



Technical Report

**TRAINING COURSE  
ON**

Soil Analysis - Soil Chemistry, Soil Physics and Soil Fertility

February 21-25, 2016

Amman, Jordan

**Japan International Cooperation Agency (JICA)  
and**

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



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## EXECUTIVE SUMMARY

### **Name of the project**

Capacity Development for Agriculture for Afghanistan 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 agricultural development in Afghanistan and other countries

### **Specific objectives of the training course on Salinity Management**

Up-to-date knowledge and enhanced capacity in soil analysis, soil chemistry, soil physics, and soil fertility

### **Specific outputs**

Twenty professionally-trained national agricultural research trainees: 9 from Afghanistan, 2 from Jordan and 7 from a range of other countries (2 from Sudan, 1 from Iraq, 2 from Palestine, and 2 from Egypt) on Improving soil analysis techniques in agricultural systems with emphasis on dry land agriculture. While 10 Afghanis, 2 Jordanian, 1 Sudanese and 1 Egyptian were funded by JICA, the remaining participants were sponsored by Arab Fund for Economic and Social Development (AFESD).

### **Specific outcomes**

Design, implement, manage, analyze and report on research and development in soil management and acquire up-to-date information on research and practical activities in soil management in each participating country.



## **GENERAL OVERVIEW**

Water is the major limiting factor of agricultural production in the dry areas of the Central and West Asia and North Africa (CWANA) regions. Despite the fact that agriculture accounts for around 80-90% of freshwater usage in this region, the rapidly growing population, industrialization, and urbanization has led to the reallocation of water from agriculture to other sectors. At the same time, high population growth rates require a continuous increase in agricultural production.

## **CONTEXT**

This training course provided an overview on soil and water analysis and its practice in the laboratory. Knowing the quality and characteristics of soil and water allows for increases in agricultural productivity and profitability. The application of water and fertilizers is closely tied to the soil characteristics. For example, planners cannot formulate recommendations for farmers if they are not able to interpret the soil characteristics, and the same is applied for water – if you do not know the characteristics of water being used for application to crops, you cannot manage potential sub-optimality that may emerge.

## **PURPOSE**

The focus of the course was predominantly on soil analysis including soil chemistry, soil physics and soil fertility. The purpose of the course was to provide participants with the necessary practical and theoretical information to analyze soil and water samples from agricultural landscapes. At the end of the course, the participants were expected to be able to:

- Take samples of soil and water as per scientific methodology
- Prepare samples for lab analysis
- Understand the methodology to use and the equipment to select for analysis
- Analyze samples and interpret results

## **TARGETED AUDIENCE**

The target audience for this course were mid-career scientific staff of national partner institutions who are educated in soil and water management/analysis. Trainees were from the following countries: 11 trainees from Afghanistan and 9 from other countries that included Sudan, Iraq, Palestine, Jordan and Egypt. While 10 Afghans, 2 Jordanians, 1 Sudanese and 1 Egyptian are funded by JICA; the remaining trainees were sponsored by AFESD. The trainees were expected to return to their parent institutions to share the knowledge gained in the course with their peers. In addition, they are expected to apply the knowledge they gained through the course in carrying out their job-related analysis tasks. Please refer to Annex III for the detailed list of trainees.



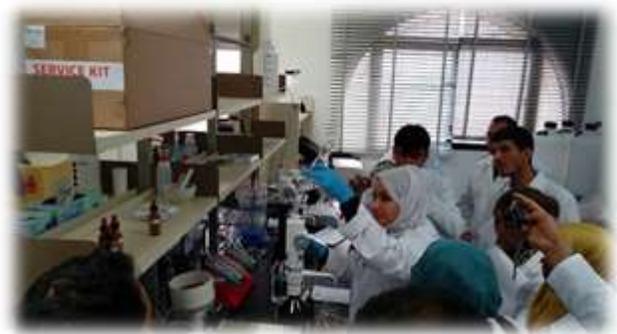
## ORGANIZING COMMITTEE

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

Dr. Vinay Nangia, ICARDA, IWLMP, Course Coordinator Eng. Luma Abu Atileh, IWLM, ICARDA

## COURSE STRUCTURE

With the financial support from JICA, through its overseas office in Afghanistan and in collaboration with NCARE and AFESD, 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 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.



## COURSE IMPLEMENTATION

The course started with an introduction to soil science including soil formation, soil horizons, soil-water-plant relationships, and was followed by lectures on principles and methods of analysis of soil physical properties, chemical properties and fertility topics. On Tuesday, the trainees received a lecture on how to take soil samples, apply tools to use, and performed field exercises to practice soil sampling followed by the visit to NCARE for hands-on experience and knowledge on laboratory work on soil physical analysis. On Wednesday, the trainees visited ICARDA's soil and water analysis laboratory in Mushaggar Research Station near Amman where they were given information and training on soil chemical analysis.

Overall, the trainees were given theoretical as well as practical knowledge on how to handle, analyze and interpret soil and water samples from agricultural landscapes. Student's interaction and participation during the course was very positive. Questions were politely raised in due time and using clear English. Spontaneous interruptions were conceded from time to time by the teachers to allow for quick reciprocal consultations among the students, which ensured better knowledge exchange and better understanding of the lecture topics. Positive and constructive behavior was particularly shown during the field trips. For the detailed course program, please refer to Annex I.

## GENERAL COURSE EVALUATION BY TRAINEES

During the training the students generally manifested appreciation for the course as a whole and for the trainers. That was made evident by their positive level of interaction, and by their scientific interest. It was clear that some of the students (technicians in particular) were more interested in the technical and practical parts of the course, while others (researchers) had more balanced interests. The general impression, however, was that most of them appreciated having an opportunity to refresh a wide range of basic knowledge that they acquired during they studies without being presented with opportunities for successive update.

The quantitative evaluation expressed by the students through the evaluation forms reflect this positive impression. The relevance of the course was rated very high (4.7/5.0), along with the usefulness of the lectures (4.7/5.0) and the effectiveness of teaching in general (4.8/5.0), and the quality of teaching material (4.7/5.0). Most of the other indicators are also high and span between 4.1 and 4.5 out of max 5.0. The only relatively low scores refer to the time allocated to discussions (3.5/5.0), suggesting the high level of interest raised by the topics presented. For more information on the evaluations, please refer to Annex IV.



## CONCLUSION

The course was successfully executed as planned, and most trainees requested that the course duration should be 2 – 3 weeks instead of one week in order to be able to include topics such as land evaluation, reclamation of soil problem, soil chemical analysis, microbiological analysis, fertilization, and water irrigation methods.

Based on trainee recommendations to extend the period of training, ICARDA may develop for the next JICA co-funded training program contract opportunities to the most qualified trainees who attended the course.