Sub-grant Title: *PNG-NARI-Upgrading National Genebanks in the Global System (A1553)*

Sub-grant No: *L23ROM161* - Amendment No.: *2*

Amendment No. 2 to Sub-Agreement No. L23ROM161

FOR THE SUB-GRANT

"Upgrading National Genebanks in the Global System (A1553)"

BETWEEN

Bioversity International
Via di San Domenico 1, 00153, Rome, Italy
(hereinafter referred to as the "Organization")

AND

National Agriculture Research Institute (NARI)
Sir Alkan Tololo Research Centre,
PO Box 4415 Lae, Morobe Province, Papua New Guinea
(hereinafter referred to as "Implementing Partner")

WHEREAS:

- Pursuant to Article 25 of the General Terms and Conditions annexed to the above-referenced Sub-Agreement, the Organization and the Implementing Partner may, by their written and mutual consent, amend its provisions.

- The Organization and the Implementing Partner wish to amend the Agreement through a

No-Cost Extension	☐	**With-Cost Extension**	☒
Budget Revision	☐	**Other Modification**	☐

The Organization and the Implementing Partner hereby agree to modify the Sub-agreement as follows:

Article 4.1 of the Specific Terms and Conditions is replaced by the following text:
4.1. This Agreement will be in force from **01 July 2023** until **31 December 2024** (hereinafter referred to as "Period of Performance"), as outlined in Annex 2.

Year 1	Year 2
01 July 2023 – 31 March 2024	01 January 2024 – 31 December 2024
USD 21,246 (budget)	USD 32,432.01 (budget)

Article 5.1 of the Specific Terms and Conditions is replaced by the following text:

5.1. The Organization has approved a budget totaling **USD 53,678.01** (**<Fifty-three thousand, six hundred and seventy-eight U.S. Dollars, one cent>) (including USD 21,246 for Year 1, USD 32,432.01 for Year 2)**. This is the full Project cost over the period of performance. Unspent funds cannot be carried forward from one year to the following years and shall be returned as per clause 5.4. and overspends are not permitted. Details of the budget are set out in the financial schedules (Annex 4) and initialed by the Parties for identification.

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Article 5.3 of the Specific Terms and Conditions is replaced by the following text:

5.3. The Organization shall pay to the Implementing Partner a contribution in an amount not exceeding USD 42,496 (including USD 10,063.99 for Year 1, maximum USD 32,432.01 for Year 2) for performance of work as described in Annex 2 and in accordance with Clause 5.1. Total amount to be paid to the Implementing Partner might be reduced taking into account expenditure to be reported in the Final Financial Report for Year 2 2024. Year 2 (1 January 2024 – 31 December 2024) budget totaling USD 32,432.01 is confirmed with the present written communication of approval. For the avoidance of doubt the organization shall not, by agreeing to have the timing of this Agreement run from July 2023 to December 2024 as set out in Clause 4.1 above be deemed to have warranted or represented that The Organization has guaranteed the availability of funds for that period or the disbursement of funds to The Implementing Partner for that time period. In no event shall the Organization be liable for reimbursement of any cost that would result in cumulative payment under this Agreement exceeding the total value as established in this clause, unless this Agreement is modified in writing.

Article 6.4 of the Specific Terms and Conditions is replaced by the following text:

6.4. **Assets management**: Assets with a unit cost exceeding US$3,000 and a useful life of more than one year must be documented in an asset register. Regarding items valued below US$3,000, the Implementing Partner should follow its organizational policy on inventory recording. At the end of this Agreement, the Implementing Partner will seek the Organization's approval for proposed actions relating to the disposal of assets.

In addition to the above, the following Annexes to the Agreement are replaced by the revised versions attached to this Amendment:

☒ Annex 2 – Scope of Work
☒ Annex 3 – Schedule of Reporting and Disbursements
☒ Annex 4 –Budget and Financial Reporting Templates

This Amendment is incorporated by reference into the Agreement.
Except as modified by this Amendment, all other provisions of the Agreement and subsequent Amendments to the Agreement shall remain in full force and effect.

The Implementing Partner hereby acknowledges receipt of a copy of this Amendment. By signing below, the Implementing Partner accepts all agreed modifications to the Agreement and all unchanged terms and provisions.

Receipt by the Organization of acceptance in writing of these terms and conditions will constitute an integral part of the Agreement.

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For and on behalf of the Organization: Date: 5 June 2024

Dr. Stephan Weise
Managing Director, Asia region

Signature

For and on behalf of the Implementing Partner: Date: 5/6/24

Dr. Nelson Simbiken
Director General

Signature

NATIONAL AGRICULTURAL RESEARCH INSTITUTE
NARI
Established 1996

Sub-grant Title: *PNG-NARI-Upgrading National Genebanks in the Global System (A1553)*

Sub-grant No: *L23ROM161* - Amendment No.: *2*

Annex 2

SCOPE OF WORK

1. Background

The National Agricultural Research Institute (NARI) is the statutory custodian of Plant Genetic Resources for Food and Agriculture (PGRFA) in Papua New Guinea. NARI conserves and manages a wide range of crop species that are indigenous, endemic, naturalised and introduced. The diversity of species, and cultivars, are used in breeding for new varieties, evaluated for agronomic traits of interest, and released farmer use, or taken up for value-addition in food/feed processing. There are also many more important crops that have not received much attention in capturing and documenting their diversity.

While the Plant Genetic Resources (PGR) are appreciably conserved, on-going necessity remains, to systematically introduce, conserve and use. NARI will continue to manage its existing PGR collections, expand collections (existing and new), characterise and document PGR under its mandate. However, the Institute needs on-going capacity strengthening for managing its PGRFA so that it can conform to standards recognised internationally. The institute is aware of its strength and weaknesses and look forward to such opportunities.

Characterization and evaluation of the range of crops is the first area for capacity strengthening. Considerable number of the indigenous or traditional species like taro, yam, banana and sweetpotato are maintained with some missing passport information, misplaced characterization data, and no physico-chemical data. Geo-reference and altitudinal data are missing for most accessions. These days, they are key data sets to help predict crop performance under changing climatic conditions. It has also been apparent that germplasm characterization has been done without proper care on understanding the utility of the descriptors list (and the descriptor states) for the various crops. Moreover, the systematic approach to characterising germplasm have not seen to be done correctly considering the various vegetative (trait) development stages. Hence, data becomes misrepresentative of the truest characters of accessions.

There have also been challenges in the transfer of data into formats that can be analysed and further interpreted scientifically. Hence the effort put into characterization and evaluation had not generated enough insight for conceptualizing crop breeding, physiology and agronomic research, in the recent years. Apart from morphological traits, it is also important that basic physico-chemical properties are established for the crop germplasms. This is an area that NARI would like to ensure these properties are established for the selected species with a view to enhance its use for food security and arising marketing opportunities, e.g green banana flour.

NARI has a local database of crops which needs continuous updating. Recently the Institute started to contribute crop information to the GENESYS global database for a small number of sweetpotato accessions only. But there is a lot more scope to understand the database and continue updating. We also plan to build our capacity on QMS and in adopting Grin Global for management of our PGRFA. Further the Institute would also require more capacity support to register GLIS-DOI for the characterised germplasm.

Secondly, we need to improve the collecting strategy for the crops NARI is mandated to manage. Collections are *ad hoc* in most cases and in only a few instances PGRFA were collected with intention for germplasm conservation. The climate and socio-cultural changes pose threats to crop species and cultivars in diverse agro-ecologies throughout the country. In the case of Taro and Yam, substantial collection efforts have been made in

the past (TAROGEN, SPYN[1]) but since then, significant numbers of accessions from the *ex-situ* collections have been lost. A large collection of winged bean (*Psophocarpus tetragonolobus*) was assembled in the 1970s but lost subsequently. A duplicate of this collection was established in Australia and part of it are currently listed to be in long-term storage in the Australian Grains Genebank, Victoria. This historical information could be used to target new collection sites to add to the available small collection re-established at NARI.

Based on our research needs, crop collection criteria developed around agro-climatic zones, ethnobotanical uses, high diversity regions and market orientation would help collect diverse cultivars. It would also be important to incorporate GIS for mapping out selected PGRFA for collection. There is a need to strategically collect, conserve and use PGRFAs from localities in PNG. Collecting PGRFA basing on important traits is important. Traits such as drought, saline, and pest and disease tolerance are currently important considerations in NARI. In places presented with biotic and abiotic stresses, nutritional traits such as starch, dry matter and range of flesh colours in staples can be further probed and collected.

Thirdly, standard operating procedures (SOPs) for germplasm conservation and maintenance need to be developed. The Institute lacks proper standard procedure for propagation and management of its PGRFA. It will embark on developing and documenting protocols already in use or drawing on other available sources. This also extends to include development of protocols for regeneration of seeded crops. Viability testing is necessary for conservation of regenerative crop species with orthodox and recalcitrant seed types. NARI has been working on rice and grain crops and fruit trees for over two decades and recently placed research emphasis on vegetables. Currently here is no SOP for storage and maintenance of seeds for the diverse crop species.

Finally, the Institute embarks on continued introduction of new crop cultivars from regional germplasm centres like Centre for Pacific Crops and Trees, Fiji or other international genebanks. The focus of the Institute is on introducing cultivars with inherent abilities to withstand drought, flooding, and salinity among others. Crops like cassava, rice, corn and soybean are important for the rural farming households. Introduction of these crops with either of the attributes will mitigate the adverse effects of the extreme climatic events. For the grains, the storage ability is already a plus for adoption by the farmers and it is currently accepted. We are looking at increasing the diversity for cassava, rice, corn and soybean. The attributes important to us are drought and flood tolerance apart from culinary attributes.

2. Objective

The Sub-Grant will contribute to supporting the PNG National Crops Gene bank to be upgraded with the main purpose for improving basic conservation operations.

3. Key deliverables and activities

The Implementing Partner will produce, achieve, or deliver on the 4 key outputs as follows:

1. Gaps in characterisation for priority agronomic, morphological and/or physico-chemical traits addressed for aibika, banana, cassava, taro, winged bean and yam, and made available on local and global databases.
2. Additional accessions of taro, banana and winged bean collected.
3. Standard Operating Procedures for regeneration/propagation of quality planting materials, and *ex situ* management of collections, developed.
4. 5-10 new crop cultivars each of cassava, potato, and corn, possessing climate resilient, and food/feed traits from CGIAR gene banks sourced and introduced.

[1]TAROGEN – Taro Genetic Resources Network Project; SPYN – South Pacific Yam Network Project

4. Work plan

	Description of activity/deliverable	Budget (in USD)	Milestone	Year 1				Year 2			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
OP1.	**Gaps in characterisation for priority agronomic, morphological and physico-chemical traits addressed for aibika, banana, cassava, taro, winged bean and yam and made available on local and global databases.**	0									
1.1.	Full passport and characterisation information check on currently maintained aibika, banana, cassava, taro, winged bean and yam collections conducted.	0	Sep 2024								
1.2.	Morphological characterisation (incl. yield data) on currently maintained collections (except winged bean), conducted.	0	Oct 2024								
1.2.1.	Morphological characterization of 13 accessions of aibika completed.	150	Sep 2024								
1.2.2.	Morphological characterization of 78 accessions of taro completed.	250	Sep 2024								
1.2.3.	Morphological characterization of 142 accessions of yam completed.	1100	Feb 2024								
1.2.4.	Morphological characterization of 65 accessions of banana completed.	1100	Oct 2024								
1.3.	Physico-chemical properties using proximate analysis and micro nutrient analysis (only where necessary) established for representative samples of aibika, banana, cassava, taro and yam.	0	Aug 2024								
1.3.1.	Proximate analysis for 5-10 low cyanide, white & yellow flesh cassava accessions established.	0	Sep 2024								
1.3.2.	Proximate analysis for 5-10 TLB tolerant and yellow/orange flesh taro accessions established.	2200	Sep 2024								
1.3.	Proximate analysis for 10 purple	2200	Sep								

3.	& white flesh tubers of *D. alata* (5) & *D. esculenta* (5) established.		2024									
1.3.4.	Proximate analysis for 10 accessions of cooking banana including ABB triploids (2), tetraploid hybrids (3), diploid AA (5), established.	2200	Dec 2024									
1.4	Adopting Grin Global to better manage the accessions conservation operational steps.	7523	Dec 2024									
1.5	Share relevant information generated, on GENESYS and WIEWS global database.	0	Oct 2024									
1.6.	Register GLIS-DOI for the characterised germplasm.	0	Oct 2024									
OP 2.	**Additional accessions of taro, banana and winged bean collected.**	0	Jul 2024									
2.1.	Taros (including eddo types), bananas (cooking types) and winged bean collected from Madang, Eastern Highlands, Simbu and Jiwaka provinces.	6400	Sep 2024									
2.2.	Preliminary characterization of the collected germplasms conducted.	1200	Dec 2024									
OP 3.	**Standard Operating Procedures for regeneration/propagation of quality planting materials, and *ex situ* management of collections, developed.**	0	Aug 2024									
3.1.	Develop SOP on propagation techniques for root, tuber and banana crops.	3232	Sep 2024									
3.2.	Develop SOP for regeneration of orthodox seed crops including rice, grain and pulse crops.	977	Sep 2024									
3.3.	Publish standard protocols for indexing or testing health of germplasm collections.		Aug 2024									
OP 4.	**5-10 new crop cultivars each of cassava, potato, and corn, possessing climate resilient, and food/feed traits from CGIAR gene banks sourced and introduced.**	0	Jul 2024									

4.1	Diverse genotypes of cassava - drought tolerant, high yielding (5); potato -PLB resistant, bacterial-wilt tolerant, chips quality (10); and corn -field corn for feed and processing (10) imported.	1500	Sep 2024								
4.2	Preliminary observation trials on-station at MRC, SRC and HRC conducted.	1400	Oct 2024								
	Visibility	500									
	Office Admin	500									
	TOTAL	**32,432**									

Annex 3

Schedule of Reporting and Disbursements

1. Schedule of reporting

No.	Report	Reporting period	Submission by
1	Interim Technical and Financial Report – Y1 2023 *(for the financial report, a detailed transaction list of expenditures is required)*	*01 July 2023 – 30 September 2023*	**31 October 2023 - SUBMITTED**
2	Interim Technical and Financial Report – Y1 2023 *(for the financial report, a detailed transaction list of expenditures is required)*	*01 October 2023 – 31 December 2023*	**15 January 2024 - SUBMITTED**
3	Final Technical and Financial Report – Y1 2023 *(for the financial report, a detailed transaction list of expenditures is required)*	*01 January 2024 – 31 March 2024*	**15 April 2024 - SUBMITTED**
4	Interim Technical and Financial Report – Y2 2024 *(for the financial report, a detailed transaction list of expenditures is required)*	*01 January – 30 June 2024*	**31 July 2024**
5	Final Technical and Financial Report – Y2 2024 *(for the financial report, a detailed transaction list of expenditures is required)*	*01 January – 31 December 2024*	**15 January 2025**

2. Schedule of disbursements

No.	Disbursement amounts	Conditions for payment
1	USD 14,872.20	Agreement signed by both Parties **PAID**
2	USD 11,408 (including USD 16,216.01 as 50% of Year 2 2024 budget deducting USD 4,808.01 as the cash balance	Upon signatures of the Amendment 2 – CE Year 2 2024

	from Year 1 2023)	
3	USD 12,972.80 (40% of total Year 2 budget)	Approval of Interim Financial and Technical Report due on 31 July 2024, detailing the spending of at least 80% of previous instalment
4	USD 3,243 (10% of total Year 2 budget)	Approval of Final Technical and Financial Report due on 15 January 2025. Final amount is subject to the balance in the approved Final Financial Report

Annex 4

Budget and Financial Reporting Templates – Y3 2024

(please see the attached Excel file)

Financial Report #:	
Project Title:	CGIAR Fund INIT-03- Genebanks
Agreement No.	A1553
BUS	B101370
LOA Number / PLA:	L23ROM161 - Amendment 2 CE 2024
LOA Start Date and end date:	7/1/2023 to 12/31/2024
Total Amount LOA	USD 32,432.01

Part I: Fund / Cash Received Statement

Date		USD	LOA/ PLA Bank Acct Curr	Exchange Rate
dd/mm/yyyy	1st payment			-
dd/mm/yyyy	2nd payment	-		-
dd/mm/yyyy	3rd payment	-		-
Total Funds Received		-	-	-

Part II: Summary

Description	Approved Budget 2024	Previouses reported expenses	Current expenses	Total Expenses	Balance	Variance
Personnel	8,575.54		-	-	8,575.54	100%
Consultants	-		-	-	-	0%
Supplies & Services	6,425.91		-	-	6,425.91	100%
Travel	6,343.24		-	-	6,343.24	100%
Training & Workshops	-		-	-	-	0%
Equipment	7,523.36		-	-	7,523.36	100%
Miscellaneous/Other	1,446.84		-	-	1,446.84	100%
Overheads (7%)	2,117.12		-		2,117.12	
Total	**32,432.01**	-	-	-	**32,432.01**	100%