PREFACE: The 1st International Conference on Genetic Resources and Agricultural Biotechnology: ”Information system and exchanges of genetic resources for effective crop improvement”

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Abstract. The First International Conference on Genetic Resources and Agricultural Biotechnology (The 1st ICGRB) was held in IPB International Convention Center on 20–21 August 2018, Bogor, Indonesia. The theme of the conference was “Information system and exchanges of genetic resources for effective crop improvement”. This conference facilitated the share and exchange of ideas, information and achievements on the management and utilization of plant genetic resources supported by biotechnology among researchers and academicians. This 1st ICGRB was also expected to result in bright ideas that will trigger international collaboration to resolve global agricultural challenges, in particular Indonesian challenge toward a sustainable bio-industry agriculture. Twelve invited speakers (Indonesia, Italy, Switzerland, Japan, Iran, USA, UK, South Korea and Singapore) shared their knowledge and experience with interactive discussion. In addition to Indonesian scientists, this event was successfully attracted approximately 150 participants coming from around seven countries joined in the plenary and parallel sessions as well as two consecutive international workshops. A total of 80 oral presentations on many crops with varied research areas were delivered in the conference by participating scientists. This conference was very useful in promoting and enhancing the applied technologies and related regulations on genetic resources exchange for crop improvement.

Keywords: the 1st ICGRB 2018, plant genetic resources, crop improvement.

1. Introduction

Several studies have shown that global crop production need to double by 2050 to meet the projected demands due to the rising of population, meat, dairy and biofuel consumption. Increasing crop yields as well as its quality, rather than clearing more land for food production, has been suggested as the most sustainable path for food security. We need second Green Revolution, an agricultural revolution that is both more productive and greener in terms of conserving natural resources and the environment than the first. Many scientists believe that this can be achieved by a combination of ecological approaches to sustainable agriculture; greater participation by farmers; agricultural analysis; research
and design; crop improvement through the application of new breeding techniques to address the climate changes and food security issues.

Effective crops improvement requires diversity of genetic resources. Unfortunately, no country is self-sufficient; all depend on crops and genetic diversity within these crops from other countries and regions. Several studies have also shown the interdependence among countries in the world on genetic resources. Transactional exchanges of plant genetic resources are essential for scientific and agricultural research, in particular for improving crops varieties in order to face the challenges of food security and climate changes.

Two international regimes that regulate exchanges of genetic resources are the Nagoya Protocol of the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). The Nagoya Protocol of the CBD covers all genetic resources, deals primarily with in situ collection of plants, animals and microbes and regulates the bilateral exchanges of genetic resources. On the other hand, the ITPGRFA which covers all plant genetic resources for food and agriculture, was designed to be in harmony with the CBD and regulates the multilateral exchanges of genetic resources of 64 important crops for food security and climate changes and deals primarily with the ex situ collection of such crops. Both conventions have not yet been fully implemented in many countries and its harmony in implementation is questionable. Part of the problem is lack of understanding on the two conventions among stakeholder and beneficiaries, including scientific communities.

Assessing and identifying new sources of genetic variation are critical parts of any long-term strategy to enhance the productivity, sustainability and resilience of crop varieties and agricultural systems. Approximately seven million crop accessions are currently being conserved in gene banks collections worldwide. This resource represents one of the greatest, largely untapped, opportunities for accelerating yield gains and overcoming emerging crop productivity bottlenecks. However, to access this wealth of diversity will require the characterization of this material via the application of state-of-the-art genomic, phenomic and molecular technologies, and the release of the subsequent data via an online, open-access portal.

The opportunity to use such genetic resources are widely open through the emerging new breeding techniques such as marker-assisted selection and genetic engineering which may solve many problems in our effort to increase yield and nutrient values of food crops, as well as to create crops varieties tolerant to less favorable environment, such as drought, flood, salinity and vulnerable to pests and diseases. In other words, the opportunities to exchanges through well-regulated and well-informed genetic resources and the use of new breeding techniques, will give us more opportunity to improve crops effectively. These issues are the main theme of this conference: exchanges and information of genetic resources for effective crops improvement. The conference also organized consecutive workshops at the following day to establish a center of excellent on plant genetic resource and to discuss the application of digital object identifier for rice germplasm, which is a pilot project to apply permanent unique identifier for crop germplasm.

2. The objectives of the 1st ICGRB
The main objectives of the 1st ICGRB were as follows:

1) To share and exchange information on conservation and sustainable use of plant genetic resources for agriculture with the support of biotechnology,

2) To synchronize and harmonize regulations/policies related to exchange of genetic resources for agriculture and its information system, and

3) To increase understanding and awareness to initiate international collaboration on the management and utilization of plant genetic resources for agriculture for effective crop improvement.
3. The time and venue of the 1st ICGRB
The First International Conference on Genetic Resources and Agricultural Biotechnology (The 1st ICGRB) was held at the IPB International Convention Center on 20–21 August 2018, Bogor, Indonesia.

4. The activities of the 1st ICGRB
The 1st ICGRB consisted of two main activities, i.e. the ICGRB 2018 seminar and two consecutive workshops. In the first day, the conference accommodated a keynote address and plenary sessions. In the second day, the conference accommodated many presenters in parallel sessions. Besides, the two workshops in the second day were International Workshop on Application of Digital Object Identifier for Rice Germplasm and International Network of Centers of Excellence on Genetic Resources. The papers presented in this 1st ICGRB were relevant to these scopes, include:

1) Policy, regulation and intellectual property rights related to plant genetic resources, in particular on access and benefit-sharing,
2) Information system and database management of plant genetic resources,
3) Application of new techniques for crop improvement such as the use of genomic sequences, genome editing and synthetic biology,
4) Bioprospecting and economic valuation of genetic resources,
5) Traditional knowledge associated with genetic resources, and
6) Sustainable plant genetic resources management and in situ conservation.

5. Invited speakers and participants of the 1st ICGRB
In the plenary session on the first day of the conference there were 11 foreign invited speakers from Japan, Iran, Switzerland, the United States, South Korea, the Philippines, England, Italy, Singapore and one relevant domestic speaker. The foreign speakers came from academics/universities and international research organizations/institutions. The list of plenary speakers with their topics and affiliation is as follows:

1) Mr. Akio Yamamoto–National Agriculture and Food Research Organization (NARO), Japan: Synergy between Nagoya Protocol and ITPGRFA on Access and Benefit-Sharing (ABS) of Plant Genetic Resources,
2) Prof. Javad Mozafari–Plant Biotechnology, National Plant Gene Bank of Iran (NPGBI): Global Information Systems on Plant Genetic Resources,
3) Prof. Claudia Seitz–Faculty of Law, University of Basel, Switzerland: Big Data and Genome Sequencing: Legal Issues and Questions,
4) Mastur, PhD–Director of the Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development (ICABIOGRAD), Indonesian Agency for Agricultural Research and Development (IAARD), Indonesia: Needs, Opportunities and Challenges for Crop Improvement in Indonesia,
5) Prof. Suk-ha Lee–Professor, Seoul National University, South Korea: Genomic Resources for Improving Legume Crops,
6) Prof. Dr. Hugh W. Pritchard, Senior Research Leader of Kew Royal Botanical Garden, UK: Sustainable Gene Bank Management and In situ Conservation,
7) Dr. Kenneth McNally–Te-Tzu Chang Genetic Resources Center and International Rice Gene Bank, IRRI, Philippine: Mass Genome Sequencing of Crops and Wild Relatives to Accelerate Crop Breeding,
8) Prof. David Douches–Michigan State University, USA: Recreating Superior Allele from Wild Relative or Landraces in Modern Cultivar Using Genome Editing,
9) Prof. Jerome H. Reichman–Bunyan S. Womble Professor of Law at Duke Law School, Duke University School of Law, USA: Why the Nagoya Protocol to the CBD Matters to Science and Industry in Canada and the United States,
10) Mr. Marco Marsella–International Consultant on Information Technology, ITPGRFA Secretariat, Italy: Permanent Unique Identifiers for Plant Genetic Resources,
11) Dr. Paul Teng–ISAAA Chair, Singapore: Global Status of Commercialized Biotech/Genetic Modified (GM) Crops in 2017, and
12) Dr. Rhodora R. Aldemita–ISAAA-KC, Singapore: Biotech Crop Adoption in Asia-Pacific.

The total number of ICGRB 2018 participants who attended on the first day was 145 people (83 participants from Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development (ICABIOGRAD), 35 participants from universities/institutions in Indonesia, and 27 participants from abroad) and the second day there were 163 people. The number of participants increased at the second day of the conference because additional participants were invited for the two workshops. All participants preferred to deliver their papers topics by oral presentation. A total of 80 papers on various topics were presented in parallel sessions by participants from universities and national research organization of Indonesia, Malaysia, The Philippines, Lao PDR, Zambia, Mozambique, Uganda and Kenya. Papers on diverse plant species categorized as food crop, horticultural crop, estate crop, aquatic and other miscellaneous crops as well as law had been presented in this conference (Table 1). As a follow up, 50 papers out of the total topics were successfully selected and edited for this 1st ICGRB proceeding.

| Crops                        | Number of papers presented |
|------------------------------|-----------------------------|
| Rice                         | 25                          |
| Bambara groundnut            | 1                           |
| 'Jernang'                    | 1                           |
| Chili                        | 5                           |
| Dendrobium species           | 1                           |
| Banana                       | 1                           |
| Tomato                       | 1                           |
| Maize                        | 1                           |
| Sorghum                      | 3                           |
| Oil palm                     | 4                           |
| Cloves                       | 1                           |
| Sweet potato                 | 2                           |
| Amorphophallus muelleri Blume | 1                        |
| Taro                         | 1                           |
| Potato                       | 1                           |
| Artemisia annua L.           | 1                           |
| Tobacco                      | 1                           |
| Soybean                      | 7                           |
| Pilea trinervia Wright. ('poh-pohan') | 1                  |
| Cacao                        | 1                           |
| Groundnut (Arachis hypogaea L.) | 1                   |
| Aquatic plant                | 1                           |
| Sago                         | 1                           |
| Durian                       | 1                           |
| Shallot (Allium cepae)       | 1                           |
| Ganoderma boninense          | 1                           |
| Others (law, database, etc.) | 14                          |

The two workshops on the second day had attracted participants. The first workshop on "International Workshop on Applications of Digital Object Identifiers for Rice Germplasm" is part of the BSF-FAO funded project "Multicountry Construction of a Test Platform for Development and
Allocation of a Unique Identifiers for Rice Germplasm”. The workshop was attended by representatives from participating countries in the collaborative activities namely Zambia, Bhutan, the Philippines, Malaysia and Indonesia. The event was also attended by invited guests from the research and development of agriculture of the universities and from the management of genetic resources.

The second workshop on "International Network of Centers of Excellence on Genetic Resources" presented two topics: a) Introducing past work on international socialization of networks and platforms for capacity building, training, benefit-sharing and cooperation for genetic resources, and b) Indonesian platform on knowledge exchange of genetic resources. The foreign experts who joined were from NARO-Japan, Michigan State University-USA, IRRI-The Philippine, University of Basel-Switzerland, National Plant Gene Bank-Iran, and WACU-Uganda. Invited guests from Indonesia were from Indonesian Institute of Sciences, the Directorate General of Intellectual Property, Vegetable Research Institute, Tropical Fruit Crop Research Institute, Padjadjaran University and the Agricultural Technology Transfer Management Center.

6. Conclusions
The 1st ICGRB 2018 was successfully organized and attracted at least 150 attendants and invited speakers from not only Indonesia, but also from Asia, Africa and Europe countries. A total of 12 were presented by invited speakers and 80 oral presentations were delivered at the plenary and parallel sessions with interactive discussion, respectively.

7. Acknowledgement
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