

AfricaRice Genebank Review 2020

| Programme: Genebank Platform | | | | |
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| Genebank reviewed: AfricaRice | | Site visit Dates: Due to Covid-19, the review had to be conducted virtually. 30 March – 3 April 2020 | | |
| | | Review report Date: 25 May 2020 | | |
| | | Center and Crop Trust responses: 30 June 2020 | | |
| Place: M'be, Bouaké, Côte d'Ivoire | | | | |
| Genebank Manager | | Marie-Noelle Ndjiondjop | | |
| Review Panel | | Jan Engels | | |
| | | Jane Toll | | |
| Crop Trust staff | | Charlotte Lusty | | |
| | Observation | Recommendation for clearance | Due date | Responses |
| 1 | 7 Major and 5 Minor | Revise the Genebank Manual and all the SOPs to ensure that they are up to date, instruct on how to do a task and what to do if a target/threshold/condition is not met, and that they specify the staff responsible for decision-making. Revise individual SOPs in accordance with Reviewers' comments in the Section Improvements. | Revised manual with master copy in French by end 2020. | <p><u>AfricaRice:</u> Agrees with the recommendation. Due to current situation we propose to postpone the due date to the end of 2021, given that all SOPs need to be reviewed, updated, edited and translated.</p> <p><u>Crop Trust:</u> The SOPs will need continuous review and updating. AfricaRice should not delay these revisions, especially concerning important updates resulting from moving to the new location. It is understood that a new manual to cover all operations will take longer to produce.</p> |
| 2 | 1 Major and 1 Minor | Develop an acquisition policy and plan of action to fulfill AfricaRice's aim to be the Rice Biodiversity Centre for Africa (RBCA). | Plan of action by end 2020. | <p><u>AfricaRice:</u> 1) Acquisition guideline will be reviewed and updated by end of 2020. 2) An overview document about the RBCA that outlines the achievements of routine activities of the genebank and the proposed research activities, collaborations and partnerships will be submitted by end of 2020.</p> <p><u>Crop Trust:</u> Agrees with recommendation. If the "acquisition guideline" is a policy then this complies with the recommendation. The reviewers are seeking an understanding of the scope of, or vision for, the RBCA and how AfricaRice will get there. This is an important aspect for the new Centre to communicate clearly. The</p> |

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| | | | | response from AfricaRice is not very clear in this regard. |
| 3 | 1 Major | Once a phytopathologist is recruited by the institute, establish a Seed Health Unit independent from the genebank operation, that is responsible for the health checks on acquisition and distribution of genebank accessions as well as of breeders' materials. Ensure it works in coordination and collaboration with the CGIAR GHU community, currently led by IITA. | Report on progress by end 2020. | <p><u>AfricaRice</u>: Agrees but the due date should be end of 2021. Because of the current pandemics and travel restrictions, we are not sure of the starting date of the new phytopathologist. Once the person is hired, s/he will also need time to settle in before working on this recommendation so the due date should be postponed to the end of 2021.</p> <p><u>Crop Trust</u>: Both recommendation and response are well appreciated.</p> |
| 4 | 1 Major and 1 Minor | Prepare a detailed plan, in line with Recommendation 5, to eliminate the backlog in regeneration and characterization within 3 to 4 years on the basis of carefully considered criteria for prioritising accessions that take account of the low viability of many accessions, the importance of securing the most original sample (MOS) and the need to generate sufficient stock for MTS and LTS with the minimum of regeneration cycles. | Plan by end 2020. | <p><u>AfricaRice</u>: Agrees to provide a plan for the accessions to be characterized and regenerated in the coming years taking into account the results of the inventory of the accessions (recommendation 5 below)</p> <p><u>Crop Trust</u>: Agrees with this important recommendation and appreciates AfricaRice's commitment to implementing it by the end of 2020 as a priority. However, see Recommendation 5 below on the logical sequence that will need to be followed.</p> |
| 5 | 1 Major and 1 Minor | Complete the inventory, reconciliation and consolidation of the collection in order to have a solid baseline for the conservation and management of the Article 15 collection moving forward. | Report progress end 2020. Up to date inventory by end 2021 | <p><u>AfricaRice</u>: Agrees with the need to update the inventory. However, this is dependent upon having the funds allocated to be able to hire staff in 2021 to carry out this important work.</p> <p><u>Crop Trust</u>: Agrees with recommendation. This appears to be the first step in the process which will support the activities to address Recommendation 4. Therefore, we assume that carrying out the inventory process is the first priority for AfricaRice staff before backlogs are dealt with. In this respect, AfricaRice should not wait for additional funding before reconciling the inventory. Further, savings will potentially be made in dealing with the backlogs as a result of doing this important work.</p> |

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| 6 | 1 Major | Investigate collection management approaches to increase cost-efficiency, maintain the most original sample in long-term storage, optimise the base-active relationship and minimise the monitoring burden. Engage with the CGIAR Genebank Platform in a system-wide discussion on the issue. | Report progress end 2020. | <p><u>AfricaRice:</u> We can report progress by end of 2020. To make changes to the cost efficiency of the operation, the date should be end of 2021 given the current circumstance and also because we need enough time to learn more from other genebanks.</p> <p><u>Crop Trust:</u> Agrees with the recommendation and appreciates AfricaRice's response.</p> |
| 7 | 1 Major and 3 Minor | Investigate and implement improvements to the efficiency and effectiveness of viability monitoring by, <i>inter alia</i> , extending the monitoring period, reducing the number of routine tests, increasing the test seed number and addressing dormancy issues. | Report progress end 2020. | <p><u>AfricaRice:</u> Agrees, we can report progress on dormancy by end of 2020. Investigating and implementing improvements to the efficiency and effectiveness of viability monitoring will possibly be achieved by 2022 because it will require: 1) check current methodologies against the FAO genebank standards and ISTA, 2) collaboration with other genebanks, 3) capacity building of the staff on new protocols needs to also be done.</p> <p><u>Crop Trust:</u> Agrees with the recommendation and appreciates that AfricaRice will commence work on this and will report progress by the end of the year.</p> |
| 8 | 2 Major and 5 Minor | Given the increased use of crop wild relatives (CWR) and AfricaRice's aspiration as the Rice Biodiversity Centre for Africa, the genebank should develop a strategy for collecting and conserving African wild species in consultation and close collaboration with the NARS, IRRI and CWR specialists. The strategy should build on and extend existing gap analyses and include research and development to improve protocols for viability testing and regeneration of CWR. | Report in line with Rec 12 by end of 2021. | <p><u>AfricaRice:</u></p> <ol style="list-style-type: none"> 1) The gap analysis and information on the selection of countries for collection will be reported by end of 2020. 2) The protocols for viability testing and regeneration will be reviewed and updated by 2021. 3) Research and development to improve protocols for viability testing and regeneration of CWR is not covered under routine activities. Therefore, additional funds will be required if AfricaRice is to pursue research on CWR viability testing protocols. <p><u>Crop Trust:</u> Agrees with the recommendation and appreciates AfricaRice's response. Indeed, fulfilling the potential role of the RBCA will need funding, which will be a concern for AfricaRice. There are some important collaborations with IRRI and with the seed quality management community of practice</p> |

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| | | | | that will help address the need for improved protocols to deal with CWR. |
| 9 | 1 Major | Renew the safety duplication agreement with NLGRP, USA before end June 2020. Revise SOPs to use monitoring of same seed lots in LTS as the proxy for the viability of the duplicated samples and cease the routine sending of viability testing samples to safety duplicate hosts. | Complete by June 2020. | <p><u>AfricaRice</u>: 1) The safety duplication agreement with NLGRP had already been renewed, and 2) the need for revising the SOP on safety duplication has already been covered in Recommendation #1. 3) AfricaRice is now abiding by the FAO standards (page 59) which state that “samples for germination testing may be sent in the separate box with the safety duplicated accessions and monitor for germination by agreement with the depository”. Therefore, AfricaRice will continue to abide by FAO genebank standards by sending viability testing samples.</p> <p><u>Crop Trust</u>: Agrees with the recommendation. It is good to hear from AfricaRice that the agreement is already renewed. On the third point, AfricaRice has perhaps not taken full account of the intention of the guideline provided by FAO, which says “<u>In some cases</u>, samples for germination testing <u>may</u> be sent...” in order to be assured that the conditions at the host institute are as good as or better than at AfricaRice. If AfricaRice doubts the conditions at NLGRP, then this would be an appropriate action. The reviewers are suggesting, however, that time and resources could be saved if the same lots are monitored at AfricaRice (rather than sent to and retrieved from NLGRP). Monitoring the equivalent lots <i>in situ</i> is a practice which is adopted by other genebanks that duplicate at NLGRP.</p> |
| 10 | 3 Major and 3 Minor | Continue to actively engage with the GRIN-Global community to fully implement GRIN-Global to manage the collection and provide public access to data on the collection. Draw on the GRIN-Global community and Genebank Platform for advice, tools and assistance to improve the system's curation functionalities, especially for automatic data upload, process control and data verification, as well as data | Report progress end 2020. GRIN-Global use for day to day management by end 2021. | <p><u>AfricaRice</u>: 1) The progress on the improvement of the data publicly available on the collection will be reported by the end of 2020. 2) Some of the sub-recommendations, including improving the functionalities on GRIN-Global process control, data verification, data analyses, scheduling regenerations, viability tests, duplications, distributions and identifying data gaps are the responsibility of the GRIN-Global developing team. This community of practice will be contacted to collect feedbacks and improve the flexibility and functionality of this software. The tentative</p> |

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| | | analyses for scheduling regenerations, viability tests, duplications, distributions and for identifying data gaps. Engage AfricaRice ICT support to ensure that up-to-date information about the collection and how to order germplasm, is readily available to the public on the AfricaRice website in fulfillment of Treaty Article 15 obligations. | | <p>deadline date for these activities will be end of 2021 and beyond.</p> <p>3) We also need to train staff abroad or in other CG genebanks in order to use the improved functionalities on GRIN-Global but, under the current circumstance where travels are restricted, this recommendation will be achieved by end of 2022 and beyond.</p> <p>4) A link to Genesys will be added by end 2020 to AfricaRice website to fulfill the obligations of Article 15 of the Treaty.</p> <p><u>Crop Trust</u>: Agrees with the recommendation and with the response. AfricaRice should participate as much as possible in the Information Management Community of Practice to ensure it benefits from and feeds into the rapid developments in GRIN-Global.</p> |
| 11 | 1 Major | Engage the AfricaRice ICT team in establishing a secure infrastructure and procedure for the operation and back-up of the genebank database. | Action required ASAP and before end of July 2020. | <p><u>AfricaRice</u>: Agrees.</p> <p><u>Crop Trust</u>: Agrees.</p> |
| 12 | 1 Major | Complete the documentation and improve the understanding of the composition of the collection to identify gaps in the <i>ex situ</i> coverage of the rice gene pool in Africa, drawing on sources both within the CGIAR and in the global rice community, in furtherance of the genebank's aim to be the Rice Biodiversity Centre for Africa. | Report progress by end 2021. | <p><u>AfricaRice</u>: This recommendation is also covered in great detail in the Recommendations 5 and 8 above</p> <p><u>Crop Trust</u>: Agrees with the recommendation. The point being made here is separate from Recommendations 5 and 8 since it is talking about the balance and representation of diversity in the collection with the aim of ensuring that the diversity of the rice gene pool in Africa is well represented in the RBCA. We understand that this goes beyond CWR to include landraces and also may involve rationalizing accessions that may be better represented elsewhere. It is important to note that this does not relate to the management of seed lots (as in Recommendation 5)</p> |
| 13 | 2 Major and 1 Minor | Strengthen the capacity of the genebank team through training, recruitment or engaging partners to support the consolidation of the collection and underpinning documentation and, in | Report progress by end 2020. | <p><u>AfricaRice</u>: 1) We will report progress on capacity building events of the staff throughout 2020.</p> <p>2) Regarding the other issues such recruitment or engaging partners to support the consolidation of the collection and underpinning documentations and in particular in pursuing a wider mandate of</p> |

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| | | particular, if pursuing a wider mandate, the RBCA team will require additional skills to introduce more strategic curation and improved coverage of the collection (as recommended in Recommendation 12). | the RBCA, it will require additional funds and is already partly addressed in Recommendation 12. <u>Crop Trust</u> : Agrees with the recommendation. AfricaRice does not give a strong response except to say more funding is required. Hopefully by the end of 2020 a clearer vision of the RBCA, its role and composition will be provided. |
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The review of the AfricaRice genebank was conducted virtually since measures to prevent the spread of COVID-19 prevented a visit to M'be. The Reviewers and Crop Trust staff at locations in Germany, Italy and the UK, were connected through 'Go to Meeting' to AfricaRice staff in Abidjan and M'be. Presentations, intense discussions and even live camera stream from the genebank and the regeneration fields were possible, without internet disruption. The Reviewers thank AfricaRice for agreeing to be reviewed in this way.

The Genebank Operations Manual version 1.0 containing six SOPs and Annexes and the draft SOP for Data Management, provided the basis for the review. In addition, the Reviewers were given other key documents, including a self-assessment, the 2015 review report and various Genebank Platform reports and documents concerning AfricaRice. During the week, they received on request, the Genebank Risk Identification, Mitigation and Monitoring Manual v.2.0 and several specified datasets downloaded from the database on viability tests, coldroom conditions, etc. The Reviewers also looked at websites and public portals to information about the genebank and its collection, including the AfricaRice website and ARGIS, Genesys and the Svalbard Global Seed Vault (SGSV) portal.

Dr Etienne Duveiller, Director of Research for Development introduced AfricaRice and its programme. Dr Marie-Noelle Ndjiondjop, Genebank Manager presented the genebank, its recent re-location back to M'be, the new facilities and its ambition as the Rice Biodiversity Centre for Africa. Dr Paul Kiepe, Head of Research and Planning, and Dr Dule Zhao, Program Leader Genetic Diversity also joined the discussions. Over the course of the week, the Reviewers held intense discussions with Dr Ndjiondjop and her team:

- Fatimata Bachabi, Research Assistant (RA) Acquisition and Distribution
- Daniel Tia, RA Viability Monitoring and Safety Duplication
- Karlin Gnikoua, RA Storage and Drying
- Bienvenu Kpeki, RA Regeneration and Characterisation
- Junior Goungoulou, Consultant Data Management

The establishment of the genebank in M'be within a relatively short time period into well-equipped facilities is a great achievement. The genebank team and AfricaRice management are to be congratulated. The genebank's new mandate is to be the Rice Biodiversity Center for Africa (RBCA). The Reviewers believe that the genebank is well on its way to fulfill this mandate and to become a critical component of the global crop conservation system for rice and for Africa. The recommendations made in this review are intended to help AfricaRice realise these ambitions. They aim to help ensure that the genebank's operating procedures meet scientific best practice and that curation of the collection is streamlined.

The Genebank Operations Manual v.1.0 gives a good overview of the mandate, policy, history of the genebank and the standard operating procedures (SOPs) give comprehensive coverage of the procedures. However, there is a serious need to ensure that the individual SOPs are updated and correctly reflect the current circumstances. This is particularly so since the genebank has relocated to a new facility and country. Also for their long-term use, it will be important to consolidate the documents and improve them particularly by giving details on targets, thresholds and specifying who are the key decision makers at different points in the process of a given operation and what happens if standards or optimal conditions are not met. The SOPs should be a key knowledge resource for the genebank. The more they are improved and used, the more ways they will be useful as a training and communication tool, for staff succession and to provide evidence of high standards of operation (Recommendation 1).

After discussions with staff and a virtual tour of the fields and greenhouse, it was made apparent that a lot of progress has been made to re-establish genebank operations and improve the status of the collection. The challenges and some of the findings of the recent inventory work, such as discovering that some stored lots are below seed quantity and viability thresholds, were shared and discussed with the reviewers openly. While staff are actively addressing arising challenges, it is critical that this effort is completed effectively and successfully (Recommendation 5) and the opportunity is taken to put in place a more strategic approach to curation and monitoring. This should involve identifying appropriate samples for long-term conservation (i.e. most original samples) and considering whether it is strategic to maintain everything in medium term storage (Recommendation 6), identifying and acting on priorities for regeneration (Recommendation 4) and considering improvements in processes and efficiencies (Recommendations 7 and 9).

As mentioned above, AfricaRice is at a crossroads. It manages a relatively small and focused collection (i.e. one crop genepool). At this point, there is an opportunity to seek closer collaboration and support from CGIAR partners in the region and from IRRI to deal with capacity and skills that are currently lacking. The decision to name the genebank the Rice Biodiversity Center for Africa, however, is highly significant since it suggests that AfricaRice aims to expand its conservation mandate. The genebank is an essential component of the Plant Treaty Article 15 genebank system and the Reviewers believe it has the potential to play a broader role for crop conservation in Africa in the context of 'a one CGIAR'. Given this context, several important issues arise concerning the composition of the collection, its evolution, the services provided by the genebank and the partnerships it seeks. Careful thought needs to go into how AfricaRice realizes its ambitions. It was not in the scope of this review to critically question the scope of the AfricaRice genebank, but it became clear that there are actions that can be taken to support the development of a coherent strategy. We consider that a clear acquisition policy and plan is essential (Recommendation 2) and is backed up with evidence-based information on the gaps in the collection (Recommendation 12). In particular, the review recommends greater attention to the wild relatives given the threats *in situ* and increasing interest in their use in breeding for adaptation to climate change (Recommendation 8),

Related to RBCA's scope is the capacity of the genebank to perform at an international level. IITA has provided help to train and support a genebank staff to perform phytosanitary activities. If AfricaRice wants to expand its remit and provide a service to distribute disease-free seed at scale outside of the region, then building adequate capacity, independent of the genebank, to address the phytosanitary health of incoming and outgoing materials will be necessary (Recommendation 3). The same applies to the staff as a whole, the current complement seems to be adequate for the

current collection size and scope with the exception that a permanent database manager needs to be in place. Temporary support is likely to be needed to overcome some of the highlighted challenges, especially to deal with documentation bottlenecks, and an opportunity exists to bring in expertise to take the collection management and coverage to another level (e.g. wild species/molecular characterization/collection curation) (Recommendation 13). The reviewers also encourage the genebank to further its collaboration within and outside the CGIAR, especially with the African NARS, to ensure the conservation of rice biodiversity of importance for Africa.

Underpinning all these processes and recommendations is an effective data management system that has the functionalities and flexibilities to support efficient collection management. The documentation system is critical to gaining a better understanding of the collection's coverage of the rice gene pool in relation to other key collections (such as IRRI's), especially for *Oryza glaberrima* and the African indigenous wild species and to improving processes and the status of the collection. As AfricaRice genebank has decided to adopt GRIN-Global in line with several CGIAR genebanks, it must actively engage and draw on that community and expertise to improve data management procedures and tools, and move away from the dependency on excel spreadsheets (Recommendation 10). More support is also needed beyond the genebank from AfricaRice ICT to improve the security, back up and public availability of data resources (Recommendation 11).

This virtual review was challenging, both for the Reviewers and for the genebank staff. It was not possible to conduct the same level of audit of the technical operations that an on-site visit would have allowed. However, the Reviewers feel that despite the limitations of the virtual medium, the review is valid and sufficiently comprehensive to meet the Genebank Platform's review expectations.

The Reviewers reported their preliminary findings to Dr Duveiller and Dr Ndjondjop on the morning of Friday 3 April. They thank AfricaRice management and the genebank team for their cooperation and patience throughout the week. Thanks also to the Crop Trust staff for their support.