



Third Country Training Program (TCTP) for Iraq

Technical Report

on

***Improving Water Productivity in Agricultural Systems***

April 24 – May 12, 2016

Amman, Jordan

Organized by

**International Center for Agricultural Research in the Dry Areas (ICARDA)**

In collaboration with

**National Center for Agricultural Research and Extension (NCARE)**

Under the support of

**Japan International Cooperation Agency (JICA)**

**Arab Fund for Economic and Social Development (AFESD)**

**Islamic Development Bank (IDB)**

**Chinese Academy of Agricultural Sciences (CAAS)**



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## Executive Summary

### Name of the project

Capacity Development for Agriculture and Water Management for Iraq and Regional countries

### Partners

Japan International Cooperation Agency (JICA)  
Arab Fund for Economic and Social Development (AFESD)  
Chinese Academy of Agricultural Sciences (CAAS)  
Islamic Development Bank (IDB)  
National Center for Agricultural Research and Extension (NCARE)  
International Center for Agricultural Research in the Dry Areas (ICARDA)

### Purpose

To enhance Capacity Development of government officials and researchers who are engaged in agricultural development in Iraq and other countries.

### Specific objectives of the training course on Seed Health Testing

Up-to-date knowledge and enhanced capacity on best practice for water management for water used efficiency.

### Specific outputs

Nine professionally-trained NARS partners from Iraq, two from Jordan and eight from other countries participated in the training: two from China, one from Lebanon, one from Palestine, one from Iran, one from Sudan, one from Turkey, and one from Morocco on improving skills for water management for water used efficiency with emphasis on dry land agriculture. While nine Iraqis, one Lebanese, one Sudanese and two Jordanians were funded by JICA, Iranian and Turkish were supported by the Islamic Development Bank (IDB), Palestine and Moroccan participants were sponsored by the Arab Fund for Economic and Social Development (AFESD), and two Chinese participants were supported by Chinese Academy of Agricultural Sciences (CAAS) (Please refer to Annex VI ).

## Specific outcomes

Design, implement, manage, analyze and report on research and development in improving water management in agricultural systems and acquire up-to-date information on research and practical activities in water management for water used efficiency in each participating country.

## General Overview

Water is the major limiting factor for agricultural production in the dry areas of Central and West Asia and North Africa (CWANA). Agriculture accounts for around 80% of water consumption in the region, however, the rapidly growing population, industrialization, and urbanization will lead to reallocation of water increasingly away from agriculture to other sectors. On the other hand, high population growth rates require a continuous increase in agricultural production.

There are few opportunities for capturing new water resources, and there is a tendency towards non-sustainable, over-exploitation of existing sources. Therefore, sustainability of agricultural production depends on conservation and appropriate allocation and management of the scarce water resources in the region. Improving the efficiency of water use through proper crop selection, cropping pattern, cultural practices, and improved management techniques is essential to boost on-farm productivity either under rainfed or irrigated conditions. Another important approach towards improving water use efficiency is to link on-farm issues at the watershed level, applying integrated natural resource management methods.

ICARDA's mission is to improve the welfare of people through agricultural research and training to increase the production, productivity, and quality of food, while preserving or improving the resource base. ICARDA's training courses are designed to improve the capabilities of scientists and technicians in national agricultural research systems (NARS) in developing countries to conduct research independently, and to foster transfer of technology and address issues related to farmers' decisions in adopting or rejecting new technologies. To this end, ICARDA has organized this course.

## Course objectives

The focus of this year's course is on improving water productivity and management of water resources in rainfed environments. The purpose of the course is to provide participants with the necessary practical and theoretical information to improve water

productivity in rainfed agriculture, and to increase their capability to support sustainable agricultural production. At the end of the course, the participants should be able to:

- Design, implement, manage, analyze and report on research and development in the area of water productivity in rainfed agriculture and acquire up-to-date information on research and practical activities in the management of water resources in each participating country
- Apply an integrated natural resource management approach to optimize the use of scarce water resources in rainfed agriculture

## Organization of the Course

With financial support JICA, through its overseas office in Jordan, IDB, AFESD, and CAAS in collaboration with Jordan's NCARE, ICARDA conducted the course at ICARDA's offices in Amman, Jordan. The course included classroom lectures and discussions, as well as practical field and laboratory exercises. The lectures were given in English, and all course materials were provided as hardcopies as well as softcopies in the form of individual flash drives to the trainees. A certificate of attendance was awarded at the end of the course to each trainee.

## Organizing Committee

Mr. Charles Kleinermann, Head, ICARDA Capacity Development Unit (CDU)

Dr. Vinay Nangia, ICARDA Agricultural Hydrologist, Course Coordinator

Mr. Masafumi Tamura, Technical Training Officer, ICARDA Capacity Development Unit (CDU)

## Course Structure

The course comprised of four modules (See detail in Annex I):

### - **Module 1: In- country preparation**

During the course, participants were requested to prepare and give a presentation on water management technologies, opportunities and research in his/her country on green water management and water productivity and on one of the two agro-ecosystems covered by the course. Therefore, all participants were requested to collect information (data, pictures, maps) on water

management issues in their country before joining the course, to be developed and presented in a formal seminar at the end of the course.

#### **- Module 2: Lectures and practical applications**

All participants participated in three weeks lectures on rainwater management and water productivity improvement in agricultural systems, and field visits and laboratory exercises. The following major subjects were covered:

- Agricultural water productivity concept, importance and ways of improvement
- Improved water management options in rainfed farming
- Planning, design and implementation of supplemental irrigation systems
- Planning, design and implementation of water harvesting systems
- Soil-water relations (measurements, monitoring and modeling)
- Experimental design and data analysis
- Scientific research, writing and presenting
- Socio-economic aspects of water resources management

#### **- Module 3: Supervised group research work**

During the last week of the course, participants worked in small groups (four trainees in each group) on a water management research project under guidance. They gained experience in the development and evaluation of water-management systems for water harvesting and for improving water productivity in rainfed environments, using an integrated approach.

#### **- Module 4: Presentation and evaluation**

At the end of the course, all four groups of participants were required to prepare and present a formal seminar on their output. ICARDA scientists participated in these seminars to discuss results and provide suggestions for improvement and further research work. Trainees were granted a “completion certificates” only if they passed the course evaluation.

## **Course Implementation**

Practical sessions were scheduled throughout the course (see Annex 1 course program). This way the trainees could directly, actively experience and practice what they heard and discussed during the lectures. At the end of the course, by preparing and presenting a

formal seminar on their outputs, the trainees got the chance to apply what they had learned during the first three weeks of the course.

Lecture notes, handouts, and manuals were given to the trainees throughout the course. At the end of the course, each trainee received a flash drive with all presentations, lecture material, manuals, software, pictures and research data. The flash drives also included the group presentations prepared by the trainees.

## Week 1

Week 1 provided the trainees with the **soil and meteorological** aspects of irrigation opening session, Dr. Vinay Nangia introduced the each other. An informal interactive learning background knowledge of the participants. The and general knowledge about climate analysis But the informal interaction among the trainees good. The next day, Dr. Nangia refreshed the the **soil-water-plant relationship**, and Dr. Ayman **soil texture and water retention, as such as on water relations.**



**water, agronomic, and** management. After the official trainees to the course and to session was held to test the level of English, computer use and water scarcity was low. and with the trainers was very knowledge of the trainees on **photosynthesis and plant**

On Tuesday, Prof. Ahmed Hachum delivered lectures on **supplemental irrigation** including the concept, management, system design, control and measurement of supplemental irrigation.

On Wednesday, Prof. Hachum covered the topics of **evapotranspiration and crop water need**, when and how much to irrigate, and irrigation scheduling using the FAO 56 manual. On Thursday, the entire day was dedicated to the topic of **rainwater harvesting – planning, designing, managing and evaluating water harvesting projects.**



On Saturday, the trainees were taken for a **field visit to the Jordan Valley of NCARE.**

## Week 2

Dr. Michel Rahbeh of the University of Jordan on the first two days of the second week delivered lectures on the burning topic of **groundwater use for agriculture**. On Monday, Dr. Stephan Strohmeier lectured on the application of the **Soil & Water Assessment Tool (SWAT)** for watershed management. On Tuesday, the trainees visited **ICARDA's water harvesting research experiments in Majedieh** near Amman International Airport. This was a useful visit since it linked the water harvesting lectures of the previous Thursday to the implementation in the field. On Wednesday and Thursday, Dr. Bogachan Benli and Prof. Suleiman lectured trainees on **improving water productivity and conservation agriculture**. Dr. Boubaker Dhehibi lectured on **economics of water productivity** which was very well received by the trainees. On Saturday morning, the trainees were taken to **Mushaggar research station of ICARDA** where they visited several experiments on supplemental irrigation and laboratories analyzing soil and water samples for physical and chemical parameters.



### Week 3

Week 3 was devoted to multidisciplinary topics. by Drs. Claudio Zucca, Jutta Werner and Kathryn **management and resource governance**. On delivered an interesting lecture on **research-for-** was followed by Dr. Murari Singh's lecture on resources experiments using statistics, and Biradar on the topic of **application of GIS and RS solving**. On Tuesday, the trainees visited



The week started with a lecture Clifton on **rangeland** Monday, Mrs. Bezaiet Dessalegn **development approach** which design and analysis of water lecture by Dr. Chandrashekhar **in water and land problem** **ICARDA's geo-informatics lab**



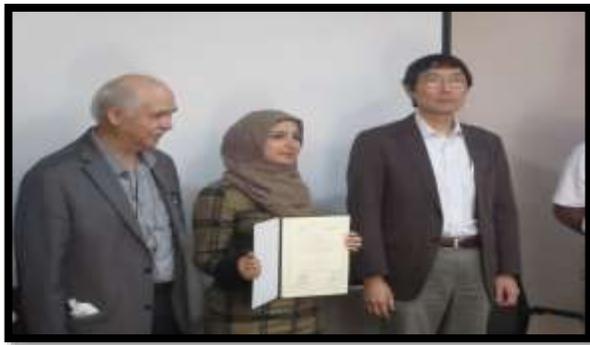
where they got hands-on experience using GIS and remote sensing software and hardware for agricultural water management research and decision making followed by in the afternoon, the trainees were divided into four groups for group presentations for the next day. Each group was given a topic to prepare to present

to be chosen among improving water productivity, micro water harvesting, macro water harvesting, and supplemental irrigation topics.

Wednesday was devoted to evaluation of the to make **group presentations** of 20 minutes each group discussion for 10 minutes. The presentations quality of introduction, definition of objectives, used, site characterization, techniques for analysis After the conclusion of group presentations, the the topics covered during the preceding three training coordinator discussed solutions of the returned the marked answer sheets to the same as the quiz the trainees took during the on the first day of the training. The objective of this exercise was to help trainees gauge if their scores had improved at the end of the training (Please refer to Annex VI). In the afternoon, JICA and CDU representatives conducted an evaluation of trainers by the trainees (Please refer to Annex III).



trainees. They were required followed by questions and were evaluated for their materials and methods to be and finally expected results. trainees took a final test on weeks of training. The questions in the quiz and trainees. This quiz was the interactive learning session



The last day of the training started with a keynote lecture by Dr. Theib Oweis and was followed by a certificate award ceremony, and feedback from trainees on their experience and suggestions on how to improve the course in the following years.

## Group Assessment

The course evaluation was carried out using a knowledge gain measurement method through which participants were subjected to a zero assessment test at the beginning and at the end of the course. The difference in scores of the participants between the two tests are reported in annex IV. The results showed an average of 76% gain in knowledge from the course ranging from 23.6/51pt to 41.6/51pt which is significant for a 3 weeks of training (please refer to Annex IV).

Trainees were divided into 4 groups and were given a topic to prepare for presentation: improving water productivity, micro water harvesting, and macro water harvesting, supplemental irrigation. They were to apply the knowledge gained in the training to prepare the presentations. The score achieved by each group shows that quality of their presentation as the lowest score was 79/100 and the highest 93/100 (please refer to Annex V).

## **General Course Evaluation by Trainees**

At the end of the training, each participant provided feedback on their perception of the effectiveness of the training process, format and content. This gives ICARDA valuable information from which to validate or fine-tune each training component (sessions, format, content, tec.), as well as the overall training program.

Through training evaluation questionnaires, various evaluations were carried out during the course, including a specific evaluation for each part of the course. Here we present an overview of the final evaluation. Issues considered were the topics and thematic areas of the course, the trainers and the organization, as well as general suggestions (Please refer to Annex III).

Regarding the overall methodology of the training course, most participants qualified it as excellent (57%) and 36% of participants expressed very good. Participants expressed their interest in giving more time for discussion, case studies and group work.

With respect to the technical level of the topics covered in the training, 84% of the participants considered that the delivered material was useful and effective. Some of them commented that it is better to have a meeting after two or three years for feedback on how the training affected their work.

## **Conclusion**

The course has provided both theoretical and practical guidance to the trainees in improving water productivity in agricultural systems. The participants nominated for the course were of high quality and appeared eager to participate. The mixture between lectures and discussions appeared to work well, and the enthusiasm of the participants over the 3 weeks course appeared to remain high.

The course evaluations support the approach taken, and the pre and post knowledge assessment tests showed an overall improvement in understanding the material.

As per the comments from the trainees and the scientists, trainees would benefit more if the follow up sessions were held after 2 -3 years. The course is evaluated as successful by the lecturers. However, in the view of capacity development to actually improve skills and techniques on water management with its use efficiency for higher agricultural production, more follow-up (ex. such as a mentoring program) for those who get the highest score in the training should be offered as a non-degree training program under the supervision of ICARDA scientists to apply and tailor the knowledge gained to the specification of their research and field activities in their own country.

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