



Third Country Training Program (TCTP) for Iraq

Technical Report

ICARDA-JICA Joint Training Course

on

Improving Water Productivity in Agricultural Systems

with emphasis on irrigated production systems



International Center for Agricultural Research in the Dry Areas

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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)
International Center for Agricultural Research in the Dry Areas (ICARDA)
National Center for Agricultural Research and extension (NCARE) - Hashemite Kingdom of Jordan

Purpose

To enhance capacity development of government officials and researchers who are engaged in irrigation projects and agricultural development mainly in Iraq

Specific objectives

Up-to-date knowledge and enhanced capacity in Improving Water Productivity in Agricultural Systems with emphasis on irrigated production systems

Specific outputs

9 professionally-trained NARS partners from Iraq, 2 from Jordan, 1 from Eritrea, 2 from Pakistan and 2 from Egypt on Water Productivity in Agricultural Systems with emphasis on irrigated production systems.

Amongst them 9 Iraqis, 2 Jordanians, 1 Eritrean and 1 Egyptian were funded by JICA (see Annex VI).

Specific outcomes

Trainees able to

- Design, implement, manage, analyze and report on research and development in the area of water productivity in irrigated 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 irrigated agriculture

Introduction

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 capture of new water resources, and there is a tendency toward 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 livelihoods 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 irrigated environments. The purpose of the course is to provide participants with the necessary practical and theoretical information to improve water productivity in irrigated 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 irrigated 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 irrigated agriculture

Organization of the Course

With financial support from the Japan International Cooperation Agency (JICA), through its overseas office in Syria and in collaboration with the Jordan's National Center for Agricultural Research and Extension (NCARE), the International Center for Agricultural Research in the Dry Areas (ICARDA) conducted the course at ICARDA 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 material was 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

- Dr. Theib Oweis, Director, ICARDA Integrated Water & Land Management Program (IWLMP)
- Mr. Charles Kleinermann, Head, ICARDA Capacity Development Unit (CDU)
- Dr. Vinay Nangia, ICARDA Agricultural Hydrologist, Course Coordinator

Course Content

The course comprised of four modules:

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 irrigation water management and water productivity and on one of the two agro-ecosystems covered by the course (supplemental irrigation and full irrigation). 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 irrigation 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 irrigated farming
- Improving traditional irrigation systems and modernization
- Planning, design and implementation of irrigation systems
- Soil-water relations (measurements, monitoring and modeling)
- Salinity assessment and management at different scales
- 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 (4 trainees in each group) on a water management research projects under guidance. They gained experience in the development and evaluation of water-management systems for irrigation and for improving water productivity in irrigated 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 the program of the course). This way the trainees could directly and actively experience and practice what they heard and discussed in the lectures. During the research module at the end of the course, the trainees received 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 water, agronomic, and meteorological aspects of irrigation management. After the official opening session, Dr. Vinay Nangia introduced the trainees to the course and to each other. An informal interactive learning session was held to test the background knowledge of the participants. The level of English, computer use and general knowledge about climate analysis and water scarcity was low. But the informal interaction among the trainees and with the trainers was very good. Next day, Dr. Usman Khalid Awan refreshed the knowledge of the trainees on soil-water-plant relationship, and Dr. Claudio Zucca delivered lectures on soil texture and water retention, and photosynthesis and plant water relations.

Next day, Prof. Shimizu from Tottori University delivered guest lecture on the topic of principles and methods of hydrological observations, and Prof. Hachum from Mosul University delivered lectures on surface irrigation management and introduction to modern irrigation systems.

On Wednesday, the trainees heard lecture on sprinkler and drip irrigation system performance evaluation and improvement. On Thursday, 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 Saturday, the trainees were taken for a field visit to University of Jordan research station in the Jordan Valley which was a very well-received trip.

Week 2

Dr. Rahbeh of University of Jordan on the first two days of second week delivered lectures on the burning topic of groundwater use for agriculture.

Prof. Hachum devoted two days of the week lecturing on salinity assessment and management, and drainage principles and design.

On Monday afternoon, Prof. Fujimaki of Tottori University lectured on determination of irrigation depth to maximize net return.

On Wednesday morning, the trainees were taken to Mushaggar research station of ICARDA where they visited experiments on supplemental irrigation, rainwater harvesting for olive and shrubs growing and laboratories analyzing soil and water samples for physical and chemical parameters. In the afternoon, Dr. Stephan Strohmier lectured on application of Soil & Water Assessment Tool (SWAT).

The Saturday field visit was to hydroponics experiment of EcoConsult Company. The project is funded by the USAID and the visit was facilitated by the team of EcoConsult. This was first time that the course introduced the topic of use of hydroponics for agricultural production.

Week 3

Week 3 was devoted to multidisciplinary topics. The week started with lecture by Mr. Atef Haddad who shared his knowledge and experience on the topics of conservation agriculture and water-efficient agricultural production. Later, Dr. Werner lectured on rangeland resource governance which was followed by a lecture on economics of water use efficiency and productivity and a lecture on research-for-development approach.

On Monday, Dr. Murari Singh's lecture on design and analysis of water resources experiments using statistics, and lecture by Dr. Chandrashekar Biradar on the topic of application of GIS and RS in water and land problem solving.

On Tuesday, the trainees visited 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. Same afternoon, the trainees were divided into four groups for group presentations the next day. Each group was given a topic to prepare and present. They had choice between water productivity, full irrigation (two groups) and water harvesting topics to choose from.

Wednesday and Thursday were devoted to evaluation of the trainees. They were required to make group presentation for 20 minutes followed by questioning and group discussion for 10 minutes. The presentations were evaluated for their quality of introduction, definition of objectives, materials and methods to be used, site characterization, techniques for analysis and finally expected results. After the conclusion of group presentations the trainees took tests on the topics covered during the preceding three weeks of training. After the break, the training coordinator discussed solutions of the questions in the quiz and returned the marked answer sheets to the trainees. This quiz was the same as the quiz the trainees took during the interactive learning session 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. In the afternoon, JICA and CDU representatives conducted an evaluation of trainers by the trainees.

The last day of the training started with certificate awarding ceremony, followed by group photos, tea break and feedback from trainees on their experience and suggestions on how to improve the course in the following years. For the lunch break, ICARDA staff joined the trainees.

All trainees departed for their respective destination on Friday, May 22nd.



ZERO and FINAL TEST ASSESSMENT

A zero assessment test was conducted on the first day of the training in which trainees were unprepared and were tested for their background knowledge on the topics to be covered during the training course. The test was out of a maximum 44 point and the highest score was 38 whereas the lowest score was 7 with 52% being the average.

The same test (with additional questions added to cover lectures given by Japanese professors) was taken by the trainees at the end of the course and the average group scores improved by reached 79% with the lowest score now being 18 and the highest now being 49 (out of 51 maximum possible score) with an group average score improving by 27%. (See details in Annex III).

GENERAL COURSE EVALUATION by TRAINEES

Overall, the evaluation of the course by the participants was positive (details in annex V). The list of the three most interesting ideas/concepts that the trainees learned in the course actually includes all course topics. This shows the heterogeneity in the scientific and professional background of the trainees but also that all topics were relevant to trainees. They stressed that the main relevant topics were on concept of water productivity, deficit irrigation and different irrigation designs-schedules and spacing.

The trainees also suggested that more time should be dedicated to cost-benefit analysis.

CONCLUSION

The participants nominated for the course were of high quality. The participants were eager to participate.

The mixture between lectures and discussions appeared to work well, and the enthusiasm of the participants over the three weeks course appeared to remain high.

The course evaluations support the approach taken, and the pre and post knowledge assessment tests show an overall improvement in understanding the material, trainees gained knowledge on Design, implement, manage, analyze and report on research and development in the area of water productivity in irrigated agriculture; acquired up-to-date information on research and practical activities in the management of water resources in each participating country and on integrated natural resource management approach to optimize the use of scarce water resources in irrigated agriculture.