase branch of CIHEAM Bari, a centre for training, research, and cooperation for the sustainable and integrated growth of rural and coastal communities.

3.4. Participant list

Table 7 – List of participants

#	Country	Name	Surname	Affiliation/Background
1	**KENYA**	Alex	KUBENDE	Tana River County Director of Agriculture
2	**KENYA**	William	JILLO	Tana River County - Irrigation Engineer
3	**KENYA**	Anita Ijayi	NUNU	KALRO Crop agronomist (rice)
4	**KENYA**	Obadiah Kuria	KIARIE	National Irrigation Authority – Tana Irrigation Scheme
5	**SUDAN**	Mohammed Babiker Ibrahim	BARSI	WATDEV Phd student
6	**ETHIOPIA**	Deribew Shanko	NEGEWO	Water and Land Resource Centre
7	**ETHIOPIA**	Hibret Andualem	JEMBERIE	Koga Branch Office, Ministry of Irrigation and Lowlands
8	**ETHIOPIA**	Melesse Beyene	BEKURE	Water and Land Resource Centre
9	**ETHIOPIA**	Daniel Berhanu	AFRASSO	Water and Land Resource Centre
10	**ETHIOPIA**	Tilahun Mulugheta	BITEW	Mech Wereda Agriculture Office
11	**EGYPT**	Rehab Ibrahim S. F.	ABDELFATTAH	Research assistant at the Egyptian Biodynamic Association
12	**EGYPT**	Buthaina Elhosieny Mohamed Ahmed	IDRISS	Project Coordinator at the Egyptian Biodynamic Association
13	**EGYPT**	Hend Hany Hafez	MOHAMED	Administration Egyptian Biodynamic Association
14	**EGYPT**	Salma Wael Mohmoud B.	ADLY	Research assistant, Faculty of Engineering, Heliopolis University
15	**EGYPT**	Mohamed Moustafa Mahmoud	EID	Research Assistant, Faculty of Organic Agriculture, Heliopolis University
16	**SUDAN***	Ahmed Alsiddig A.	ELSHAIKH	University of Khartoum, WRC
17	**SUDAN***	Eslam Ahmed G.	MOHAMED	Agricultural Research Corporation
18	**SUDAN***	Amani Ahmed M.	IDRIS	Agricultural Research Corporation
19	**SUDAN***	Ali Mohamed M.	ELHAJ	The Hydraulics Research Center (HRC-SUDAN)
20	**SUDAN***	Mohammad Osman Ali	BABIKER	Gezira Scheme Authority
WATDEV PhD Students				
1	**KENYA**	Hellen Jerotich	SANG	WATDEV Phd student
2	**ETHIOPIA**	Mulugeta Ferede	MELESE	WATDEV Phd student
3	**EGYPT**	Samar Mohamed Abdou	GOMAA	WATDEV Phd student
WATDEV project partners' representatives				
1	**UGANDA**	Moses	ODEKE	ASARECA
2	**EGYPT**	Mohamed Abdelkader Hamza	MUBARAK	Heliopolis University (Project Manager, Office of Sponsored Programs)

**Invited to attend online*

Keynote speakers' and lecturers

Table 8 – Training Course's Speakers list (in alphabetic order)

Module	Country	Name	Surname	Affiliation
2	Tunisia?	Fouial	ABDELOUAHID	CIHEAM Bari
2	Italy	Pier Paolo	ABIS	AQP
3	Italy	Annarita	ANTONELLI	CIHEAM Bari
2	Italy	Giulia	ATZORI	CNR-IPSP
2	Italy	Stefania	AUGENTI	AQP
3	Italy	Virginia	BELSANTI	CIHEAM Bari
2	Italy	Deborah	BENTIVOGLIO	UnivPM
3	Italy	Claudio	BOGLIOTTI	CIHEAM Bari
2	Italy	Alessio	BOLOGNESI	FederUnacoma
3	Belgium	Nienke	BUISMAN	EC – DG R&I
2	Italy	Donatella	CANIANI	UNIBAS
3	Italy	Luigi	CAVESTRO	CIHEAM Bari
2	Italy	Francesco	CELLINI	ALSIA-Agrobios
2	Italy	Mauro	CENTRITTO	CNR-IPSP
2	Italy	Adriano	CONTE	CNR-IPSP
2	Italy	Simona	CORRADO	AQP
3	Belgium	Etienne	COYETTE	EC - DG INTPA
2	Italy	Annamaria	D'ONGHIA	CIHEAM Bari
2	Italy	Donatella	DANZI	CNR-IPSP
3	Italy	Saverio	DE SANTIS	CIHEAM Bari
2	Italy	Claudio	DI IACONI	CNR-IRSA
3	Morocco	Noureddin	DRIOUECH	CIHEAM Bari
2	France	André Pierre Marie	FABBRI	CNR-IPSP
3	Italy	Marinella	GIANNELLI	CIHEAM Bari
3	Italy	Daniela	GUIDA	CIHEAM Bari
2	Lebanon	Mouïn	HAMZE	CIHEAM Bari
2	United States	Matthew	HAWORTH	CNR-IPSP
2	Lebanon	Roula	KHADRA	CIHEAM Bari
3	Lebanon	Jimmy	KHALIFE	CIHEAM Bari
3	Italy	Gaetano	LADISA	CIHEAM Bari
1-2	Italy	Nicola	LAMADDALENA	CIHEAM Bari
2	Italy	Paolo	LANZA	AQP
2	Italy	Valentina	LAZZAZZERA	CNR-IPSP
3	Italy	Silvia	LECCI	CIHEAM Bari
3	Italy	Magdalena	LUTZ	CIHEAM Bari
3	Italy	Donato	MACARIO	CIHEAM Bari
2	Italy	Lorenzo	MARCONI	UniBO
2	Italy	Giovanni	MARINO	CNR-IPSP
3	Italy	Rosanna	MARTUCCI	CIHEAM Bari
2	Italy	Fabrizio	MAZZETTO	UniBZ
2	Italy	Felicia	MENICUCCI	CNR-IPSP
2	Italy	Alessandro	MONTAGHI	CNR-IRET
2	Italy	Vincenzo	MONTESANO	CNR-IPSP
1	Uganda	Moses	ODEKE	ASARECA
3	Italy	Ernesto	PAGANO	Laboratoriorosso
2	Italy	Angelo	PETROZZA	ALSIA-Agrobios
1	Italy	Domenico	PIGNONE	CNR
2	Italy	Maurizio	PROSPERI	UniFG
2	Italy	Carlo	RANIERI	CIHEAM Bari
2	Italy	Vito	RENÒ	CNR-STIIMA

Module	Country	Name	Surname	Affiliation
3	France	Pierre-Bruno	RUFFINI	University of Le Havre Normandy
2	Italy	Serena	SPAGNULO	AQP
3	Germany	Joachim H.	SPANGENBERG	SERI
1	Canada	Elaine	SPRINGGAY	FAO
2	Canada	Stephan	SUMMERER	ALSIA-Agrobios
3	Italy	Alberto	TARANTINO	AICS Cairo
2	Italy	Maurizio	TRIGGIANI	PoliBA
2	Italy	Luigia	TROIANO	AQP
1	Italy	Pandi	ZDRULI	CIHEAM Bari

4. Outcomes

4.1. Methodology

Simple surveys (Annex 7.6) were delivered by email to the participants to understand their level of knowledge about the Training items before and after their participation in the Training of Trainers. The tool adopted to collect this information was Google Forms.

Such an evaluation allowed the collection of inputs to feed the outcome indicator linked to the ***Specific Objective 1 (SO1): "Number of national research institutions and corresponding staff members strengthened with capacity building and training activities."***

The number of responses collected in the three modules varies as follows (Figure 1).

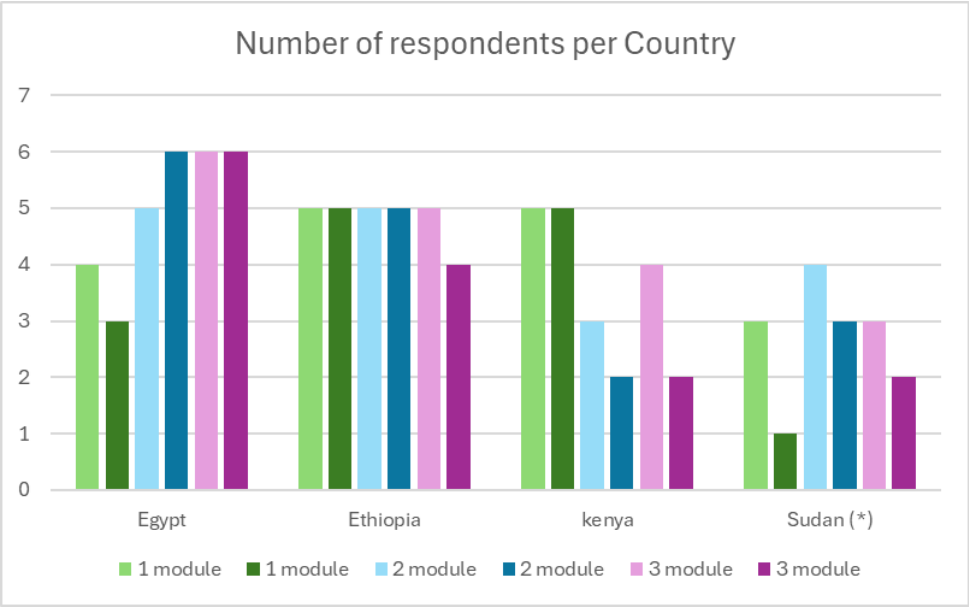

Figure 1 – Variation in the number of respondents (before and after the training) across the three Modules (pale colours relate to the surveys conducted before the training, while dark colours pertain to the surveys taken afterward)

4.2. Knowledge Self-Appraisal before and after the completion of the 3 Training Modules

Even if the Self-Assessment Evaluation form was targeted on the Module's contents, some questions were in common to the different questionnaires.

Among them the one related to the level of know-how or understanding of the course's items.

Here below the variation of the level of understanding before/after the course is displayed.

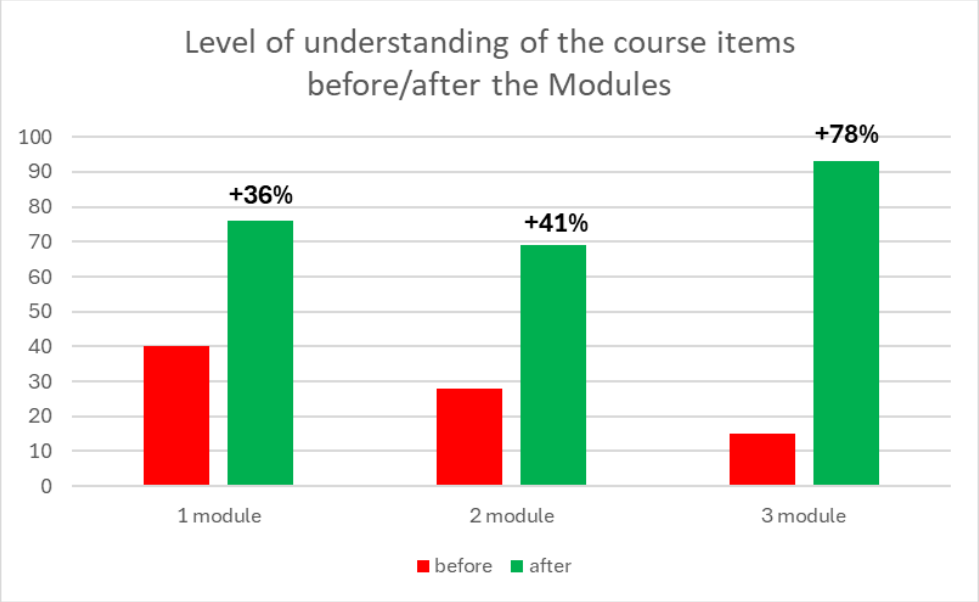

Figure 2 – Variation of the level of understanding of the Course's items before/after each Module

As shown in Figure 2, the levels of knowledge (or understanding) about the module's items before the course progressively decreased (from 40% to 28% and to 15%) as the items moved from BMPs to Innovation and then to EU Programmes. Conversely, the level of understanding after the completion of each module increased from 36% to 41% to 78%. The areas of knowledge that saw the most significant increase were those related to the 3rd Module, "Networking for cooperating, Project design and Funding Opportunities" because the participants were less accustomed to working on these items in their daily activities.

4.3. Participants' evaluation of the Training Modules

At the end of each module, all participants were invited to answer an online questionnaire and provide their opinions on the quality of the program and overall organization.

Below are the main answers collected.

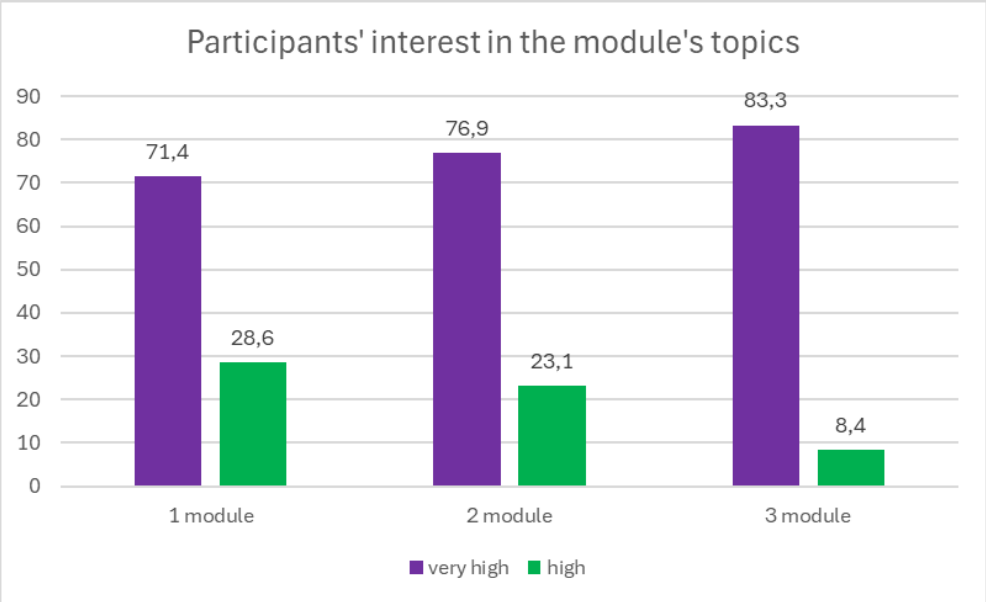

Figure 3 - Participants' interest in the Module's topics.

Participants show an increasingly level of interest about the modules' topics, from the 1st to the 3rd module (see Figure 11), ranging from 71.4% to 83.3%.

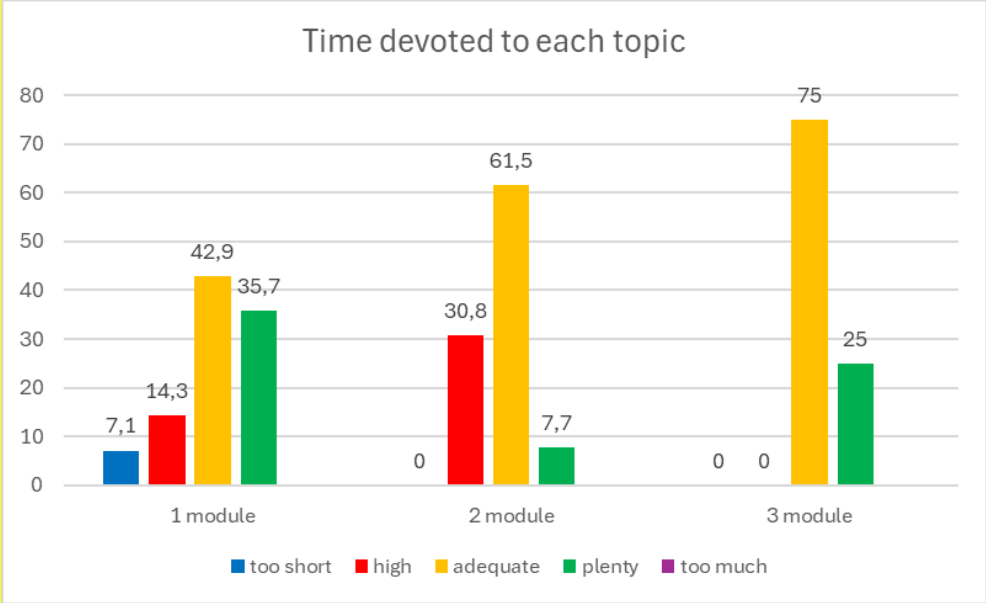

Figure 4 - Overall evaluation of the time devoted to each topic during the course.

The respondents (75% of them) considered the time devoted to each topic adequate.

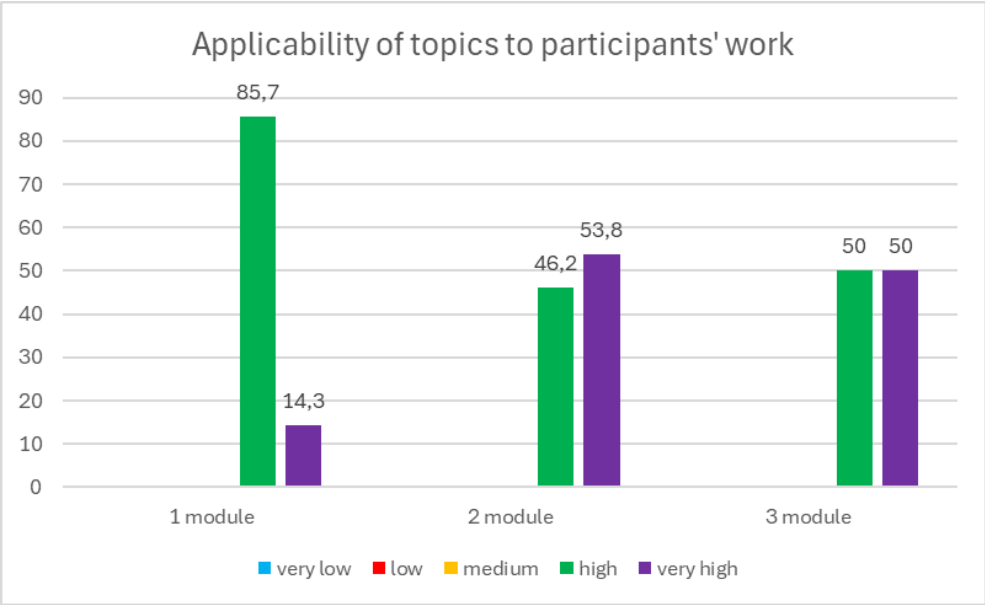

Figure 5 - Evaluation of the applicability of the Module's topics to the participants' work

Most of the participants perceived as highly applicable to their daily work the knowledge about BMPs acquired during the 1st module.

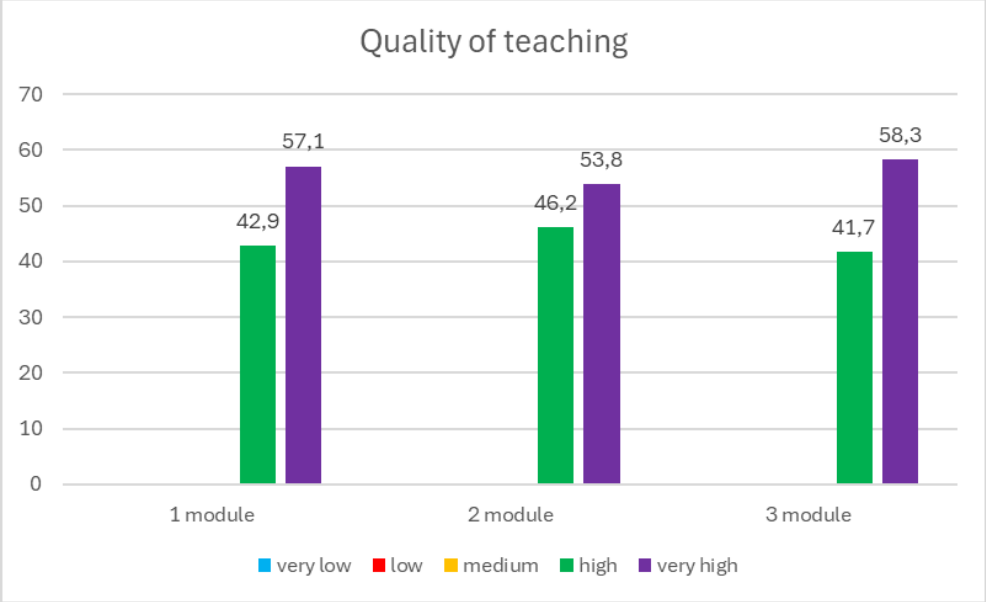

Figure 6 - Overall evaluation of the quality of teaching.

As shown in Figure 6, the quality of teaching was evaluated as high-very high by the totality of participants.

Even the completeness and overall quality of the training materiel was evaluated high-very high, even if, due to the different contents of the courses, the completeness seems to decrease moving from the 1st to the 3rd module (see Figure 7).

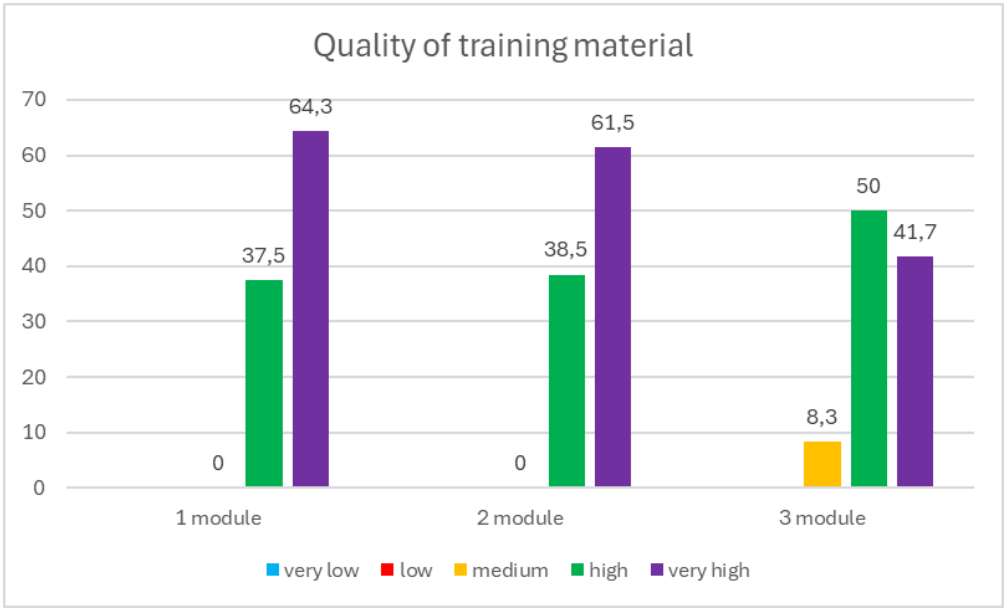

Figure 7 - Overall evaluation of the training material.

As depicted by the Figure below, participants demonstrate of having a very good level of interactions among them (Figure 8) and with the lecturers (Figure 9).

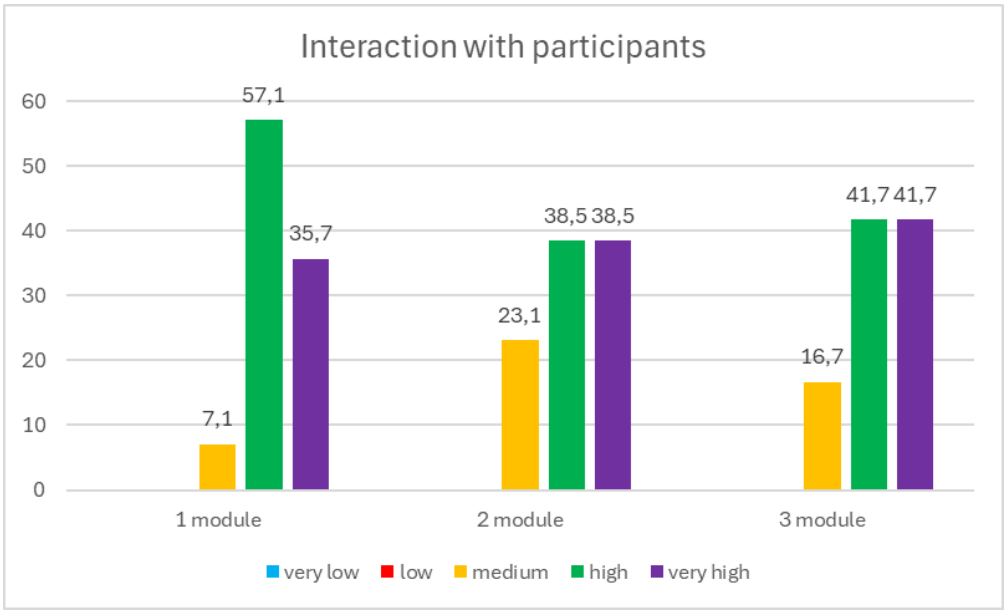

Figure 8 - Variation of the level of interaction among participants along the course.

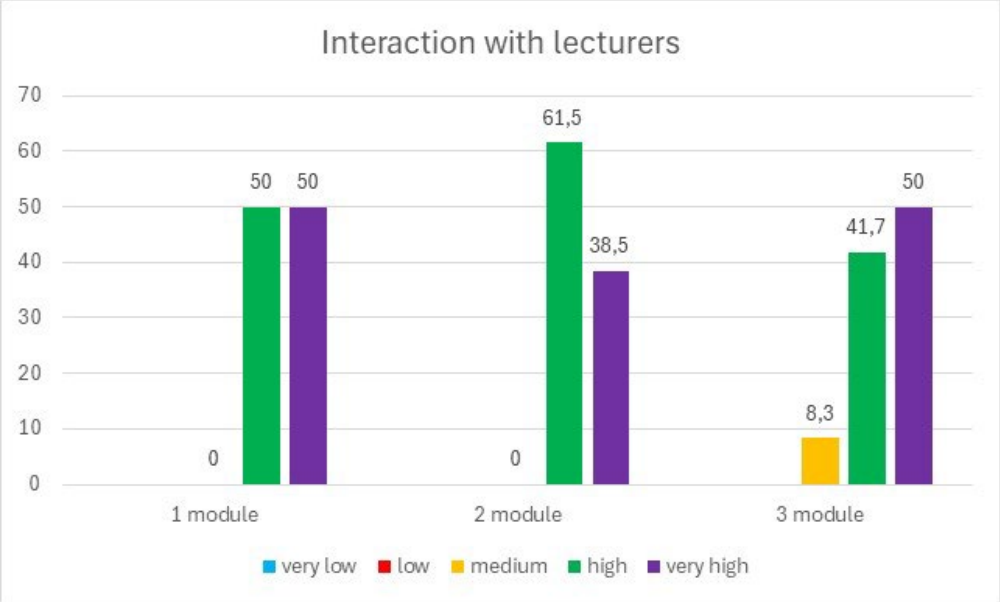

Figure 9 - Evaluation of the interaction level between trainees and lecturers.

As shown in the Figure here below, the overall evaluation of the three modules is very positive, with 66.7% of the respondents to the survey assessed the modules excellent, whereas the 30.7% assessed the modules very good.

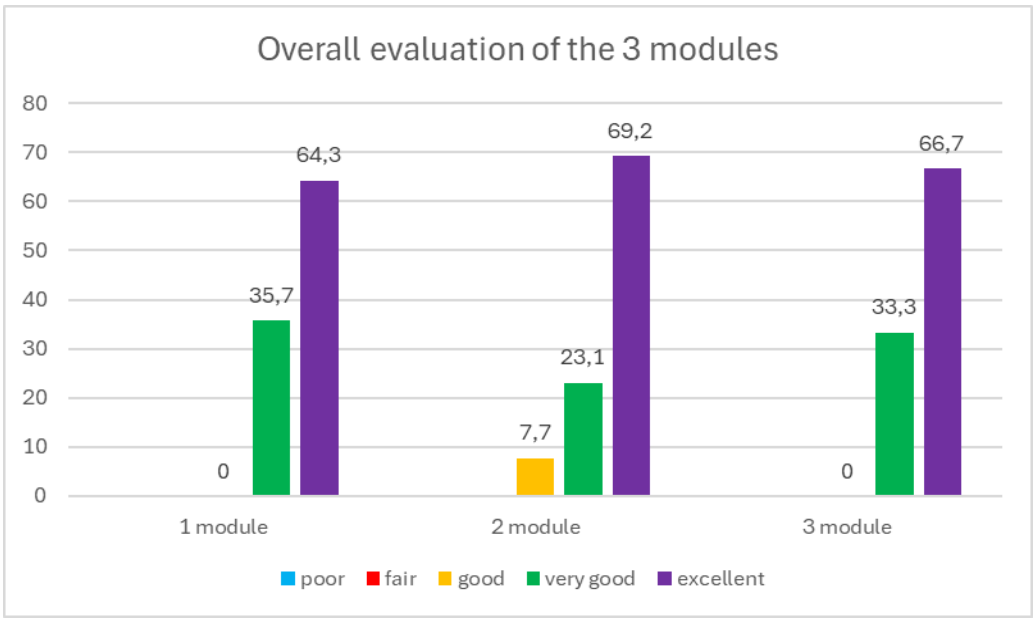

Figure 10 – Overall evaluation of the 3 modules of the Training Course.

5. Indicators

As reported in the Paragraph 1.3, the Training course described in this Deliverable, contributes to the achievement of the following Logical Framework's Indicators:

- **OT5.1 – Implementation of training courses over 2 years** (number of trained people/years).

A2.1 - Awareness meetings (4) (Jun.-Jul. 2023): 78 participants

A2.2 - 1st training module (Dec. 2023): 20 participants

A2.2 - 2nd Training module (Sep. 2024): 20 participants

A2.2 - 3rd training module (Feb. 2025): 28 participants (8 master students)

A2.2 - Follow-up meetings (3) (Mar.-Apr. 2024): 167 participants

A2.4 - Follow-up & innovation roadshow (3) (Feb.-Mar. 2025): 317participants

Target: 1,000 trained people; Achieved result: 690 trained people (69%)

- **OT5.2 - Degree of satisfaction of involved trainees** (reaching at least of 90% of satisfaction of trained people)

A2.2 - 1st training module (Dec. 2023): 35.7% very good; 64.3% excellent (100% of satisfaction rate)

A2.2 - 2nd Training module (Sep. 2024): 23.1% very good; 69.2% excellent (92.3% of satisfaction rate)

A2.2 - 3rd training module (Feb. 2025): 33.3% very good; 66.7% excellent (100% of satisfaction rate)

Target: 90% of participants satisfied; Achieved results: 97.4% of participants satisfied (as average)

6. Conclusions

6.1. Strategic Impact and Capacity Building Outcomes

From December 2023 to February 2025, the WATDEV project has successfully delivered a comprehensive three-module training program that has fundamentally strengthened institutional capacity and research capabilities across East Africa and Egypt. Through strategic investments in human capital development, the initiative has created a robust foundation for sustainable agricultural development and international cooperation in the region.

Transformational Learning Outcomes

The project achieved remarkable success in building technical and institutional capacity among young researchers and professionals. Across all three modules, participants demonstrated significant knowledge gains and enhanced practical competencies. Most notably, in Module 3 (Networking and Project Design), participant confidence in project design and implementation reached 100% completion rates, representing a 22% increase from baseline assessments. Similarly, comfort levels with EU-AU cooperation programs increased from 44% to 100%, demonstrating the program's effectiveness in bridging knowledge gaps in international development frameworks.

The integration of theoretical knowledge with practical application emerged as the program's greatest strength. Participants gained comprehensive understanding of precision agriculture technologies, sustainable farming practices, and international funding mechanisms including Horizon Europe, DeSIRA Initiative, Erasmus+, and Marie Skłodowska-Curie Actions. This multi-dimensional approach has equipped beneficiaries with both technical expertise and strategic capabilities essential for leading agricultural innovation in their home institutions.

6.2. Institutional Strengthening and Network Development

Beyond individual capacity building, the WATDEV project has catalyzed institutional strengthening through enhanced networking and collaboration frameworks. The program successfully connected participants with high-level decision-makers from CIHEAM Bari, AICS, and the European Commission, establishing valuable partnerships that extend well beyond the training period. These networks represent critical infrastructure for future research collaboration and knowledge exchange.

The project's emphasis on science diplomacy and cross-cutting sustainability issues has particularly strengthened participants' ability to navigate complex international development challenges. Post-training assessments reveal that participants now view organizational policies and technical integration as more critical success factors (+3% and +7.1% respectively) than previously perceived, indicating sophisticated understanding of project implementation dynamics.

6.3. Key Challenges and Adaptive Management

The project encountered several implementation challenges that provided valuable learning opportunities. Technical delivery constraints, particularly for international participants accessing online components during field visits, highlighted the critical importance of in-person learning for hands-on agricultural technologies. The project team demonstrated effective adaptive management by prioritizing face-to-face engagement and increasing practical field exposure across all modules.

Logistical challenges, including visa processing support for international participants, were successfully addressed through enhanced administrative support systems. These experiences have informed improved protocols for future international training initiatives and demonstrate the project's commitment to inclusive participation.

6.4. Enabling Factors for Success

Several critical factors contributed to the project's exceptional outcomes:

- **Strategic Partnership Framework**: The collaboration between CIHEAM Bari, international development agencies, and regional institutions created a robust platform for knowledge transfer and capacity building.
- **Comprehensive Curriculum Design**: The integration of technical agricultural content with project design and funding mechanisms provided participants with holistic skill sets essential for career advancement and institutional development.
- **Quality Assurance and Continuous Improvement**: Regular participant feedback and adaptive programming ensured that training content remained relevant and responsive to emerging needs.
- **Investment in Practical Learning**: The emphasis on field visits, hands-on activities, and real-world application significantly enhanced knowledge retention and practical competency development.

6.5. Strategic Recommendations for Scaling and Replication

Based on the project's demonstrated success and lessons learned, the following recommendations will maximize the impact of future initiatives:

Immediate Enhancement Opportunities

- **Extend Program Duration**: Increase training duration across all modules to allow for deeper technical coverage and expanded practical application. The consistent feedback requesting longer programs indicates strong participant engagement and appetite for more comprehensive learning.
- **Strengthening Practical Components**: Expand field visit programs and hands-on learning opportunities, particularly for precision agriculture and sustainable farming technologies. Consider establishing partnerships with demonstration farms and operational facilities to provide ongoing practical learning sites.
- **Develop Advanced Modules**: Create follow-on programming that builds upon foundational training, potentially integrating with existing master's degree programs to provide formal accreditation pathways for participants.

Strategic Scaling Framework

- **Regional Hub Development**: Establish regional training centers in East Africa and Egypt to reduce travel costs and increase program accessibility while maintaining quality standards through CIHEAM Bari oversight. This could be achieved by means of the activity A5.2 "*Establishing od a Regional Water Knowledge Hub for training and capacity building services on regional transnational water management in east Africa with the specific aim of sharing knowledge on climate-smart water management (…)*".
- **Institutional Partnership Expansion**: Develop formal agreements with universities and research institutions in target countries to ensure sustainable knowledge transfer and local capacity for program delivery.
- **Digital Learning Integration**: Develop hybrid delivery models that combine in-person practical training with high-quality digital content, addressing geographical constraints while maintaining hands-on learning priorities.

Sustainability and Impact Measurement

- **Alumni Network Activation**: Establish formal alumni networks to facilitate ongoing collaboration, knowledge sharing, and peer-to-peer learning among program graduates.

- **Impact Tracking Systems**: Implement comprehensive monitoring systems to track participant career advancement, institutional changes, and project implementation outcomes over 3-5 year periods.
- **Knowledge Product Development**: Transform training materials into publicly available resources, including best practice guides and technical manuals, to amplify program impact beyond direct participants.

6.6. Investment Return and Future Value Proposition

The WATDEV project represents exceptional value for donor investment, delivering measurable capacity building outcomes that will generate long-term institutional benefits across the region. The program's success in building both technical competencies and international collaboration capabilities positions participants as catalysts for sustainable agricultural development and research innovation.

The demand demonstrated for expanded programming, evidenced by consistent participant requests for longer and more comprehensive training, indicates strong market validation for continued investment. The project's proven model provides a scalable framework for regional capacity building that can be adapted to diverse agricultural development contexts while maintaining quality and effectiveness standards.

Through strategic scaling and replication, the WATDEV approach can serve as a cornerstone for sustainable agricultural development capacity building across Sub-Saharan Africa and the Mediterranean region, generating significant returns on donor investment through enhanced institutional capabilities and strengthened international cooperation frameworks.

7. Annexes

7.1. Training Material:

- 1st module: https://cloud.watdev.eu/index.php/s/DrsSdCHDwFetRj6
- 2nd module:
  - https://cloud.watdev.eu/index.php/s/2DE6myMTGxspLtK
  - https://cloud.watdev.eu/index.php/s/fsEEiix79i5R4jn
- 3rd module: https://cloud.watdev.eu/index.php/s/6iWa6tmHrK3jjxa

7.2. Training programme (weekly):

- 1st module: https://cloud.watdev.eu/index.php/s/wjKqEQ6sRDCFq2G
- 2nd module: https://cloud.watdev.eu/index.php/s/nE7HozqSjTGt7SC
- 3rd module: https://cloud.watdev.eu/index.php/s/LexffTgdpLxqC6w

7.3. Daily attendance register:

- 1st module: https://cloud.watdev.eu/index.php/s/YCM9Gq7LCqDyEJo
- 2nd module: https://cloud.watdev.eu/index.php/s/xrTBPRZzRWYGe9R
- 3rd module: https://cloud.watdev.eu/index.php/s/smQwAiL9XyWQ7Dp

7.4. Attendance certificate:

- 1st module: https://cloud.watdev.eu/index.php/s/deFfHi7HkzNNErJ
- 2nd module: https://cloud.watdev.eu/index.php/s/JSrC4tnPAskoKXe
- 3rd module: https://cloud.watdev.eu/index.php/s/NnYZEDDomfXYNjT

7.5. Photo gallery:

- 1st module: https://cloud.watdev.eu/index.php/s/bEGQqgB5bzZP3n9
- 2nd module: https://cloud.watdev.eu/index.php/s/6zjJsxznzjb2Eeb
- 3rd module: https://flic.kr/s/aHBqjC2LsU

7.6. Knowledge Self-Appraisal surveys (before the training module)

- 1st module: https://cloud.watdev.eu/index.php/s/pA8qbPJ6BJH2TNS
- 2nd module: https://cloud.watdev.eu/index.php/s/WYWseSKG3yEW22x
- 3rd module: https://cloud.watdev.eu/index.php/s/WxsKG747c5zWq6Q