



Technical Report

**TRAINING COURSE
ON**

**Best practices for conserving genetic resources and
management of genebank**

8 – 19 February, 2016

LARI, Lebanon

**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)
Global Crop Diversity Trust (GCDT)
Lebanese Agricultural Research Institute (LARI)

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 Genebank and Germplasm

Up-to-date knowledge and enhanced capacity on best practices for conserving genetic resources and management of genebank.

Specific outputs

A total of 24 participants trained on best practices for efficient conservation of genetic resources: 9 from Afghanistan, 2 from Lebanon, 2 from Syria, 2 from Iraq, 1 from Bahrain, 1 from Egypt, 1 from Palestine, and 1 from Sudan. In addition the newly hired research assistants in ICARDA's Genetic Resources Section (GRS) and students under ICARDA's co-supervision benefitted from the course.

Funding for this activity was utilized from several donors: 9 Afghanis, 2 Lebanese, 1 Syrian and 1 Egyptian were funded by JICA. The participants from the other countries were sponsored by Arab Fund for Economic and Social Development (AFESD) and the ICARDA Genetic Resources Section (GRS) staff and interns were funded through the endowment fund provided by GCDT.

Specific outcomes

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



GENERAL OVERVIEW

Genetic resources conservation and sustainable use are pre-requisites for sustainable agricultural development and food security. They are used as sources of valuable genes to develop new cultivars resistant and tolerant to major biotic and abiotic stresses. They can be also adopted in the rehabilitation of degraded ecosystems.

ICARDA is assisting countries in the Central, West Asia and North Africa (CWANA) region to establish strong plant genetic resource conservation programs. One of the ICARDA GRS unit objective is to strengthen the capacities of National Agricultural Research System (NARS) genebank through training and technical backstopping.

PURPOSE

Provide training on best practices for *ex situ* and *in situ* conservation of genetic resources and the management of genebanks.

TARGETED AUDIENCE

Staff working in genebanks from different countries: A total of 24 participants were trained on best practices for efficient conservation of genetic resources; 9 from Afghanistan, 2 from Lebanon, 2 from Syria, 2 from Iraq, 1 from Bahrain, 1 from Egypt, 1 from Palestine, and 1 from Sudan. In addition, newly-hired research assistants in ICARDA's GRS and students under ICARDA's co-supervision benefitted from the course. Please refer to Annex III: List of trainees for more detailed information.

ORGANIZING COMMITTEE

Dr. Ahmed Amri, Deputy director, Biodiversity & Integrated Gene Management (BIGM) - A.Amri@cgiar.org

Mr. Charles Kleinermann, Head, Capacity Development Unit (CDU) - c.kleinermann@cgiar.org

Dr. Ahmad Omar Kanaan, Research Assistant, BIGM - A.Kanaan@cgiar.org

Dr. Fawzy Nawar, Documentation Specialist, GRS - F.Nawar@cgiar.org

Dr. Mariana Yazbeck, Genebank Manager, Lebanon - m.yazbek@cgiar.org

Mr. Masafumi Tamura, Technical Training Officer, CDU – m.tamura@cgiar.org

Please refer to Annex II for more details on the list of trainers.

COURSE STRUCTURE

The course was offered through seven different modules: each one covered a major activity of conservation of agrobiodiversity. The modules are briefly described below:

Module 1: Introduction to biodiversity and genetic resources conservation

This module included discussions on the importance of genetic resources conservation, concepts/definitions, conservation approaches (half a day)

Module 2: Gap analysis and collecting of novel diversity

This module included gap analysis and the steps required in organizing the collection of genetic resources (half a day).

Module 3: Information management and documentation

This module presented all the key elements of a efficient and effective database system and provided examples of ICARDA-GRS database and informed the trainees about the progress in developing the Germplasm Resource Information System (GRIN) Global database (one day).

Module 4: Best practices for conservation / *ex situ* conservation of gene resources

This module included the theoretical and practical aspects related to processing of seeds, germination test, seed health testing, multiplication/regeneration, characterization, storage, management of genebank (5 days including 3 days practical).

Module 5: Management of genebanks

This module visited ICARDA's genebank with introduction given to major equipment needed for establishing a genebank (one day).

Module 6: Promoting *in situ*/on-farm conservation of agrobiodiversity

This module covered *in situ*/on-farm conservation of agrobiodiversity including development of management plans (two days)

Module 7: Use of genetic resources in breeding

This module introduced breeding efforts of genetic resources including visits to breeding and pre-breeding activities (one day)





COURSE IMPLEMENTATION

The course was conducted through three different approaches: introductory lectures on the subject matter followed by discussions (a CD of lectures were provided to the trainees); practical sessions either in laboratories or in the field where the activities are reviewed and recommendations are given for improvement; and reviewing and summarizing the best practices using the FAO genebank standards and the genebank knowledge base information. The course was also designed to cover development of management plans for *in situ* conservation.

The first day began with a zero (initial) test to examine the background knowledge of the trainees in order to ensure that the level of lecturing, practical sessions, and exercises were adapted to the level of knowledge of the group. It was followed by introductory lectures on biodiversity and genetic resources conservation and practical session on use of DIVA-GIS for gap analysis by Dr. Mariana Yazbek and Dr. Ali Shehadeh, followed by the discussion.

The second day was delivered by Dr. Athanasios Tsivelikas on best practices for collecting new diversity followed by introduction to documentation of genetic resources, ICARDA's database, GRIN Global, and GENESYS by Dr. Mohamed Fawzi Nawar.

The third day began with lectures to cover Module 4 on multiplication and regeneration of self-pollinated and cross-pollinated species followed by field visit. Module 4 was continued in the fourth and the fifth day on characterization of cereals, food legumes and forages and range species, and practical sessions on characterization. On the sixth day, Dr. Safaa Kumari delivered lectures on seed health testing, and the seventh day was delivered by Dr. Ahmed Amri on distribution of genetic resources, sub-setting approaches, and focused identification of germplasm strategy (FIGS) as a conclusion of Module 4.

The eighth day introduced management of genebanks to cover Module 5: requirements for establishing a genebank and major equipment needed, followed by a visit to ICARDA's genebank.

On the ninth day, Dr. Ahmed Amri and the other trainers presented technical options for conservation of landraces and natural habitats that covered Module 6 of the course and facilitated group activities for development of management plans.

The tenth day delivered lectures on pre-breeding and breeding efforts. Trainees also visited fields and greenhouses at ICARDA's Terbol research station accompanied by ICARDA breeders.

The last day was used for discussion and providing a final assessment to evaluate the trainees' improvement. The assessment indicated an average score of 12.4pts out of 18pts which was 7.7pts of average gain in knowledge.



GROUP ASSESSMENT

A zero (initial) test of knowledge as well as a post test of knowledge were conducted to test how much information the trainees retained from the course. Four questions (Q1, Q2, Q3, Q4) were asked, with varying level of complexity, before and after the course. Questions were graded and the results are presented below. Twenty-two (22) participant took the pre test (2 participant were not able to take due to arrival delay), and 24 participant took the post test. All results are shown below. (**Note:** Q = Question).

The results showed tangible improvement as the average group score reached 12.4pts out of 18pts (68%), which can be interpreted as a 42% average gain in knowledge in comparison of the pre test group average score.

Pre (initial) Test					
Participant	Q1 /2pts	Q2 /2pts	Q3 /2pts	Q4/ 12pts	Total /18pts
1	0	0	0	0	0
2	0	0	0	2	2
3	1	2	2	5	10
4	0	0	0	3	3
5	1	0	0	0	1
6	1	1	2	7	11
7	1	1	2	2	6
8	0	0	0	2	2
9	0	0	1	4	5
10	0	1	2	2	5
11	1	0	0	4	5
12	1	0	2	6	9
13	1	0	2	4	7
14	0	0	0	0	0
15	0	1	0	5	6
16	0	0	0	0	0
17	0	0	0	3	3
18	0	0	0	3	3
19	1	0	0	2	3
20	0	0	2	4	6
21	0	2	0	5	7
22	1	2	1	5	9
Average	0.4	0.5	0.7	3.1	4.7

Post test					
Participant	Q1 /2pts	Q2 /2pts	Q3 /2pts	Q4/ 12pts	Total /18pts
1	1	0	0	6	7
2	2	2	2	8	14
3	2	1	2	12	17
4	2	2	1	5	10
5	1	1	2	7	11
6	0	0	0	0	0
7	2	2	2	12	18
8	1	0	2	4	7
9	0	0	1	7	8
10	1	2	2	8	13
11	2	2	2	11	17
12	2	0	2	11	15
13	0	1	0	9	10
14	1	2	2	9	14
15	2	0	2	12	16
16	2	2	2	9	15
17	2	2	2	12	18
18	0	1	0	5	6
19	1	2	2	8	13
20	1	2	0	0	3
21	2	2	0	8	12
22	2	2	2	12	18
23	2	2	2	12	18
24	2	2	2	12	18
Average	1.4	1.3	1.4	8.3	12.4



GENERAL COURSE EVALUATION by TRAINEES

Overall, the evaluation of the course by the participants was positive. The list of the three most interesting ideas/concepts that the trainees learned in the course included all course topics. The evaluation expressed by the students through the evaluation forms reflect this positive impression. The relevance of the course was rated very high (4.8/5.0), along with the usefulness of the lectures (4.6/5.0) and the effectiveness of teaching in general (4.5/5.0), and the quality of teaching material (4.5/5.0). Most of the other indicators are also high and span between 4.0 and 4.6 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, please refer to Annex IV.

CONCLUSION

The training used an interactive approach including theoretical lectures and practical sessions along with discussions. This approach allowed the participants to accomplish the following:

- To grasp the major definitions and approaches for conservation of genetic resources;
- To learn step-by-step the core activities of a reliable genebank;
- To understand the institutional, technical, and equipment needs for establishing a functional genebank;
- To be initiated the approach for *in situ*/on-farm conservation of agrobiodiversity by discussing in groups cases for the development of management plans
- To be introduced to international policies and legislations governing the conservation and access to genetic resources.

The pre and post-evaluation of knowledge of participants showed substantial gain in better understanding of aspects related to genetic resources conservation.

At the last session, participants were asked about priority areas for further training, which included: documentation of genetic resources, promoting *in-situ*/on-farm conservation of genetic resources, documentation, use of molecular markers for diversity analysis, Focused Identification of Germplasm Strategy (FIGS) for mining genetic resources, continuum between conservation and use.

The involvement of the seed health laboratory, breeding programs, and seed unit has allowed for a better understanding of the value of interacting with other disciplines. Similarly, the visit to the genebank and laboratory at LARI provided the opportunity for participants to observe a functional genebank, tissue culture and biotechnology laboratories.