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The International Treaty
ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE



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**Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development (ICABIOGRAD)
Indonesian Agency for Agricultural Research and Development (IAARD)
Ministry of Agriculture**

Technical Report

**Evaluation of DOI Implementation in participating country: MARDI, Malaysia
18 – 20 July 2019**

Introduction

MARDI (Malaysian Agriculture Research and Development Institute) Rice Gene Bank is one of participating country representatives from Malaysia involved in the Multi-country Construction of a Test Platform on the Assignment of Digital Object Identifiers for Rice Germplasm project, coordinated by ICABIOGRAD-IAARD. In 2018, MARDI Rice Gene Bank participated in the 1st International Training on DOI Testing to Support Software Implementation for Rice Germplasm Management and Exchanges held in Bogor on April 23 to May 1 2018. The training was organized by ICABIOGRAD-IAARD (in collaboration with ITPGRFA-FAO and IRRI). It was attended by 14 participants from 6 countries, including Indonesia.

The training was aimed to socializing the Integration Toolkit v1.0.1 software for batch-registering DOI on rice accessions. During the training, registration of DOI rice collections from each participating country was also conducted. It is expected that the DOI registration of rice collections will continue to be carried out by each participant after returning to their respective institutions.

The Integration Toolkit v1.0.1 then was developed into Integration Toolkit v2.0.3, and has been disseminated at the 2nd International Training on DOI Testing to Support Software for Rice Germplasm Management and Exchanges held in Yogyakarta on April 27 to May 2, 2019. The training activities were attended by 16 participants from 14 countries, including Indonesia.

Evaluation Activities

The visit program to the MARDI Rice Gene Bank was carried out in order to monitor and evaluate the recent status of the DOI implementation. The visit was done to MARDI Rice Gene Bank facility located in Seberang Perai, Kepala Batas, Penang, Malaysia. The Gen Bank is part of the MARDI facilities that is specified for the management of rice genetic resources. The Central Bank Gen of MARDI is located in the MARDI headquarter office in Serdang, which manages and collects other commodities besides rice.

The first day of monitoring and evaluation activities (on July 18) was conducted through meetings and discussions with MARDI Rice Gene Bank staffs, namely Mr. Azuan bin Amron, Lukman Hakim, Ramzan and Ms. Rahinisa Kamaruzaman. The coordinator of MARDI Rice Gene Bank's data management, Mrs. Site Noorzuraini Abd Rahman was unable to attend during the visit. Azuan Amron represented Mrs. Site Noorzuraini Abd Rahman to present the status of DOI implementation in MARDI Rice Gene Bank. Meanwhile, Ramzan and Lukman Hakim presented the management profile of rice genetic resources in MARDI Rice Gene Bank. On the second day of July 19, Ms. Rahinisa Kamaruzaman accompanied a field visit to facilities for research and management of rice genetic resources at MARDI Rice Gene Bank.

The total collection of rice genetic resources conserved in MARDI Rice Gene Bank is currently 13,020 accessions, which consist of local varieties, improved varieties and introduced varieties from IRRI. Conservation activities are carried out in three conditions, i.e. short term, medium and long term. A series of conservation activities such as rejuvenation, seed propagation, morpho-agronomic characterization and evaluation were carried out around the gene banks with the support of experimental garden facilities and greenhouses on an area of about 85 hectares.



Figure 1. Visiting greenhouse facility for screening of pests/diseases resistant accessions (left) and rice growing facility in the field (right).

In managing data for all crops genetic resources, MARDI Gene Bank has developed the MARDI Agrobiodiversity Information System (AgrobIS). The total number of collections is 18,120 accessions, which includes 13,020 rice accessions, 1,600 accessions of vegetable crops, and as many as 3,500 accessions to plant genetic resources with recalcitrant seeds. In particular for rice genetic resources MARDI Rice Gene Bank has developed a database system under the name Rice Gene Bank Information System (RGBIS) since 2002.



Figure 2. Display room showing various types of rice panicle (left) and seed reference/seed file (right) di MARDI Rice Gene Bank.



Figure 3. Rice seeds conservation in the medium (left) and long term (right).

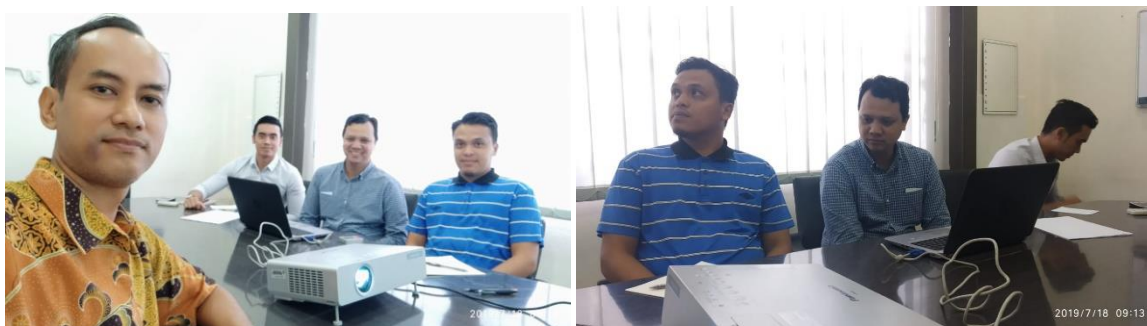


Figure 4. Presentation of DOI implementation status in MARDI Rice gene Bank by Azuan Amron, and continuing with a short course on technical implementation of Integration Toolkit v2.0.3 by Hakim Kurniawan from ICABIOGRAD-IAARD.

From the results of monitoring activities, it is known that MARDI Rice Gene Bank has successfully registered DOI of rice collections as many as 715 accessions by implementing Integration Toolkit v1.0.1. However, there are two common problems faced during the implementation of DOI registration using Integration Toolkit v1.0.1:

- a. Integration Toolkit v1.0.1 can only be run using the Linux operating system, with some supporting software that demands very high storage space and computer memory capacity.

- b. Integration Toolkit v1.0.1 is executed by using a command prompt that is quite difficult to understand by common bank managers.

During the monitoring and evaluation, a short course was done to introduce the latest version of Integration Toolkit v2.0.3. This newer version can be run using Windows operating system with supporting software and minimal computer specification requirements. To help users technically implement the Integration Toolkit v2.0.3, some supporting software along with technical guidance documents have been provided and can be downloaded via the Google cloud link as follows:

- a. GLIS Integration Toolkit v2.0.3 Manual:
<https://drive.google.com/file/d/17vniplKdMwdLPJTys5VXrfqxt5eNkL6D/view?usp=sharing>
- b. PGRFAs standard datasheet (with data sample):
https://drive.google.com/file/d/1KpLU2z_CjOa47fgP7WI5g3ED9H4Xw3EC/view?usp=sharing
- c. Software and documents:
https://drive.google.com/open?id=1Npb_wSdHNLU7GoIshpGhF6rfJ9XHGFqY

By implementing newer version of Integration Toolkit v2.0.3 it is expected that the problems faced by the MARDI Rice Gene Bank team in registering DOI so far can be overcome. The DOI implementation at the MARDI Rice Gene Bank will be continued with the priority of program plans to:

- a. Continuing to register DOI of rice accessions in the gene bank collection.
- b. Expanding the DOI implementation in other crops.
- c. Disseminating the DOI implementation to researchers inside MARDI, and other institutions outside MARDI.



PGRFA list

PGRFA (1-20 of 715)

DOI	WIEWS code	Local ID	Date	Created
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Methic
10.18730/KAM94	MYS005	MRGB11633	2002-02-01	In-hou
10.18730/KAKYY	MYS005	MRGB04633	1987-02-01	In-hou
10.18730/SEXDG	MYS005	MRGB13005	2018-06-01	In-hou
10.18730/SEXCF	MYS005	MRGB13001	2018-06-01	In-hou
10.18730/KAM50	MYS005	MRGB08638	1996-07-01	In-hou
10.18730/SAKXK	MYS005	MRGB10499	2001-10-18	In-hou
10.18730/KAM3=	MYS005	MRGB08363	1994-08-16	In-hou



Figure 5. DOI registration achievements of MARDI Rice Gene Bank (left), and screenshot of Rice Gene Bank Information System (RGBIS) main menu (right).

Conclusions

MARDI Rice Gene Bank has successfully registered DOI of rice collections as many as 715 accessions by implementing Integration Toolkit v1.0.1. However, there are common problems faced during the implementation of DOI registration using Integration Toolkit v1.0.1, i.e. Integration Toolkit v1.0.1 demands very high storage space and computer memory capacity, and a very technical procedures in executing the Toolkit. During the monitoring and evaluation, a short course was done

to introduce the latest version of Integration Toolkit v2.0.3. This newer version can be run using Windows operating system and much easier to be implemented. By implementing newer version of Integration Toolkit v2.0.3 it is expected that the problems faced by the MARDI Rice Gene Bank in registering DOI so far can be overcome.

The DOI implementation at the MARDI Rice Gene Bank will be continued with the priority of program plans to continuing to register DOI of rice accessions in the gene bank collection, expanding the DOI implementation in other crops, and disseminating the DOI implementation to researchers inside MARDI, and other institutions outside MARDI.