Supporting the implementation of the Regional Water Scarcity Initiative (WSI[1]) in the Near East and North Africa (NENA) Region

Workshop Report

Water productivity in the olive oil sector: identification of production systems, economic and environmental indicators, and sustainable practices and technologies

Deliverables Report:
Activity 2.3.C: Normalized determination of economic water productivity along the value chain for strategic crops

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[1] **About the Water Scarcity Initiative (WSI)**
The Water Scarcity Initiative (WSI) Programme is a regional partnership programme led by the Food and Agriculture Organization of the United Nations (FAO) to address water scarcity and its impacts on food security, livelihoods, and ecosystems in the Near East and North Africa (NENA) region.
Established in 2013, WSI brings together governments, UN agencies, international and regional organizations, research institutions, and development partners to promote sustainable agricultural water management in the context of climate change. The programme works across countries to strengthen water governance, enhance the resilience of food systems and water services, and support evidence-based decision-making.
Through pilot interventions, capacity development, knowledge sharing, and regional cooperation, WSI supports countries in using water more efficiently and sustainably while advancing progress toward the Sustainable Development Goals related to water, food security, climate action, and partnerships.

Contents

List of Acronyms

CEE: Cost of Environmental Externalities

COP-28: 28th Conference of the Parties to the United Nations Framework Convention on Climate Change

CWSI: Crop Water Stress Index

E-LCA: Environmental Life Cycle Assessment

EUT: Eutrophication

EWF: Economic Water Footprint

FU: Functional Unit

IRR: Internal Rate of Return

ISI: Institute for Scientific Information

LCA: Life Cycle Assessment

LCC: Life Cycle Costing

LCI: Life Cycle Inventory

LCIA: Life Cycle Impact Assessment

NENA: Near East and North Africa

NPV: Net Present Value

PWF: Production-based Water Footprint

SIC: Specific Input Cost

WSI: Water Scarcity Initiative

Key messages

Executive Summary

A multi-stakeholder workshop was organized to establish a participatory framework for improving water productivity in Tunisia's olive oil value chain under the FAO-led Regional Water Scarcity Initiative (WSI). Bringing together researchers, policymakers, and sector experts, the workshop aimed to identify priority intervention areas, select relevant production and processing systems, define assessment indicators, and explore sustainable practices and innovative technologies. Participants confirmed the olive oil sector as the priority value chain due to its economic significance, export potential, and relative resilience to water scarcity. Key challenges identified included drought, soil and water salinization, inadequate monitoring of olive water requirements, limited technical support, and investment constraints faced by small producers. The Central-Eastern region of Tunisia was selected as the main study area, with intensive and semi-intensive irrigated olive production systems and three-phase and two-phase extraction technologies prioritized for analysis. The assessment framework will apply Life Cycle Assessment (LCA) approaches, focusing primarily on water scarcity footprint, carbon footprint, and life cycle costs.

The workshop also identified promising intervention pathways, including smart irrigation technologies, digital agriculture solutions, agroecological soil management practices, and circular economy approaches for olive by-product valorization. These outcomes provide a solid foundation for future data collection, scenario evaluation, and the development of evidence-based recommendations to enhance water productivity, sustainability, and resilience in Tunisia's olive oil sector.

Keywords

Water productivity, olive oil value chain, water scarcity, climate resilience, Life Cycle Assessment (LCA), smart irrigation, sustainable agriculture, circular economy.

Highlights

• A participatory approach was adopted to establish a methodological framework for improving water productivity across Tunisia's olive oil value chain.

• Drought, salinization, inadequate monitoring of crop water requirements, and limited investment capacity were identified as the main constraints affecting water productivity.

• The Central-Eastern region, together with intensive and semi-intensive irrigated production systems and three-phase processing technologies, was prioritized for detailed assessment and intervention.

• LCA environmental indicators and LCC economic indicators were prioritized to assess the environmental and economic performance of the olive oil value chain, focusing on water scarcity, carbon footprint, and life cycle costs.

• Smart irrigation, digital agriculture, agroecological practices, and circular economy solutions were highlighted as key pathways to enhance sustainability, resilience, and resource-use efficiency in the Tunisian olive oil sector.

List of Tables

1. Workshop objective

The workshop was organized to establish a scientific and participatory foundation for improving water productivity in the Tunisian olive oil sector. It brought together institutional stakeholders, researchers, and practitioners to discuss and prioritize olive production and processing systems, identify suitable study areas, select relevant economic and environmental indicators, and assesses sustainable practices and innovative technologies. The goal is to enhance resource-use efficiency across the olive oil value chain and foster more sustainable and resilient agricultural systems.

2. Opening of the workshop

The event commenced with a welcome address by Mr. Mondher Ben Salem, Director General of the National Institute of Agronomic Research of Tunisia (INRAT). He highlighted the strategic importance of improving water productivity within the agricultural sector, particularly in the olive oil industry, a cornerstone of the Tunisian economy. He emphasized the necessity of science-based, participatory approaches to address the escalating challenges posed by climate change and resource depletion, while simultaneously strengtheningthe sector’s competitiveness.

Mr. Boubaker Dhehibi (ICARDA) subsequently underscored the importance of collaboration among national and international institutions to achieve the project's objectives. He stressed the critical role of scientific research, knowledge exchange, and stakeholder engagement in supporting the sustainable development of agricultural value chains in arid and semi-arid environments.

3. Plenary presentations

3.1. General context, project objectives and workshop program

Presented by Dr. Boubaker Dhehibi (ICARDA)

Dr. Dhehibi presented the comprehensive framework of the FAO-led Regional Water Scarcity Initiative (WSI) Programme, which was launched during COP-28 in the UAE and is supported by the Swedish International Development Cooperation Agency (SIDA) with a budget of $31.5M USD (spanning 2024–2028). The initiative aims to address water and food security challenges in the NENA region by enhancing the policy environment and implementation capacity for efficient, sustainable, and productive water use.

The overarching regional project is structured around three main outcomes:

1. Governance: Strengthening governance to achieve sustainable agricultural water use and enhanced food security.
2. Resilience: Enhancing the resilience of food systems and water services to climate change.
3. Knowledge: Sharing and disseminating knowledge and experience for capacity development, informed decision-making, and enhanced regional cooperation.

In Tunisia, ICARDA's intervention focuses specifically on Outcome 2 (Product 2.3), which targets the reduction of food loss and waste and the reinforcement of climate-resilient, gender-transformative value chains. The key planned activities include:

- Activity 2.3.C: Standardizing the determination of economic water productivity along strategic value chains. This involves analyzing the synergies and trade-offs between water consumption and economic value by calculating both the Production-based Water Footprint (PWF) and the Economic Water Footprint (EWF).
- Activity 2.3.D: Developing action plans to improve economic water productivity while empowering women and youth. This includes elaborating and evaluating various scenarios (integrating sustainable practices, technological innovations, and financial support) using integrated biophysical and socio-economic models.

Mr. Dhehibi also outlined the specific expected outcomes and deliverables for the Tunisian context, which include:

- A validation report of the prioritized strategic value chain following stakeholder consultation (May 2026).
- The design of data collection tools and a comprehensive field survey report (June–July 2026).
- Technical reports on the standardized determination of economic water productivity (July–August 2026).
- Evaluation reports on water productivity improvement scenarios and a finalized operational action plan (September 2026).
- The drafting of a scientific article for an ISI-indexed journal (September 2026).

Finally, he presented the specific program and objectives of the current workshop, which were structured into five key collaborative steps:

1. Identify the main challenges related to improving water productivity in the olive oil value chain.
2. Select the priority study area based on predefined criteria.
3. Select and prioritize the most relevant production and processing systems.
4. Select and prioritize environmental (LCA) and economic indicators.
5. Identify alternative practices and technologies to be compared against traditional practices.

3.2. Analysis and prioritization of agricultural value chains

Presented by Dr. Mohamed Zied Dhraief (INRAT)

Dr. Dhraief outlined the rigorous, multi-criteria methodology that was adopted in order to select the project's priority and important agricultural value chain. This analysis incorporated economic, social, environmental, and strategic factors to determine which sectors had the greatest potential for sustainability, resilience, and contribution to agricultural and territorial development.

The results identified the olive oil sector as the most strategic and resilient, due to its strong export performance, high sustainability scores, and natural adaptation to water stress. For context, it should be noted that while other sectors were evaluated, they presented specific barriers. Dates are a high-value export, but they face severe climate vulnerability and water scarcity. Citrus shows adaptation potential, but it needs improvements in quality and competitiveness. Durum wheat requires heavy structural modernization to overcome low productivity and technological constraints. Therefore, olive oil was ultimately selected as the priority focus.

During the subsequent interactive session, participants asked pertinent questions about the methodology. They specifically asked about the difference between a "strategic" sector and a "sustainable" one. They also expressed concerns about the exclusion of the livestock sector from the analysis. Mr. Dhraief and the project team explained that, although they initially considered livestock-related value chains, they ultimately excluded them due to technical, organizational, and time constraints. This allowed the project to maintain a concentrated focus.

In response to stakeholder requests for literature reviews and technical backing, the team explained that the selection process relied on a robust combination of available data, research findings, and stakeholder engagement. Specifically, three strategic crop value chains were initially shortlisted and then prioritized through targeted consultations with a panel of twelve experts. These consultations confirmed the olive oil value chain as the most strategic and important option.

3.3. Water productivity along the olive oil value chain

Presented by Dr. Saïda Elfkih (Institut de l'Olivier, Sfax)

Dr. Elfkih presented findings from the GCP/RNE009/SWE project, "Implementation of the 2030 Agenda for Water Efficiency/Productivity and Water Sustainability in NENA Countries," which analyzed biophysical and economic water productivity in the Tunisian olive oil sector. The analysis evaluated the entire value chain—production, transformation, and commercialization—and noted that water consumption during the commercialization phase is negligible compared to the other two stages.

The study examined two distinct production regions.

- Kairouan (Arid): Characterized by an average rainfall of 300 mm/year. Olive cultivation is the primary agricultural activity here, covering 204,000 ha (31% of the region's agricultural area). The irrigated olive area spans 16,500 ha (representing 18% of Tunisia's total irrigated olive area).
- Jendouba (Humid/Sub-humid): Characterized by a significant water potential of 600 mm/year. Olive cultivation is a secondary activity compared to forage crops and livestock, though it is gaining traction due to rising global olive oil prices.

Dr. Elfkih explained that water productivity at the farm level is influenced by a combination of intensification factors, including irrigation efficiency, soil management, planting density, pruning techniques, mineral and organic fertilization, and phytosanitary treatments.

The analysis of the processing stage revealed significant differences in water consumption depending on the extraction system used. Notably, the study found that the three-phase continuous system used the most water, up to 1.4 liters per kilogram of olives. Consequently, two-phase continuous systems and traditional press systems demonstrated superior biophysical and economic performance.

Dr. Elfkih highlighted the project's key deliverables, which are designed to translate the findings into practical applications. These include ten thematic technical sheets covering topics such as irrigation piloting, fertigation, and soil work; an IT application designed to precisely calculate the irrigation requirements of olive trees; and a capacity-building program disseminated through Farmer Field Schools (Ecoles Champs Paysannes).

3.4. Life Cycle Assessment (LCA)and Life Cycle Costing (LCC) methodology

Presented by Dr. Saker Ben Abdallah (INRAT)

Dr. Ben Abdallah introduced the Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) methodologies that will be used for the project. These methodologies will provide a holistic evaluation that complies with ISO 14040 and 14044 standards.

He emphasized that measuring only water volume (m^3) is insufficient. A core objective of using LCA/LCC is to identify "trade-offs" and avoid "burden shifting." For instance, optimizing irrigation to conserve water typically necessitates energy for pumping, which increases the carbon footprint. Conversely, maximizing water yield often requires fertigation, which increases the risk of soil eutrophication and acidification.

The presentation detailed the four core steps of the LCA/LCC framework:

1. Goal and Scope Definition: The study encompasses both the agricultural phase (Traditional, Intensive, and Hyper-intensive systems) and the transformation phase (Traditional [7% of national capacity], 3-phase [76%], and 2-phase [17%] systems). The analysis will be measured against three Functional Units (FU): 1 kg of olive oil (production), 1 m^3 of water consumed (resource), and 1 hectare (surface).
2. Life Cycle Inventory (LCI): Data collection will rely on primary data from field surveys in Tunisia (e.g., pumped water volumes, fertilizer doses, tractor fuel, mill electricity/water consumption, and economic costs) combined with background data from the Ecoinvent database (e.g., impacts of fertilizer manufacturing, the Tunisian electricity mix, and diesel production).
3. Impact Assessment (LCIA): The environmental impacts (LCA) will be evaluated using specific indicators: Water Scarcity Footprint, Climate Change (Global Warming Potential), Aquatic/Marine Eutrophication, and Ecotoxicity. The economic impacts (LCC) will be evaluated using Life Cycle Cost, Gross Margin, Net Present Value (NPV), and Internal Rate of Return (IRR).
4. Interpretation: The final step will involve identifying the best-performing systems, pinpointing environmental and economic "hotspots" (practices with the highest impacts), conducting sensitivity analyses, and proposing targeted strategies for improvement and innovation.

4. Participatory working sessions

Following the presentations, experts engaged in five structured participatory sessions to build a consensus on the methodological framework and project parameters.

4.1. Session 1: Prioritizing water management and productivity challenges in the olive oil value chain

During the first session, experts participated in an exercise designed to identify and rank the primary constraints hindering water productivity. Environmental stressors dominated the discussion. Drought was overwhelmingly cited as the most critical challenge, with 16 votes. Soil and water salinization followed closely behind with nine votes. Beyond climatic factors, participants identified significant socioeconomic and technical barriers. These included a lack of monitoring for crop water requirements, limited technical support, and investment difficulties for smallholder producers. Processing-related challenges, such as high-water consumption in mills and the management of olive mill wastewater (margine), were also identified as critical areas requiring urgent intervention.

The following table outlines the primary environmental, socioeconomic, and technical constraints identified by experts, ranked by the frequency of their citation during the session.

Table 1. Prioritization of key challenges hindering water productivity in the Tunisian olive oil

Code	Challenges identified	Number of responses
D1	Drought	16
D2	Overexploitation of water resources	5
D3	Evaporation	2
D4	Pumping costs	1
D5	Margin management	3
D6	Soil and water salinization	9
D7	Lack of monitoring of the water requirements of olive trees	8
D8	High water consumption in oil mills	4
D9	Low adoption of technologies	7
D10	Limited technical support	8
D11	Excessive use of inputs	0
D12	Difficulty for small producers to invest	8
D13	Risk of pollution (effluents)	1
D14	Weak integration between agriculture and industry in water management	3
D15	Water availability and access	2
	Low planting density (South)	2
	Workforce	2
	Soil quality	1

4.2. Session 2: Selection of priority study areas

This session was divided into two parts: establishing selection criteria and subsequently voting on the target region. Participants reached a strong consensus on three primary criteria (11 votes each): (i) the planned expansion of irrigated olive groves under the National Water Strategy 2050, (ii) the area's proportional contribution to national olive production, and (iii) the intensification of production systems driving high water consumption.

Table 2 details the criteria proposed and voted on by participants to ensure the selected study areas align with national strategic goals and resource vulnerability.

Table 2. Expert consensus on selection criteria for priority study areas

Code	Selection criteria	Number of responses
C1	Expansion of irrigated olive grove areas (Water Strategy 2050)	11
C2	Significant olive production (% of national production)	11
C3	Sensitivity to the degradation of natural resources (water, soil)	8
C4	Diversification of the production system	3
C5	Dominant system: monoculture	8
C6	Intensification of the production system: high water consumption	11
C7	Number of oil mills in the area	6
C8	Olive growers' expertise	9
C9	Climate aridity	2

Applying these criteria, the Central-Eastern (CE) region emerged as the absolute priority study area (12 votes) due to its strategic importance and rapid agricultural intensification. The Northwest (NW) region was identified as a secondary priority (6 votes), primarily due to the vulnerability of its natural resources and the diversity of its production systems.

Table 3. Ranking of Tunisian regions for the implementation of the study

Region	Number of responses
NE	3
NW	6
CE	12
CW	2
SE	0
SW	3

4.3. Session 3: Prioritization of production and processing systems

To determine where project interventions would yield the highest impact, experts evaluated both the agricultural and industrial phases.

At the production level, the intensive irrigated system was ranked as the highest priority (14 votes) due to its alarming water consumption and widespread expansion. The semi-intensive irrigated system ranked second (12 votes), recognized for its broad spatial distribution and substantial potential for productivity gains.

The table below summarizes the experts' evaluation of various agricultural production systems, highlighting the intensive irrigated system as the most critical target for intervention.

Table 4. Prioritization of olive production systems based on resource consumption and environmental impact

Olive oil production system	Total number of responses	C1: High water consumption	C2: High environmental impact	C3: Most dominant model	C4: Low yield	C5: Mechanization
Traditional extensive system	8	0	2	3	5	1
Semi-intensive irrigated system	12	2	3	7	4	1
Intensive irrigated system	14	8	2	6	1	2
Hyper-intensive irrigated system	2	1	0	0	0	0

At the processing level, the three-phase extraction system was designated the top priority. Despite being resource-intensive, it remains prevalent and is therefore a critical target for addressing high water usage and wastewater generation. The continuous two-phase system ranked second due to its environmental advantages and lower water requirements.

Table 5 reflects the prioritization of extraction technologies, emphasizing the urgent need to address the high-water consumption and wastewater generation associated with three-phase systems.

Table 5. Ranking of olive oil processing systems for targeted interventions

Priority Rank	Olive oil processing system
1	3-phase system
2	2-phase system
3	Traditional system

4.4. Session 4: Selection of LCA and LCC indicators

To ensure the project's assessment framework aligns with local realities, experts selected specific indicators for the Life Cycle Assessment (LCA) and Life Cycle Costing (LCC).

- Environmental Indicators (LCA): The Water Scarcity Footprint was the undisputed top priority (18 votes), directly reflecting Tunisia's severe vulnerability to water stress. This was followed by the Carbon Footprint (13 votes) and Land Use (7 votes).

The following table presents the environmental metrics chosen by the panel to evaluate the ecological footprint of the olive oil value chain, with a strong emphasis on water scarcity and climate change.

Table 6. Selected environmental indicators for Life Cycle Assessment (LCA) in the Tunisian context

Code	Environmental indicators	Number of responses
IE1	Carbon footprint (kg CO_2-equivalent/kg of olive oil): Quantifies greenhouse gas emissions.	13
IE2	Eutrophication (kg PO_4^{3-}- eq / kg of olive oil (or kg N- eq)): Quantifies nutrient pollution.	0

IE3	Acidification potential (AP) (kg SO_2- eq / kg of olive oil) (or mol H^+- eq / kg): Quantifies the emissions of acidifying gases (SO_2, NOx, NH_3) related to the combustion of diesel (tractors, irrigation pumps).	1
IE4	Ecotoxicity potential (CTUe /kg of olive oil): Quantifies chemical toxicity. It will capture the impact of pesticide/herbicide use and the toxic load (polyphenols) of olive mill wastewater on Tunisian soils.	2
IE5	Water scarcity footprint Footprint (m³-eq / kg of olive oil): This indicator quantifies the potential for water deprivation for humans and ecosystems.	18
IE6	Fossil resource depletion potential (ADP- fossil) MJ / kg of olive oil (Megajoules) or kg Toe / kg (Tonne of oil equivalent): Measures the consumption of non-renewable energy over the entire cycle.	3
IE7	Land Use (m²·year / kg of olive oil (square meters per year to produce 1 kg)) or Points (Pt) (local species deficit)): Measures the land area occupied and the time required to produce the functional unit.	7

- Economic Indicators (LCC): Life Cycle Cost (LCC) was the preferred indicator (13 votes) to assess total production expenses. Experts also highly valued the Cost of Environmental Externalities (CEE) (6 votes) to effectively monetize environmental damages like pollution and water depletion, alongside Net Present Value / Net Added Value (4 votes).

Table 7 outlines the prioritized economic metrics that will be used to assess the financial viability and environmental externalities of the targeted production and processing systems.

Table 7. Selected economic indicators for Life Cycle Costing (LCC) in the Tunisian context

Code	Economic indicators	Number of responses
IE1	Life Cycle Cost (LCC) (TND / kg of olive oil): The total cost of production, including depreciation of the irrigation system, pumping energy, inputs, labor and crushing.	13
IE2	Net Added Value (NPV) (TND / kg of olive oil) (or TND / hectare for an agronomic perspective): The actual profit generated (Selling price of the oil - Total Life Cycle Cost).	4
IE3	Cost of Environmental Externalities (CEE) (TND / kg of olive oil) (Tunisian dinars of environmental damage per kg): This is the monetization of the environmental impacts calculated in the E-LCA (climate, acidification, toxicity, water scarcity).	6
IE4	Specific Input Cost (SIC) (TND / kg of olive oil): The direct financial cost of a particular input required to produce the functional unit.	2
—	extended cost-benefit analysis	Additional proposal

4.5. Session 5: Identifying alternatives for improved water management

During the final session, the focus shifted from identifying problems to brainstorming solutions, resulting in a robust portfolio of technical and organizational alternatives to traditional practices. These alternatives were systematically categorized into four intervention pillars:

1. Good agricultural practices & soil management: Conservation tillage, optimized planting density, intercropping, agroforestry, and soil/water conservation structures (e.g., *jessours*).

2. Irrigation strategies: Subsurface irrigation, intelligent scheduling, deficit irrigation, and the integration of unconventional water sources (such as treated wastewater).
3. Digitalization & smart agriculture: Remote sensing, drones, thermal imaging (CWSI) for water stress monitoring, soil moisture sensors, and integrated digital platforms.
4. Circular Economy (Processing phase): Valorization of pruning residues (biochar, composting), recovery and reuse of olive mill wastewater, and the integration of renewable solar energy in mills.

The final table categorizes the diverse technical, digital, and organizational solutions brainstormed by participants to transition the sector toward more sustainable and circular practices.

Table 8. Comprehensive portfolio of proposed alternatives for enhanced water management and productivity

Good agricultural practices and soil management	Irrigation strategies and alternative water resources	Digitalization and agriculture	Transformation phase and circular economy
Limited soil tillage (limiting evapotranspiration)	Underground irrigation	New water-saving technologies and remote sensing	Valorization of pruning waste (biochar)
Appropriate planting density	Irrigation management	Thermal imaging camera (CWSI)	Compost
Composting	Use of unconventional waters	Use of drones	Composting
Forage crop	Treated wastewater	Digital twins	Distillation
Intercropping	Intelligent irrigation system	Irrigation management via applications	Coal made from olive mill wastewater
Plant cover (organic matter)	Deficit irrigation (EUT)	Using smart sensors to optimize irrigation	Valorization of olive mill wastewater
Agroforestry	Irrigation strategies (managing irrigation needs)	Monitoring of water stress (IR index)	Renewable energies
Management of pruning timber	Supplemental irrigation strategies (water conservation)	Smart irrigation	Solar energy
Legumes		Control platform	
Agroecological practices		Soil moisture sensors and weather station	
Crop rotation			
Implementation of benches and jessours (dry stone walls)			
Best practices and complete technical package			
Mitigation methods			

5. Conclusion

The workshop successfully culminated in the validation of the project's methodological framework through a highly participatory, expert-driven approach. By bridging institutional knowledge and scientific research, the event generated a broad consensus on the critical parameters that will dictate the subsequent phases of the study.

Key validated outcomes include:

- Focus area: The Central-Eastern region of Tunisia was definitively selected as the primary study zone.
- Target systems: Intensive and semi-intensive irrigated production systems, alongside three-phase and two-phase processing mills, will serve as the focal points for analysis.
- Assessment framework: The environmental evaluation will be driven by water scarcity and carbon footprints (LCA), coupled with an economic evaluation that focuses on life cycle costing and the possibility of monetizing environmental externalities (LCC).
- Intervention Pathways: Future scenario modeling will prioritize smart irrigation, digitalization, agroecological soil management, and circular economy practices.

Ultimately, the shared vision established during this workshop provides a robust, evidence-based foundation for the upcoming data collection, scenario modeling, and the formulation of actionable decision-support tools aimed at enhancing water productivity, resilience, and sustainability in the Tunisian olive oil sector.

Appendices

Appendix 1: Workshop Program

برنامج ورشة العمل حول إنتاجية المياه في قطاع زيت الزيتون: تحديد نظم الإنتاج، المؤشرات الاقتصادية والبيئية والممارسات والتكنولوجيات المستدامة

الاربعاء 13 ماي 2026

نزل رويال أسبو بتونس (Royal ASBU TUNIS)

09:00–08:30	استقبال وتسجيل المشاركين
09:15–09:00	الكلمة الافتتاحية: السيدة رئيسة مؤسسة البحث والتعليم العالي الفلاحي السيد مدير عام المعهد الوطني للبحوث الزراعية بتونس السيد بوبكر الذهيبي عن المركز الدولي للبحوث الزراعية في المناطق الجافة
09:30–09:15	تقديم المشروع وأهداف الورشة
09:50–09:30	عرض نتائج التشخيص الأولي حول تحديد سلاسل القيمة ذات الأولوية
11:00–09:50	نقاش مع الخبراء حول: 1) تحديد منطقة الدراسة 2) تحديد نظم الإنتاج المعنية بالدراسة
11:30–11:00	استراحة قهوة
12:30–11:30	متابعة النقاش : اختيار المؤشرات الاقتصادية والبيئية
13:30–12:30	نقاش حول الممارسات والتكنولوجيات المستدامة
14:00–13:30	ملخص الورشة، صياغة التوصيات، واختتامها
14:00	الغداء

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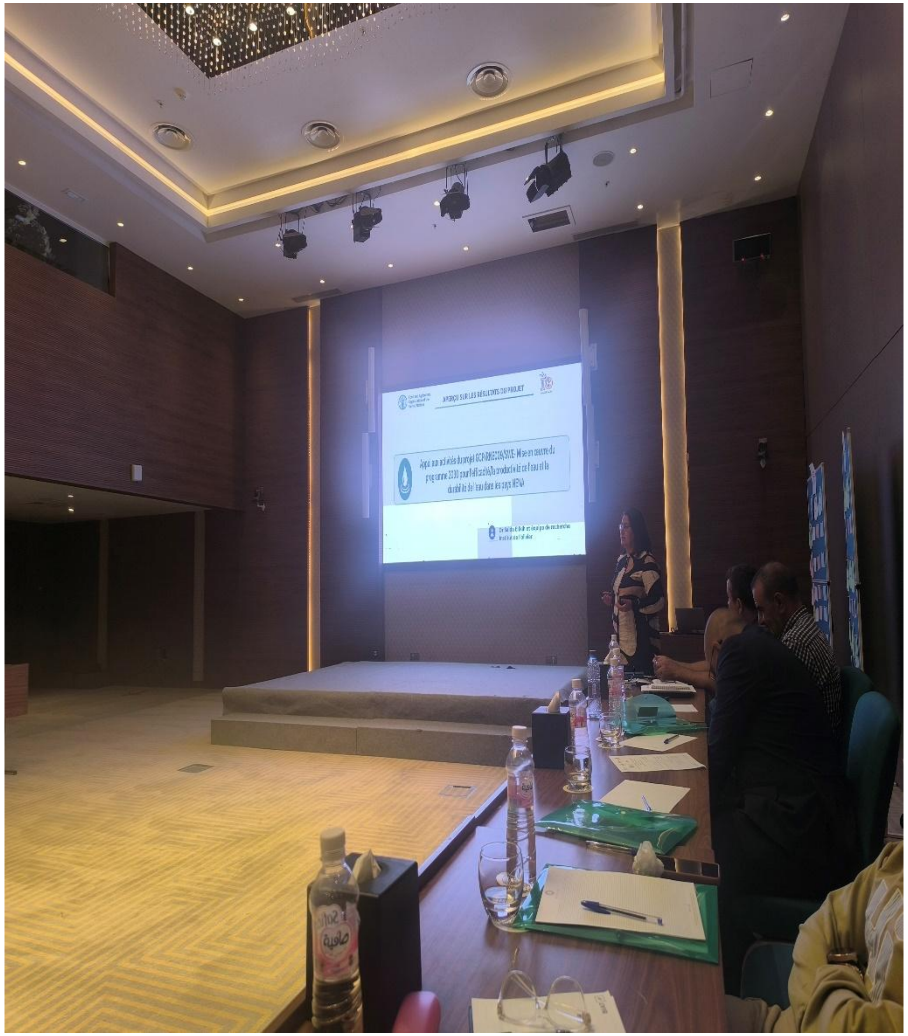
الفاكس: (216/71) 752.897 ؛(216/71) 716.537

Appendix 2: Photos of the workshop


Regional Water Scarcity Initiative (WSI) Programme

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Bonnes pratiques agr et gestion des sols
Stratégies d'irrigation et ressources en eau alternat
Digitalisation et Agriculture
Phase de Transf et économie circulaire
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ICARDA
Sweden Sverige
REGIONAL INITIATIVE ON WATER SCARCITY
FOR THE NEAR EAST AND NORTH AFRICA
In collaboration with
IWMI
unicef


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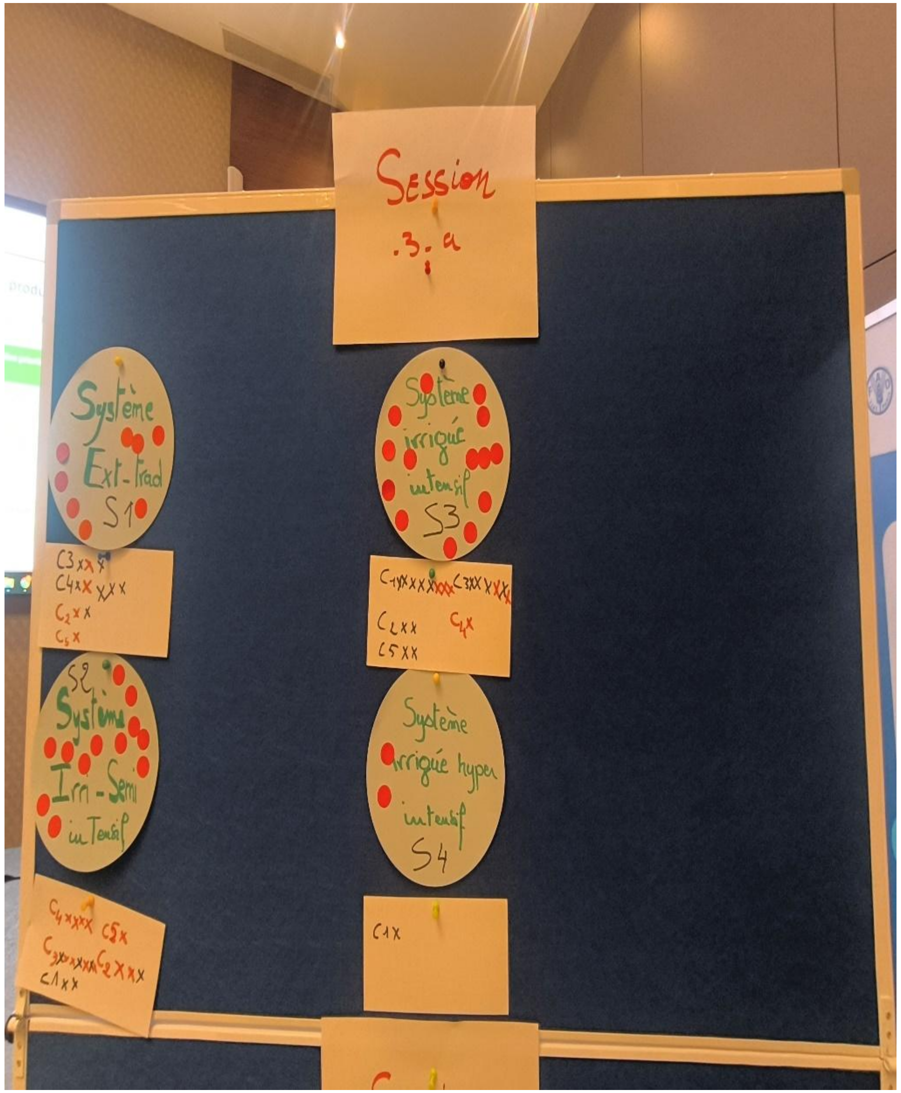
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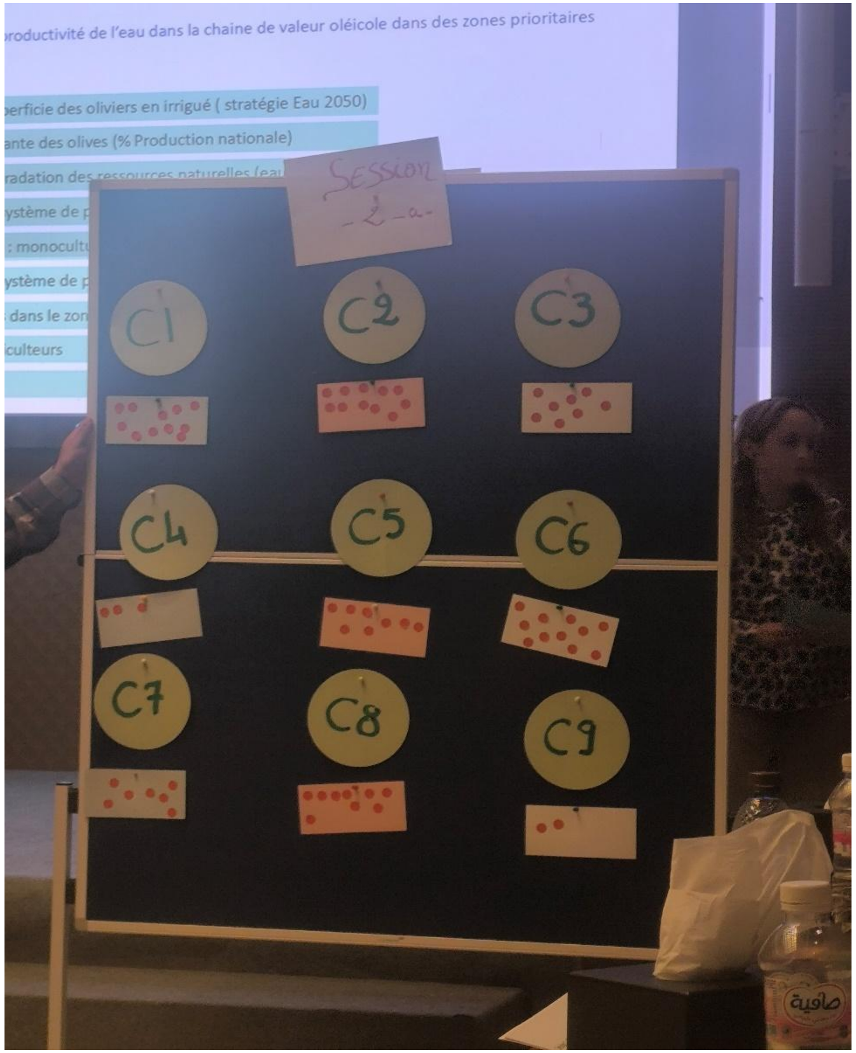
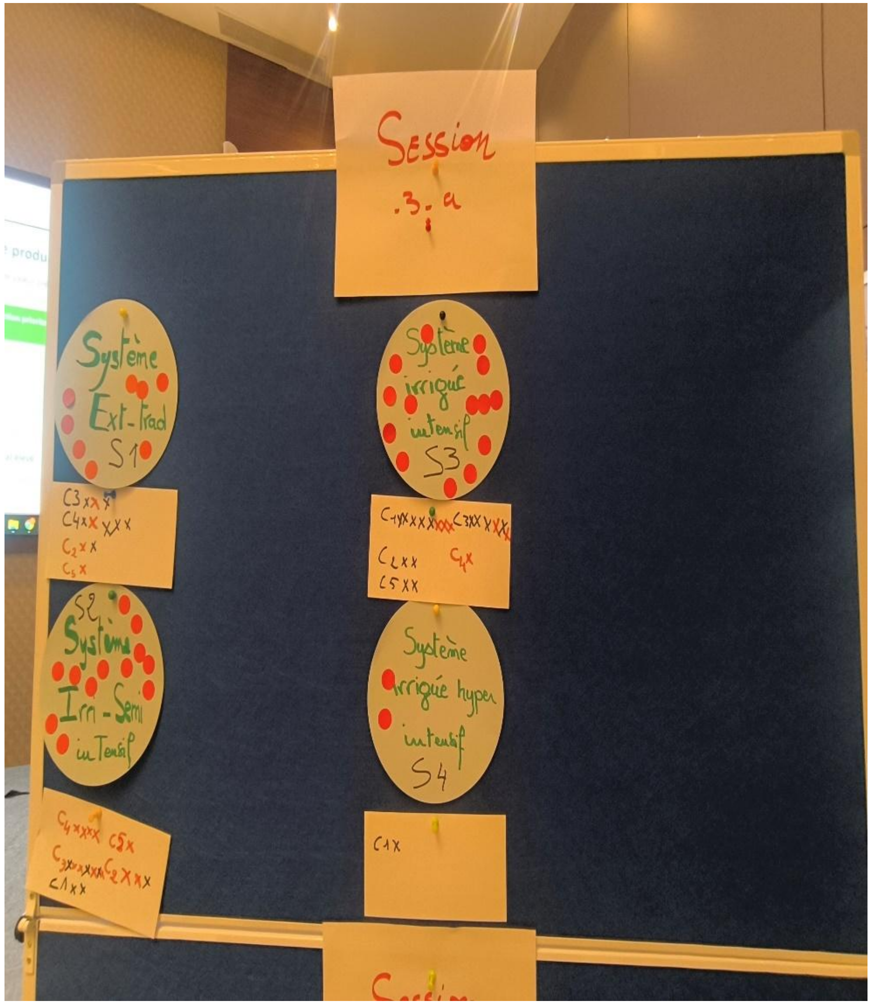

roductivité de l'eau dans la chaine de valeur oléicole dans des zones prioritaires
perficie des oliviers en irrigué (stratégie Eau 2050)
ante des olives (% Production nationale)
Session
-2-a-
C1
C2
C3
C4
C5
C6
C7
C8
C9


Session
.3.a
Système
Ext-Trad
S1
Système
irrigué
intensif
S3
Système
Irri-Semi
intensif
Système
irrigué hyper
intensif
S4


Session
-2-b-
C1
C2
NE
NO
CE
CO
SE
SO
REGIONAL INITIATIVE
ON WATER SCARCITY
ICARDA