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AgroTechnology VET Centres to Network and Train Future Farmers in Jordan and Palestine

Project acronym: AgroTec
December 2025

Deliverable D3.3	**4 Courses**

AgroTec D3.1 Deliverable – Training material

Work Package (WP)	WP3: AgroTec Development
WP Leader	AgriWatch BV
WP members	The University of Jordan National University College of Technology Mutah University Palestine Technical University - Kadoorie Palestine Polytechnic University Slovak University of Agriculture in Nitra Int@E UG
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Beneficiary number	**Beneficiary name**
BE 001	AgriWatch BV
BE 002	The University of Jordan
BE 003	National University College of Technology
BE 004	Mutah University
BE 005	Palestine Technical University - Kadoorie
BE 006	Palestine Polytechnic University
BE 007	Slovak University of Agriculture in Nitra
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List of Acronyms

This table shows the acronyms used in this deliverable in alphabetical order.

Acronym	Description
AgriWatch	AgriWatch BV
EC	European Commission
EO	Earth Observation
EU	European Union
JO	Jordan
HE	Higher Education
HEI	Higher Education Institution
GA	Grant Agreement
MS	Milestone
PS	Palestine
Int@E	Int@E UG
WP	Work Package
WPL	Work Package Leader
UJ	The University of Jordan
NUCT	National University College of Technology
MU	Mutah University
MS	Milestone
PPU	Palestine Polytechnic University
PTUK	*Palestine* Technical University - Kadoorie
SUA	Slovak University of Agriculture in Nitra
ToT	Training-of-Trainers
WEF	Water-Energy-Food

1 Executive Summary

The report outlines the progress of the AgroTec project's implementation concerning Task 3.6, which focuses on testing and integrating educational systems. It highlights the testing and demonstration of 4 of the 12 courses developed for VET students at local university partners in Jordan and Palestine, with the project set to continue until December 2025.

The D3.3 deliverable, titled "4 Courses", is a specific output within Work Package 3 (AgroTec Development). It represents the practical implementation phase, during which selected vocational courses are piloted, tested, and demonstrated at the local partner universities in Jordan and Palestine.

Key Characteristics of Deliverable D3.3

Objective: The primary goal is to test and integrate 4 specific courses (selected from the 12 newly developed modules) into the educational systems of the partner institutions. This activity aims to demonstrate smart farming and marketing techniques to students, staff, and professionals.

Target Audience: The piloting phase involves approximately 30 participants per course, including university staff, students, entrepreneurs, and professionals from the agri-food sector.

Implemented Courses by Partner

The consortium partners have identified and implemented specific courses to fulfil this requirement, utilizing blended learning formats (face-to-face and online) and practical training in newly established AgroTec centers.

2 Introduction

The AgroTec project aims to support economic development in rural areas of Jordan and Palestine (JO&PS). Given agriculture's significant role in the region's employment and economy, it plays a crucial role in supporting income, food security, and livelihoods. Both countries face challenges such as food deficit, high food prices, water scarcity, and overuse of groundwater, which heavily affect their economic growth in general and their agricultural sector in particular, especially under expected future drought conditions.

To tackle these issues, a consortium of six universities and two business partners will establish **five "AgroTec" centres** in universities across JO&PS. These centres will offer practical, innovative vocational education and training (VET) courses, fostering cooperation among companies, VET institutions, and stakeholders in the Agri-Food value chain.

The project's focus includes promoting smart tools for data enrichment through Earth Observation (EO) and Geospatial technologies, as well as IoT sensor networks for soil-crop monitoring, processing, marketing, and quality control. The curriculum will be developed to address the new skills required in these advancements, filling gaps in traditional curricula.

The project's main outputs include developing 12 vocational courses and organizing 20 Training-of-Trainers (ToT) sessions to upskill staff in vocational education and training (VET) and higher education institutions (HEIs). These courses focus on Geo-ICT solutions and agrarian trade and marketing.

The ToT activities will specifically target AgroTec centers, emphasizing teaching methodologies, the creation of a methodological framework for training, and the design and

development of materials for the 12 vocational courses. This includes producing teaching materials, exercises, and exams.

Currently, at least 12 courses have been developed based on the project's needs assessment. Some of these courses include Agrarian Marketing and Geospatial Foundations for Crop Monitoring. These courses were developedThis report outlines the implementation of Task 3.6, which focuses on testing and integrating educational systems. It highlights that at least 4 out of 12 vocational courses have been tested and successfully demonstrated at local universities in Jordan and Palestine. This course execution is part of the AgroTec project, which is scheduled to run until December 2025 and beyond. by five local universities in collaboration with EU partners. **Of the 12 courses** being developed, at least **four** were selected for delivery, which is the focus of this **deliverable D3.3**.

Overall, the project seeks to enhance agricultural practices, strengthen vocational education, foster innovation, and empower various stakeholders in Jordan and Palestine's agricultural sectors.

3 Objectives of the Deliverable D3.3

This report outlines the implementation of Task 3.6, which focuses on testing and integrating educational systems. It mentions that at least 4 out of 12 vocational courses have been tested and demonstrated at local universities in Jordan and Palestine. This course execution is part of the AgroTec project and is set to run until December 2025 and beyond.

4 Activities Undertaken

The specific activities carried out under this task and deliverables include:

4.1 Piloting and Integration of Vocational Courses

The primary objective of Task 3.6 is to test and demonstrate **4 specific courses** chosen from the 12 newly developed modules within the educational systems of partner universities in Jordan and Palestine. This activity is scheduled to officially begin in September 2024, after the programs are accredited. **Although the accreditation process was not part of the project proposal, local partners successfully achieved it, as noted in the AgroTec project interim report.**

Partners implemented these courses within various academic frameworks:

- The University of Jordan (UJ): Integrated courses into the B.Sc. in Horticulture and Crop Science and the Higher Diploma in Smart Agriculture. Piloted courses include "Principles of Farm Machinery", "Plant Biotechnology", and "Tools and Technologies of Smart Agriculture".
- National University College of Technology (NUCT): Piloted courses within the Diploma in Smart Agriculture and B.Sc. in Engineering. Courses include "Principles of Farm Machinery", "Consumer Behaviour", and "Marketing of Smart Agriculture".
- Mutah University (MU): Updated and delivered practical courses such as "Agricultural Economics", "Organic Farming", and "Innovative Technologies in Vegetable Production".
- Palestine Polytechnic University (PPU): Implemented courses within the Applied Biology–Plant Biotechnology program. Specific courses include "Crops and Plant Pests Diagnosis and Monitoring", and "Food Marketing".

- Palestine Technical University - Kadoorie (PTUK): Integrated courses as electives for undergraduate and master's degrees. Courses include “ICT in Agriculture”, “Smart Agriculture Technologies”, and “Precision Farming”.

4.2 Testing and Demonstration Methodology

The activities under Task 3.6 involved specific methodologies to ensure effective transfer of knowledge:

- Target Audience Selection: The goal was to select approximately 30 participants per course. The target mix included staff from agricultural research offices, university students/staff, interns from SMEs/startups, NGO professionals, and entrepreneurs/farmers.
- Blended Learning: Due to challenges such as political instability and movement restrictions (particularly in the West Bank), partners utilised a blended learning approach, combining face-to-face instruction with online learning components.
- Use of AgroTec Centers: Practical training and workshops were conducted using the newly established AgroTec centers and equipment, such as IoT sensor networks, weather stations, and spectral analysis tools, to demonstrate smart farming techniques.

4.3 Reporting and Evaluation

As part of Deliverable D3.3, each partner university prepared reports documenting the piloting process. These reports detail the course descriptions, modes of delivery, student numbers, and challenges faced (e.g., equipment limitations or travel restrictions). This documentation serves as the verification that the testing and integration into the educational systems were successfully initiated.

5 Implemented Courses

5.1 Courses Implemented at Palestine Polytechnic University (PPU)

Palestine Polytechnic University successfully implemented the course “Crops and Plant Pests Diagnosis and Monitoring” during the period September–December 2025 as part of the Applied Biology–Plant Biotechnology program. The course was delivered using a blended learning approach, combining face-to-face instruction with limited online components to accommodate movement restrictions in Hebron. It provided students—predominantly female—with practical and theoretical skills in pest and disease diagnosis, integrating classical methods with modern ICT-based tools to support sustainable agricultural practices and reduce crop losses under local conditions.

In addition, the University is preparing to implement the course “Food Marketing” during September–December 2026 as a joint offering between the Applied Biology–Plant Biotechnology and Marketing programs. This course will also follow a blended delivery model and aims to equip a larger, more diverse student cohort with foundational marketing knowledge tailored to the agro-food sector, as part of the AgroTec project. Emphasis will be placed on consumer behaviour, sustainability, ethics, and emerging trends such as digital marketing and smart agriculture. Similar logistical challenges related to mobility and regional instability are anticipated, and partial online delivery is planned to ensure uninterrupted learning.

Together, these courses reflect PPU’s commitment to interdisciplinary education, capacity building, and the integration of modern technologies to address real-world challenges in agriculture and food systems as the expected outcome of the AgroTec Project.

For this, PPU has established a comprehensive **two-year Diploma program (76 credit hours) titled “Smart Agriculture,” which has received accreditation and approval from the Ministry of Higher Education**.

PPU Course 1: Crops and Plant Pests Diagnosis and Monitoring

Course Description: This course provides agriculture and food science students with comprehensive knowledge and practical skills for diagnosing and monitoring crop pests and diseases, with a particular focus on Palestine and neighboring regions. It addresses the impacts of both biotic pests and abiotic stress factors on agricultural productivity and emphasizes accurate diagnosis as the foundation of effective and sustainable pest management. The course integrates classical field and laboratory diagnostic methods with modern tools, including information and communication technologies (ICT), to identify visible and non-visible symptoms and enable early detection before infestations reach the economic threshold. Through this integrated approach, the course aims to prepare a new generation of farmers and agricultural professionals capable of managing farms efficiently, minimizing crop losses, and improving agricultural sustainability.

Mode of Delivery: Blended learning (90% face-to-face, 10% online)

Duration: September 2025 – December 2025 (2 Credit hrs theoretical + 1 credit hr practical)

Program: Applied Biology- Diagnostics and Plant Biotechnology

Teaching Staff: Dr. Rami Arafeh and Mr. Zaid Altaradeh

Number of Students: 23 students (Palestine Polytechnic University), including 22 female students

Challenges Faced: Due to movement restrictions and ongoing instability in Hebron, West Bank, the course was partially delivered online (approximately 10%) to ensure continuity of instruction.

Figure 1: A) Agrilive monitoring system used in the university's greenhouse. B) Students in the practical part learning on Agrilive system. C) In the laboratory, practical session. D) Students performing molecular diagnosis of plant pest resistance gene. E) Students following up on practical aspects in diagnosis.

PPU Course 2: Food Marketing

Course Description: This course explores the principles and practices of marketing within the food, beverage, and food services sectors, which represent some of the largest and most dynamic industries worldwide, particularly in developing economies. It introduces students to core marketing concepts

while examining the unique characteristics of food products and their cultural, social, and economic significance. The course analyzes how the specific context of the agro-food sector shapes effective marketing strategies and decision-making processes. It also addresses current trends and controversies in food marketing, including sustainability, ethics, consumer behavior, and public health concerns. Special emphasis is placed on emerging approaches such as digital marketing, smart agriculture, and technology-driven communication tools, equipping students and farmers with the knowledge needed to respond effectively to evolving markets and consumer expectations.
Mode of Delivery: Blended learning (90% face-to-face, 10% online)
Duration: Expected in September 2026 – December 2026 (3 Credit hrs)
Program: Applied Biology-Plant Biotechnology + Marketing Program
Teaching Staff: Dr. Amjad Al-Natsheh + Dr. Fawzi Razem
Number of Students: Expected 50 students (Palestine Polytechnic University), > 50% female students
Challenges Faced: Due to movement restrictions and ongoing instability in Hebron, West Bank, the course will likely be partially delivered online (approximately 10%) to ensure continuity of instruction.

5.2 Courses Implemented at the University of Jordan (UJ)

The University of Jordan successfully implemented smart farming tools in two courses within the B.Sc. in Horticulture and Crop Science curricula. They include "**Farm Machinery**" and "**Plant Biotechnology**". Moreover, the course "**Tools and Technologies of Smart Agriculture**" was implemented during the period September–December 2025 as part of the accredited "**Higher Diploma in Smart Agriculture**" program. The courses were delivered in person. It provided students with practical and theoretical skills in tools and technologies related to smart agriculture.
Together, these courses reflect the University of Jordan's commitment to interdisciplinary education, capacity building, and the integration of modern technologies to address real-world challenges in agriculture and food systems as the expected outcome of the AgroTec Project.

UJ Course 1: Principles of Farm Machinery

Course Description: Basic principles and definitions of mechanics and methods of power transmission; Agricultural tractor; Soil tillage and soil preparation equipment; Planting equipment; Chemical Application equipment; Harvesting equipment.
Mode of Delivery: Blended learning (50% face-to-face, 50% online)
Duration: two times (2 Credit hrs theoretical + 1 credit hr practical)

- First semester: September 2024 – December 2025
- Second: February 2025-June 2025

Program: B.Sc. in Horticulture and Crop Science
Teaching Staff: Dr. Issa Gammoh
Number of Students: 35 students
Challenges Faced: Limited number of available teaching equipment.

Figure 2: UJ Course 1, Principles of Farm Machinery

UJ Course 2: Plant Biotechnology

Course Description: This course introduces students to the latest developments in plant biotechnology, particularly vegetative propagation, haploid plants, somatic hybridization, somatic cell fusion, and in vitro fertilization. Production of disease-free and indexed plants, as well as gene cloning and transformation, including Smart farming

Mode of Delivery: 100% face-to-face

Duration: February 2025 – June 2025 (3 Credit hrs theoretical)
Program: Applied Biology- Diagnostics and Plant Biotechnology
Teaching Staff: Dr. Monther Sadder
Number of Students: 5 students
Challenges Faced: Limited number of available teaching equipment.

Figure 3: UJ Course 2, Plant Biotechnology

UJ Course 3: Tools and Technologies of Smart Agriculture

Course Description: Role, importance, and trends of using Sensors and Actuators in agriculture. Practical principles of electrical and electronic components. Working Operation principles and types of sensors in agriculture: soil, weather, crop, livestock and drone-based sensors. Sensors and data collection. Practical basics and types of actuators: mechanical, electrical, hydraulic and pneumatic actuators. The course will include visits to the laboratory of sensors and the hydroponic greenhouse, where students familiarize themselves with the interaction of sensors and actuators

Mode of Delivery: 100% face-to-face
Duration: September 2025 – December 2025 (3 Credit hrs)
Program: High Diploma in Smart Agriculture program
Teaching Staff: Dr. Issa Gammoh
Number of Students: Six students (University of Jordan), > 66% female students
Challenges Faced: Limited number of available equipment for teaching.

Figure 4: UJ Course 3, Tools and Technologies of Smart Agriculture

5.3 Courses Implemented at the National University College of technology (NUCT)

The National University College of Technology (NUCT) adopted a flexible and practice-oriented approach to smart agriculture education by implementing three-month specialised training courses alongside a **nine-month accredited professional diploma program titled "Vocational Diploma in Smart Agriculture."** These programs were designed to equip participants with both theoretical knowledge and hands-on skills in modern agricultural technologies, including smart farming tools, digital monitoring systems, and sustainable agricultural practices. The courses were delivered through face-to-face instruction, with a strong emphasis on applied learning and real-world problem solving.

Through these short- and medium-term programs, NUCT aimed to enhance technical capacity, support workforce development, and respond to the evolving needs of the agricultural sector. This approach reflects NUCT's commitment to vocational education, technology transfer, and the integration of innovative solutions in agriculture, aligning with the AgroTec Project's objectives and expected outcomes.

NUCT Course 1: Principles of Farm Machinery

Course Description: Basic principles and definitions of mechanics and methods of power transmission; Agricultural tractor; Soil tillage and soil preparation equipment; Planting equipment; Chemical Application equipment; Harvesting equipment.

Mode of Delivery: Blended learning (100% face-to-face)
Duration: two times (2 Credit hrs theoretical + 1 credit hr practical)

- First semester: September 2024 – February 2025
- Second: February 2025-June 2025

Program: B.Sc. in Engineering
Teaching Staff: Eng. Sara Qtaishat
Number of Students: 14 students
Challenges Faced: Limited number of available equipment for teaching.

Figure 5: NUCT Course 1: Principles of Farm Machinery

NUCT Course 2: Consumer Behavior

Course Description: This course introduces students to the fundamental concepts and recent developments in consumer behavior. It focuses on understanding how individuals and groups select, purchase, use, and evaluate products and services. The course examines psychological, social, cultural, and economic factors that influence consumer decision-making, including perceptions, motivations, attitudes, learning, and lifestyles. Students will also explore market segmentation, consumer research methods, and the impact of digital technologies and data analytics on modern consumer behavior, including applications related to smart and digital marketing.
Mode of Delivery: 100% face-to-face
Duration: February 2025 – June 2025 (3 Credit hrs theoretical)
Program: Applied Biology- Diagnostics and Plant Biotechnology
Teaching Staff: Dr. Kholod Hijazi
Number of Students: 12 students
Challenges Faced: Limited number of available equipment for teaching.

NUCT Course 3: Marketing of Smart Agriculture

Course Description: This course explores the role, importance, and emerging trends of marketing in smart agriculture systems. It focuses on how digital technologies, data-driven decision-making, and smart farming tools influence agricultural markets and consumer behavior. The course covers market analysis, value chain development, pricing strategies, and branding of smart and sustainable agricultural products. Students will learn how data collected from smart farming systems can support marketing decisions, demand forecasting, and supply optimization. Practical aspects include case studies on agri-tech startups, digital platforms, traceability systems, and e-marketing tools used in

agriculture. The course also includes visits to smart agriculture facilities and agri-business laboratories, where students become familiar with real-world applications of marketing strategies integrated with smart farming technologies.
Mode of Delivery: 100% face-to-face
Duration: September 2025 – December 2025 (3 Credit hrs)
Program: Diploma in Smart Agriculture program
Teaching Staff: Dr. Tarek Albloush, Eng. Sara Awni
Number of Students: 9 students (University of Jordan), > 66% female
Challenges Faced: Limited number of available teaching equipment.

Figure 6: NUCT Course 3: Marketing of Smart Agriculture

5.4 Courses Implemented at the Palestine Technical University Kadoorie (PTUK)

The courses implemented in the Faculty of Agriculture Science and Technology, Palestine Technical University Kadoorie, as elective courses

PTUK Course 1: ICT in Agriculture (Online)

Course outlines:

- Introduction to ICT in agriculture
- Farm management software and applications in agriculture
- Type and Use of sensors and IOT in agriculture
- Electronic marketplaces and e-commerce in agriculture
- Geographic Information Systems (GIS) and Remote Sensing in agriculture
- Data management and AI in agriculture
- ICT for weather forecasting
- ICT-enabled extension services for farmers.

PTUK Course 2: Smart Agriculture Technologies (Online)

Course outlines:

- Introduction to Smart Agriculture Technologies
  2.2 What is smart agriculture? What is needed for smart agriculture? What are the challenges?
- Smart soil management and technologies
- Smart crop management and technologies
- Smart irrigation management and technologies
- Smart livestock farming and animal tracking technologies
- Smart greenhouse management and technologies
- Use of blockchain technology in agriculture
- Smart packaging, labelling, and 3D technologies in agriculture

PTUK Course 3: Precision farming (Online)

Implemented: First semester 2024/2025 (undergraduate) **/** Faculty of Agriculture Science and Technology

Course outlines:

- Soil analysis
- Crop monitoring
- Resource management
- Yield optimization
- Technology integration

PTUK Course 4: Agriculture machines (Online)

Implemented: First semester 2024/2025 (undergraduate) **/** Faculty of Agriculture Science and Technology

Course outlines:

- Modern agriculture practices
- Machine diagnostics
- Technical specifications
- Efficient operation techniques
- Safety protocols

Staff / teachers involved at the courses:

1) Prof. Nawaf Abu khalef / dean of the Agriculture Science and Technology
2) Dr. Ahmed Amarna / lecturer at Agriculture Science and Technology
3) Prof. Rana Al qubaj / vice president of International Cooperation
4) Dr. yahya stati / lecturer at Agriculture Science and Technology
5) Eng. Soulman taha / lecturer of Electrical Engineering

Students training on AgroTec:

- Including AgroTec principles in the online courses:

1. Big data analysis – **Master Degree**, 2024 and 2025, **15** students

2. Sensors Technologies – **Undergraduate**, 2025, **35** students
3. Precision farming - **Undergraduate**, 2024 and 2025, **33** students
4. Agriculture machines: **Undergraduate**, 2024 and 2025, **27** students

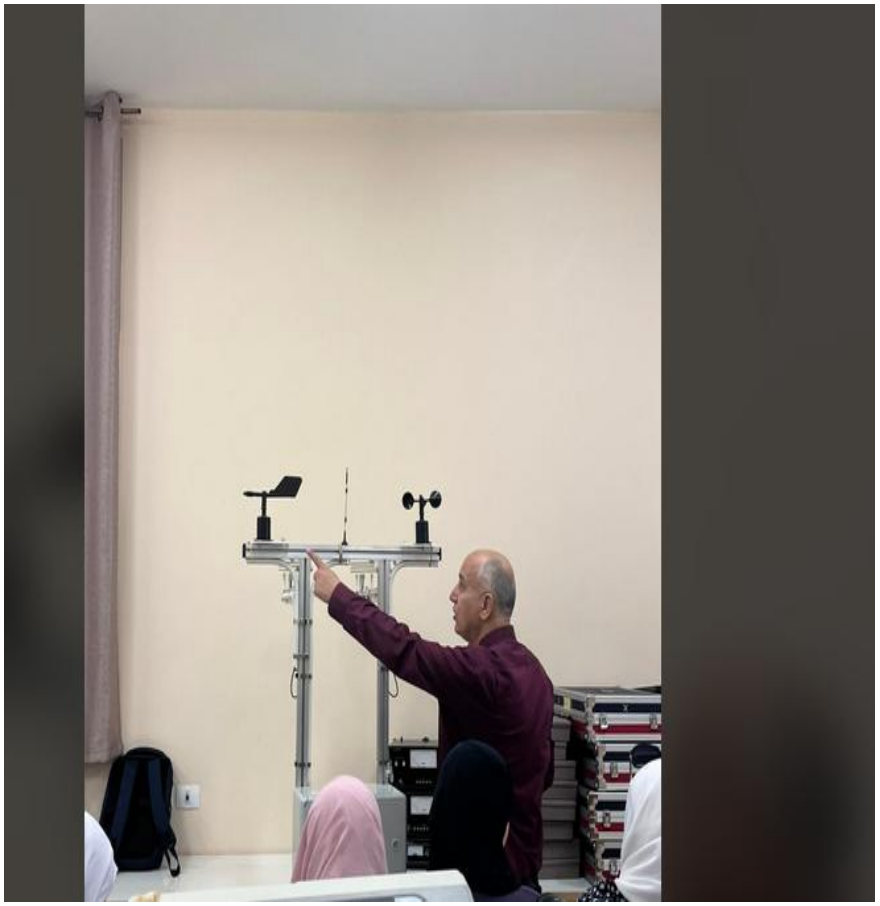

Figure 7: PTUK - Eng. Soulman Taha / ICT lecturers explaining the wind speed and wind direction sensor

Figure 8: PTUK - Explaining the devices used for smart irrigation

Figure 9: *PTUK - Prof Nawaf Abu Khalef, Dr ahmad Amar, Dr Raed Daraghmeh with students in the AgroTec Lab*

Figure 10: PTUK - Photos from different dissemination visits

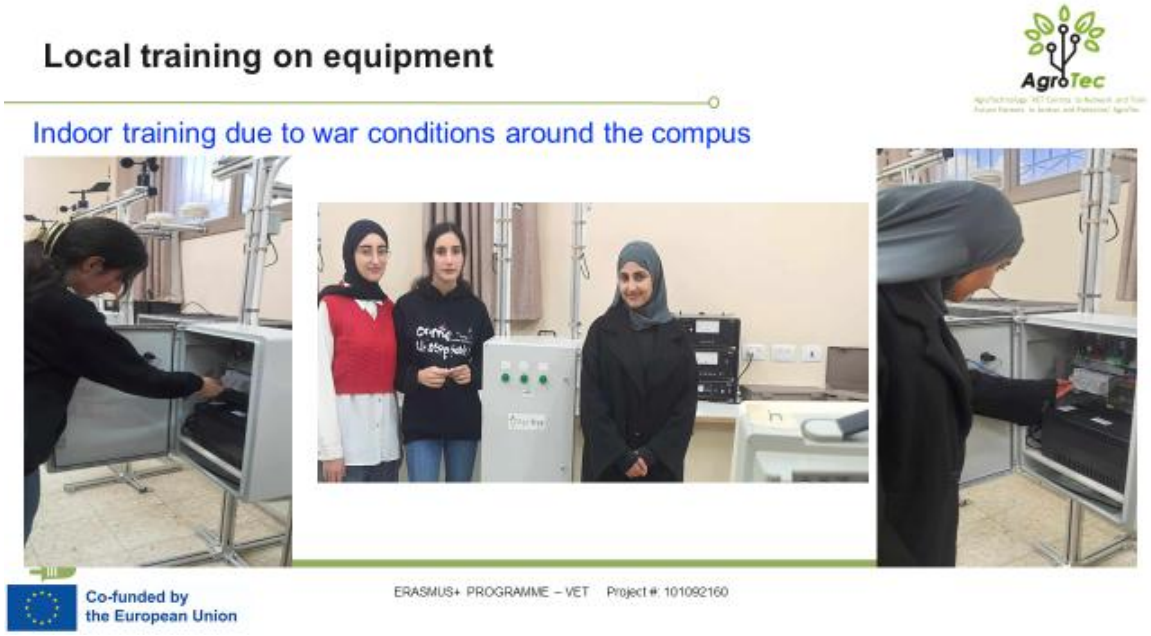

Figure 11: PTUK - Photos from different training session on the AgroTec sensors

5.5 Courses Implemented at the Mutah University (MU)

Mutah University successfully implemented 5 courses during the first and second semesters of 2024/2025 and the first semester of 2025/2026. The course was delivered using a blended learning approach, combining in-person instruction with limited online components. It provided students—predominantly female—with practical and theoretical skills in pest and disease diagnosis, integrating classical methods with modern ICT-based tools to support sustainable agricultural practices and reduce crop losses under local conditions.

Together, these courses reflect Mutah University's commitment to interdisciplinary education, capacity building, and the integration of modern technologies to address real-world challenges in agriculture and food systems as the expected outcome of the AgroTec Project. These courses are as follows:

- Course 1 Agriculture Economics
- Course 2 Organic Farming
- Course 3 New Tech in Irrigation and Drainage
- Course 4 New in Plant Propagation and Structure
- Course 5 Innovative Technologies in Vegetable Production

No	Course Name	No. Student 1- semester 2025/2024	NO. Student 2-semester 2025/2024	NO. Student 1-semester 2025/2026
1	Agriculture Economics	70	60	74
2	Organic Farming	31	Not available this semester	35
3	New Tech in irrigation and drainage	21	27	Not available this semester
4	New in Plant Propagation and Structure	23	32	27
5	Innovative Technologies in Vegetable Production	22	33	Not available this semester

MU Course 1: Agriculture Economics

Description: This course gives students a good understanding of how economics is applied to agriculture. The student will learn the basics of economic development in production, pasture, farm management, farming, farming, and consumption. Students will learn to evaluate the economic efficiency and sustainability of agricultural practices and policies, and understand the global challenges facing the agricultural industry.

Course Aims (Objectives): Learn the basic concepts, theories, and terminology in agricultural economics.

- Develop an understanding of the basic principles of agriculture and economics

Develop an appreciation of the theoretical and practical aspects of agricultural marketing

Delivery Mode: Blended learning (90% In Person, 10% online)

Duration: September 2025 – December 2025 (3 Credit hrs theoretical)

• Course Title: Principles in Agriculture Economic	• Course Number:1101210
• College: Agriculture	• Credit Hours: 3
• Department: plant production	• Pre-requisite :
• Semester & Academic Year: Spring, • 2023\ \ 2024	• Instructor: Dr. Muawya Alasasfa
• Office Hours: 11am 12 pm (Sunday , Tuesday) 1 pm - 2 pm (Sunday , Tuesday)	• Lecture Time: 11 pm – 12 pm (Monday, Wednesday)

MU Course 2: Organic Farming

Course Description: Principles, concepts, and techniques of organic and sustainable agriculture, like the social and economic components of organic agriculture systems, including soil and water management, marketing of organic products; Biological covering; Cultural practices; pest control; organic matter management to support the soil food and nutrient availability; crop rotations, plant competition and plant health; integrating crops and animals; organic animal husbandry practices; crop systems studies.

Course Objectives:

- Define sustainable agriculture and agroecosystems and describe how these systems function.
- Learn the principles and practices of organic crop production
- Outline the procedures involved in converting from a non-organic to an organic production system including sources of advice.
- Develop a soil management plan for an organic system that optimizes plant nutrition and minimizes environmental degradation using cover crops, compost and other organic and mineral amendments.
- Develop a pest management plan for an organic system that minimizes curative control measures
- Understand the foundation of organic animal husbandry and the integration of crops and animals on the organic farm
- Learn how to apply for an organic farm certificate.

Mode of Delivery: Blended learning (90% In Person, 10% online)

Course Information:

• Course Title: Organic Farming	• Course Number: 1101225
• College: Agriculture	• Credit Hours: 3
• Department: plant production	• Pre-requisite :
• Semester & Academic Year: Spring, 2023 2024	• Instructor: Dr. Muawya Alasasfa
Office Hours: 11.30 am -1.00 pm (Sunday, Tuesday)	Time of the lecture: 12.30 pm – 2.00 pm

MU Course 3: New Tech in Irrigation and Drainage

Course Description: This course provides a comprehensive overview of the principles, practices, and technologies involved in irrigation and drainage systems. Students will gain an understanding of the importance of water management in agriculture, including strategies for water conservation and the integration of new technologies into irrigation systems.

Course Objectives:

- Understand the fundamental principles of irrigation and drainage systems.

- Identify and evaluate various irrigation and drainage techniques.

- Analyze the role of water-saving strategies in agricultural sustainability.

- Explore emerging technologies in irrigation systems.

- Apply theoretical knowledge to practical scenarios through case studies and field visits.

• Course Title: Organic Farming	• Course Number: 1101225
• College: Agriculture	• Credit Hours: 3
• Department: plant production	• Pre-requisite :
• Semester & Academic Year: Spring 2023 \ 2024	• Instructor:
Office Hours: 11.30 am -1.00 pm (Sunday, Tuesday)	Time of the lecture:

Delivery Mode: Blended learning (90% In Person, 10% online)
Duration: September 2025 – December 2025 (3 Credit hrs theoretical)

MU Course 4: New in Plant Propagation and Structure

Course Description: This course focuses on propagation Structures: mist chambers, greenhouses, glasshouses, cold frames, hot beds, polyhouses, nursery (tools and implements), needs and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages. Also, it will be about seed dormancy (scarification & stratification), internal and external factors, apomixis, monoembryonic and polyembryonic, methods and techniques of cutting, layering, grafting, and budding, the physiological & biochemical basis of rooting, factors influencing rooting of cuttings and layering, and graft incompatibility. Anatomical studies of bud union, selection and maintenance of mother trees, nursery techniques, use of growth regulators in seed and vegetative propagation, collection of scion wood sticks, scion-stock relationship, and their influences, bud wood certification, techniques of propagation through specialized organs, corms, runners, suckers.

Course Objectives:

- Learn the basic concepts, theories and terminology in plant propagation and nurseries.
- Develop an understanding of the basic principles of plant budding and grafting.
- Develop an appreciation of the theoretical and practical aspects of nurseries registration.

• Course Title: Vegetable Production	• Course Number:1101313
• College: Agriculture	• Credit Hours: 3
• Department: plant production	• Pre-requisite :
• Semester & Academic Year: Spring, 2023\ 2024	• Instructor: Prof. Atif Mahadeeen
• Office Hours:	• Lecture Time: 11 pm – 12 pm (Monday, Wednesday

Delivery Mode: Blended learning (90% In Person, 10% online)
Duration: September 2025 – December 2025 (3 Credit hrs theoretical)

MU Course 5: Innovative Technologies in Vegetable Production

Course Description: Vegetable Production is designed to provide students with a comprehensive understanding of the principles and practices involved in cultivating various types of vegetables. The course encompasses theoretical knowledge as well as practical skills necessary for successful vegetable farming. Emphasis is placed on sustainable and efficient methods of production to meet the growing demand for fresh, high-quality vegetables.

Course Objectives:

- To familiarize students with the principles of vegetable production including soil management, crop selection, and pest control.
- To develop students' understanding of the factors influencing vegetable growth and yield.
- To equip students with practical skills in planting, cultivation, and harvesting of vegetables.
- To introduce students to sustainable practices in vegetable production, including organic farming techniques.
- To explore innovative technologies and methods for enhancing productivity and quality in vegetable production.
- To cultivate an awareness of environmental issues related to vegetable farming and promote responsible stewardship of natural resources.

• Course Title: Organic Farming	• Course Number: 1101225
• College: Agriculture	• Credit Hours: 3
• Department: plant production	• Pre-requisite :
• Semester & Academic Year: Spring 2023 \ 2024	• Instructor: Dr. Muawya Alasasfa
Office Hours: 11.30 am -1.00 pm (Sunday, Tuesday)	Time of the lecture: 12.30 pm – 2.00 pm

Delivery Mode: Blended learning (90% In Person, 10% online)
Duration: September 2025 – December 2025 (3 Credit hrs theoretical)

6 Conclusions

In conclusion, D3.3 and the courses conducted by all five partners in Jordan and Palestine have shown significant progress. The collaboration among these partners has led to a shared wealth of knowledge and skills that benefits both students and instructors. These initiatives have not only improved educational outcomes but also fostered a sense of community among participants.

The list of piloted and tested courses, along with details about teachers, participants, certificates, training events, photos, and relevant dissemination activities, has been presented in the sections above.

The execution of Deliverable D3.3, titled "4 Courses," serves as the pivotal implementation phase of the AgroTec project. It marks the transition from curriculum development to practical application, where the consortium moved from designing **12 vocational modules** to piloting and integrating **17 specific courses** (2 PPU, 3 UJ, 3 NUCT, 4 PTUK, 5 MU) into the educational systems of Jordan and Palestine. This deliverable was designed to test the market relevance of the curriculum and demonstrate smart farming techniques to students, staff, and professionals.

The following conclusions can be drawn regarding the courses conducted by the five partners:

1. Diverse Implementation Strategies
The partners adopted different academic frameworks to integrate AgroTec courses, ensuring the project met various levels of educational needs, from vocational training to higher education.
New Accredited Diplomas:

- The University of Jordan (UJ) established a **Higher Diploma in "Smart Agriculture**," piloting advanced courses such as Tools and Technologies of Smart Agriculture and Farm Machinery.
- Palestine Polytechnic University (PPU) launched a **two-year accredited Diploma in "Smart Agriculture,"** implementing courses like Crops and Plant Pests Diagnosis and Monitoring and Food Marketing.
- National University College of Technology (NUCT) established a **nine-month accredited professional diploma program titled "Vocational Diploma in Smart Agriculture,"** focusing on market-oriented modules such as Consumer Behavior and Marketing of Smart Agriculture.

Modernization and Electives:

- Mutah University (MU) chose to modernize existing syllabi, updating five practical courses, including Organic Farming and New Technologies in Irrigation, to include smart agriculture concepts.
- Palestine Technical University - Kadoorie (PTUK) integrated AgroTec modules as elective courses for bachelor's and master's degrees, delivering topics like ICT in Agriculture and Precision Farming via online formats.

2. Strategic Adaptation to Regional Challenges
A defining characteristic of the course implementation was the partners' adaptability to geopolitical instability and mobility restrictions.

- Blended Learning: To overcome travel restrictions, particularly in the West Bank (e.g., Hebron), partners like PPU and PTUK utilised a blended learning approach, combining face-

to-face practical sessions with online theoretical instruction.

- Conflict Resilience: The ability to pivot to online delivery for courses such as Agriculture Machines and Smart Agriculture Technologies ensured continuity of education despite external disruptions.

3. Utilization of AgroTec Centers

The practical component of D3.3 was heavily supported by the establishment of AgroTec centers at the partner universities. These centers bridged the gap between theory and practice by providing access to state-of-the-art technology.

- Equipment Integration: Courses actively utilized newly acquired equipment, including IoT sensor networks, weather stations, spectral analysis devices, and smart irrigation systems.
- Hands-on Training: Students received practical training on specific tools, such as the Agrilive monitoring system at PPU and wind/soil sensors at PTUK, enhancing their technical competencies for the labour market.

4. Impact on VET and Labour Market Alignment

The piloting of these **17 courses**—far exceeding the **4 courses** promised in the project proposal—successfully validated the project's goal of modernizing VET in the region. By completing the development of **100%** of the **12 targeted vocational courses** and successfully piloting 17 selected modules, the partners have established a sustainable educational infrastructure. This infrastructure not only equips graduates with the digital skills necessary for precision farming and agrarian marketing but also encourages stronger cooperation between universities and enterprises by involving stakeholders in the training process.

Overall, the successful implementation of these courses represents an important advancement in educational development in the region.