PAPUA NEW GUINEA

NATIONAL AGRICULTURAL RESEARCH INSTITUTE

ANNUAL IMPLEMENTATION PLAN

2022

CORPORATE PLAN No. 3/2022

Promoting Excellence In Agricultural Research For Sustainable Development

NARI Annual Implementation Plan 2022
Corporate Plan 2/2022

Recommended **Citation**: National Agricultural Research Institute, 2022. Annual Implementation Plan 2022, Corp[orate Plan 3/2022, National Agricultural Research Institute, Lae, Papua New Guinea.

NARI Annual Implementation Plan 2022

(Corporate Plan 3/2022)

National Agricultural Research Institute

Lae, Papua New Guinea

Distribution of the final document will be available through our website (https://www.nari.gov.pg) or by contacting:

The Director General
National Agricultural Research Institute
Sir Alkan Tololo Research Centre
NARI Head Office
P.O. Box 4415
Lae 411
Morobe Province, Papua New Guinea

Phone (Reception): 675 76061118/ 79864776
Email: naripng@nari.gov.pg

Acronyms and Abbreviations

ACIAR	Australian Centre for International Agricultural Research
ADD	Agricultural Development Domains
AIP	Annual Implementation Plan
AR4D	Agriculture Research for Development
ARSF	Alumni Research Support Facility (ACIAR)
ASF	African Swine Fever
BSFL	Black Soldier Fly Larvae
BWAP	Banana Wilt Associate Phytoplasma
CC	Climate Change
CM	Centre Manager
DFAT	Department of Foreign Affairs and Trade
DG	Director General
DOI	Digital Object Identifier
EHP	Eastern Highlands Province
EU	European Union
FC	Financial Controller
FPDA	Fresh Produce Development Agency
GESI	Gender and Social Inclusion
GHG	Green House Gases
GIS	Geographical Information Systems
GLIS	Global Information System for PGR
GoPNG	Government of PNG
GW	Galip Weevil
HARC	High Altitude Regional Centre
HRC	Highlands Regional Centre
HT	Human Talents
HTMDS	Human Talent Management and Development Strategy
IAEA	International Atomic Energy Agency
ICDF	International Corporation and Development Fund
ICT	Information & Communications Technology
IFPRI	International Food Policy Research Institute
IRC	Islands Regional Centre
ITPGRFA	International Treaty for Plant Genetic Resources for Food and Agriculture
JICA	Japan International Corporation Agency
LLG	Local Level Government
M&E	Monitoring and Evaluation
MOU	Memorandum of Understanding
MOV	Means of Verification
MRC	Momase Regional Centre
NAIC	National Agricultural Insect collection
NAQIA	National Quarantine and Inspection Agency
NARI	National Agricultural Research Institute
PGR	Plant Genetic Resources
PIP	Public Investment Programme
PM&E	Planning Monitoring & Evaluation
PNG	Papua New Guinea
PPT	Power Point
RA	Result Area
SHP	Southern Highlands Province
SIP	Strategic Implementation Plan
SOP	Standard Operating Procedures
SRC	Southern Regional Centre
SRF	Strategic and Results Framework
TC	Tisssue Culture
TO	Technical Officer
TOT	Training of Trainers
WHP	Western Highlands Province

Table of Contents

Table of Contents

NARI Corporate Annual Implementation Plan 2022

1. Introduction

The National Agricultural Research Institute (NARI) is a government funded statutory institution that operates within the strategic framework set by the PNG Government through the recently developed long and medium-term plans viz. Papua New Guinea Vision 2050, the Development Strategic Plan (2010-2030), the Medium Term Development Plan III 2017-2022 and other national policies. NARI's institutional objectives are well aligned with the national and sector plans as shown in Figure 1.

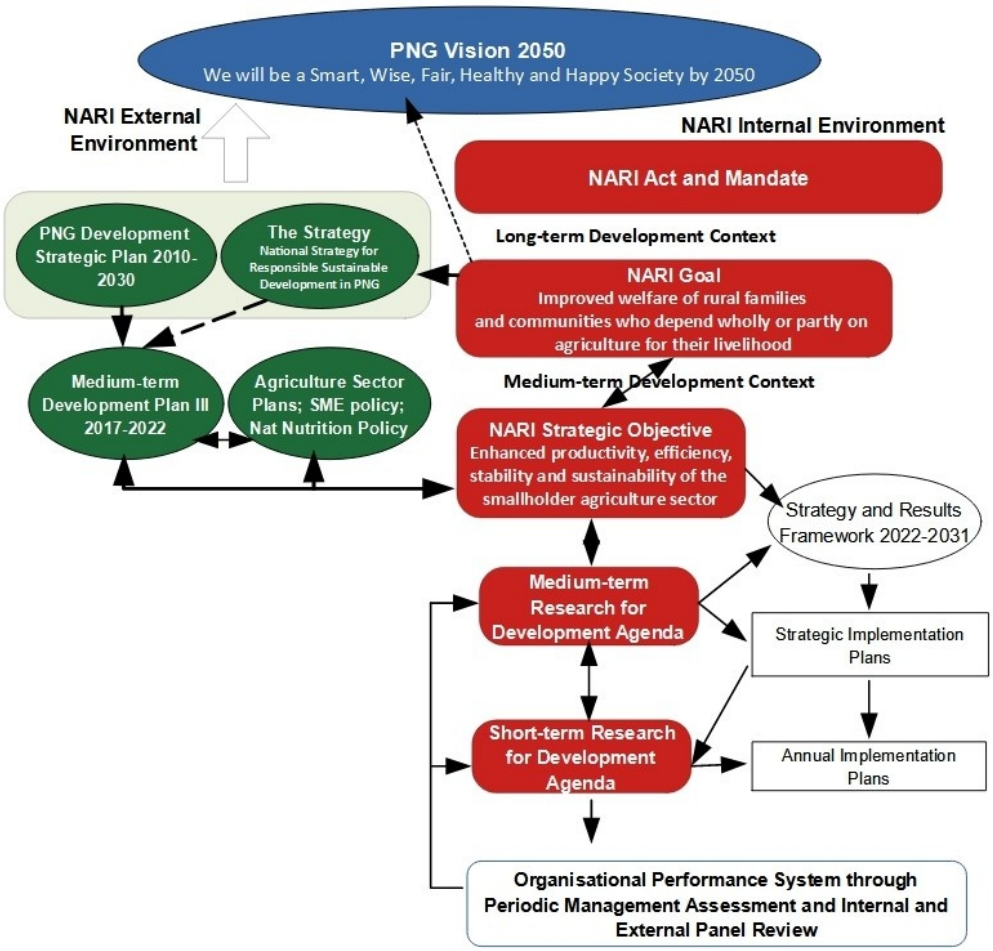

Figure 1: NARI contribution to sectoral and national development

The Strategy and Results Framework (SRF) II 2022-2031 provides the overall context and direction for the priorities set by the Institute in this 10-year planning time frame. The Strategic Implementation Plan (SIP) 2022-2026 outlines the 5-year priorities and target results for the Institute to achieve in its contribution in AR4D. The NARI AIP 2022 is the last tier document in the NARI planning and implementation process as depicted in Figure 1. The plan provides an overall framework for NARI's Research for Development priorities, key performance indicators and planned implementation in 2022.

The AIP is an important planning and management tool to ensure that implementation processes required for achieving short to medium term outcomes are followed. Annual plans assist in allocation of resources, monitoring implementation progress of activities and aid in making necessary adjustments and taking corrective actions. They also allow for on-going planning, evaluation and periodic reviews and reporting and further aid in impact assessment exercises.

The implementation of the annual plan is coordinated from NARI's eight establishments, comprised of Highlands Regional Centres at Aiyura and Tambul; Momase Regional Centre at Bubia including Labu; Islands Regional Centre at Keravat; Southern Regional Centre at Laloki; Kilakila (Insectory and Chemistry Laboratory) in Port Moresby and the Head Office at Bubia.

The AIP will be monitored on a quarterly basis for implementation of activities and inputs, and realisation of outputs and outcomes. This will be summarised in a six-monthly progress report. An annual report will provide an assessment of delivered outputs, accomplished milestones and achieved outcomes as stated in the annual implementation plan.

2. Structure of the Annual Implementation Plan

The conceptual basis of NARI's planning framework follows a cascading logic of interlinked logframes that depict the linkages between short-term projects and medium-and long-term development objectives within the organisation and the sector. It serves for the purpose of planning as a simplified road map for achieving major milestones in the development impact pathway (Figure 2). The AIP 2022 is linking to the framework outlined in the SIP 2022-2026 and the anticipated outputs identified in the seven Result Areas (RA) within the three major priorities viz. Markets, Value Chains and Trade; Resilient Systems; Nutritious Food and Healthy Diets.

The different sections of this plan are organised by Priority and Result Areas. The tables in the following sections show the outputs generated in 2022 coming from the various projects and studies funded by donor grants, the GoPNG Public Investment Program and the Institute's own resources (Annex 1) and how they contribute to the targeted RA outputs. The last sub-section shows the key outputs planned as part of Institutional Management and Development. Routine activities and associated outputs in day-to-day management are not displayed.

2.1 Priority 1 – Economic Development and Value Chains

2.1.1 Result Area Foresighting and Advocacy

The first Result Area under Priority 1 is designed to conduct strategic research in identifying AR4D investment opportunities and gathering information that will inform policy and priority setting at national and institutional level. In 2022, NARI is working with the International Food Policy Research Institute (IFPRI) conducting a study that is generating information that will inform future investment for an inclusive agricultural transformation strategy. It will examine the various parts of the agricultural transformation process from farm productivity, linkages in local markets, the rural non-farm economy and options increasing female engagement to harnessing urban markets using case studies. More details on the planned outputs can be found in Table 1.

2.1.2 Result Area Value Chain Support

The second Result Area focuses on specific priority value chains (see SIP Annex 3 for the prioritisation methodology) and uses a whole-value chain approach to address key bottlenecks that require research innovation for greater efficiency and productivity and ultimately greater returns to value chain actors. There are five value chains that NARI will initially focus on during the 5 year period of this plan, viz. Sweetpotato, Potato, Banana, Galip nut, and Pork Product Value chains.

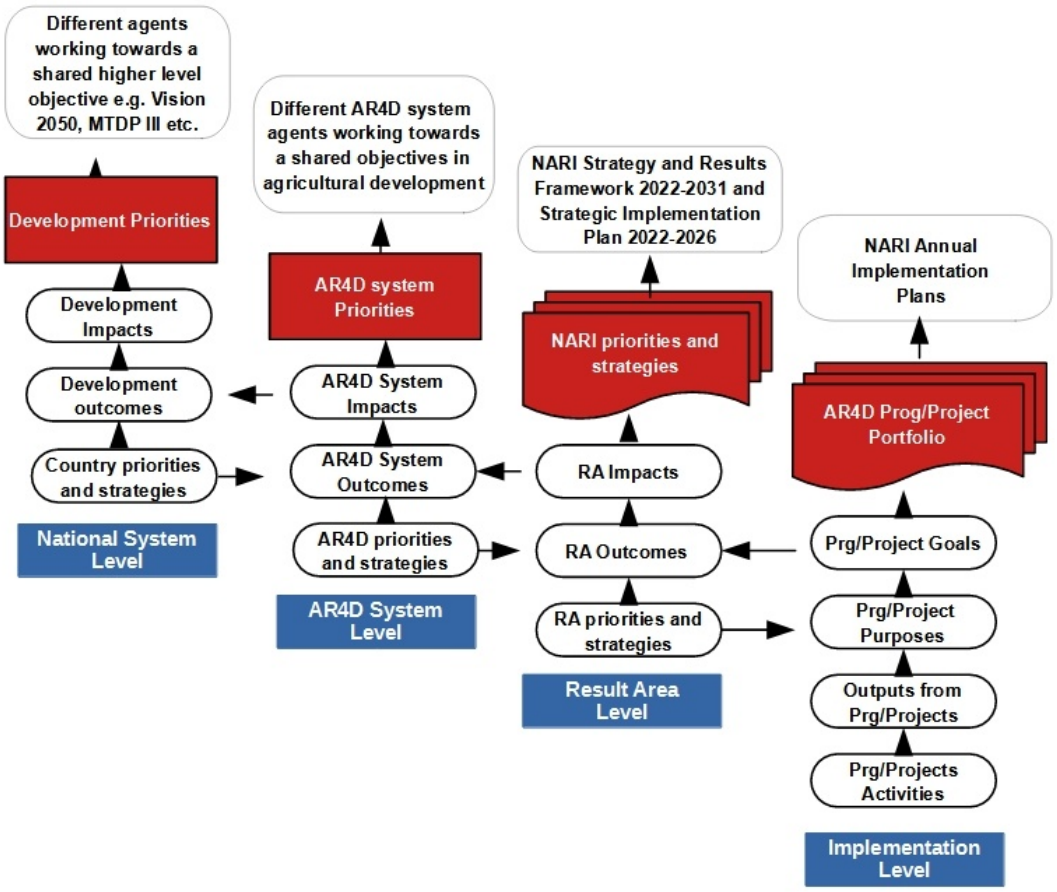

Figure 2: Cascading logic - Interconnected level of operation in the AR4D system

Value chain innovations for sweetpotato, potato and banana

NARI has been developing a range of innovations to support the sweetpotato value chain over many years. In 2022, most of the work will be focused validating soil fertility management options and practices working with farming communities in the Asaro Valley as well as women groups in Jiwaka. At the same time on-station trials continue to gain a better understanding on the nutritional requirements and soil interactions using different management options. In support of the potato value chain, NARI is increasing its capacity to diagnose virus diseases affecting potato as well as validating rapid propagation techniques using cuttings as an alternative technique to generate planting material especially in remoter regions where supply with seed potatoes is difficult.

NARI will continue supporting the potato and sweetptoato industry with supply of tissue-cultured potato plantlets to its partner FPDA and pathogen tested quality sweetpotato cuttings to stakeholders as foundation material for further production of quality seed material.

Banana is a very important crop in PNG but little research has gone into this staple. NARI is currently developing protocols for *in-vitro* propagation of popular cooking banana types. This is important for rapid propagation of bananas in case of larger scale production but also for conservation purposes of this important crop.

Table 1: Expected outputs in 2022 against Result Area Priorities in Result Areas 1 and 2, Priority 1

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Result Area 1 – Foresighting and Advocacy			
Information on costs and benefits of key agri-food system and investment options that are inclusive, pro-poor and targeted to promote economic growth;	• Literature reviews on NARI's previous work on value chains; • New value chains of food crops with potential for commercialisation identified • Macro-economic models on future investment developed; • growth opportunities in the non-farm sector with a focus on female engagement and empowerment identified • indicators/ measures of participation by and benefits received for women, youth, and other vulnerable groups	Review document; Strategy paper on future investment in new value chains of food crops Policy paper on future economic investment options and research investment;	M. Ivekolia, R.Ovah, D. Benny/MRC&SRC/ B40332
Increased capacity and networking in the design of agricultural transformation strategies;	• Study tour to IFPRI in Washington • Successful completion of implemented studies • Application of knowledge in other areas	Trip report Final Project Report New proposals	
Information on future research needs and partnerships in policy analysis and data-driven investment opportunities;	• inventory of relevant organizations/ministries/ agencies that are directly involved in agriculture and biosecurity policy formulation and regulation • Factors contributing to an environment that is conducive and effective in promoting investment growth in the agricultural sector.	Report	
Communications tools used and stakeholder interactions facilitated to share information and advocate identified strategies;	• Presentations made to relevant stakeholders and policy makers on recommendations from the IFPRI funded study	Meeting reports; minutes; PPT presentations	
Result Area 2 – Value Chain Support - Value chain innovations for sweetpotato, potato and banana			
In-depth value chain mapping and research needs assessment for	Soil fertility improvement in banana production systems in PNG (Literature review)	Technical Report/Publication	W. Sirabis/HRC

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
sweetpotato, potato and banana			
Soil management package for sweetpotato production systems	On-station trial completed as planned Information on preferred soil management options by women farmers in Jiwaka Extension Booklet on options of farm by-products as nutrient source in SP systems	Quarterly and Annual Reports; publications	W. Sirabis/HRC/A10226
Potato and sweetpotato varieties meeting end-user requirements;	• Review of available information on potato and sweetpotato varieties • Plan to fill information gaps	Proposal document	J. Waki and staff from other centres
Gaps in availability of guidelines, protocols and systems for production of certified planting material of sweetpotato, potato and banana addressed;	• Status of virus infection in common potato varieties • Protocols for Potato Rapid propagation technique available to stakeholders • Capacity in virus diagnostic using DAS-ELISA and LAMP improved; • Protocols for tissue culture propagation for 3 diploid banana types developed	Technical reported/Scientific publication Technical Report/Extension Bulletin Staff successfully perform tests – Technical report/Scientific publication	G. Tumae/MRC/B40330 W. Maso/HRC/A10227 B40330/A10227 J. Pilon, G. Rauka, J. Aidaboe/MRC/B40325
Specific innovations in target value chains made available to actors in the value chains as part of scaling process	• PT varieties produced and supplied according to demand; • Quality Potato plantlets supplied as per agreement	PT production and sales records	NARI TC lab Aiyura (Technical Services)
Result Area 2 – Value Chain Support – Galip value chain			
Commercial viability of business models for galip nut processing improved;	• Financial analysis of operating cost at the factory and primary processing to factory gate; • Cost of production of nuts and various by-products • Options for use of by-products assessed	Annual project report Technical reports Technical report	Project partners/IRC/K1006 W. Mollo/IRC/K1006 D. Hannet, W. Oli/IRC/K1006
Appropriate business models for micro-enterprises developed and capacity of operators increased;	• financial analysis for female smallholders selling galip or from micro-enterprises • Training modules and learning materials appropriate for micro-enterprises and female	Annual reported Learning materials	Project partners/S.Kapi/IRC/K1006

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
	smallholders for galip production and processing • key factors that enable microenterprises and female entrepreneurs to effectively participate in canarium value adding and processing	Annual report/technical report	
Improved production technologies developed (harvesting practices, on-farm processing;	• Information and protocol for effective and affordable off-station drying methods and protocols; • Harvesting system at different scales of operation; • Information on reproductive biology of trees and implications for tree improvement; development of a cropping calendar • Information on tree variability	Technical reports and publications	D. Hannet/IRC/K1006 G. Hannet/IRC/K1006 G. Hannet/IRC/1006
Information on management options and strategies for the Galip weevil	• Information on Galip Weevil life cycle stages and protocols for in-vitro rearing of weevil; • Information on natural enemies of GW; • Information on population structure and vertical distribution maps of GW in infested trees; • Information on origin and dispersal of GW; • Information on alternative hosts of the GW;	Technical reports/scientific publications	J. Yombai/IRC/K1006
Suitable mechanisation options available for different scales of operation;	• Information on efficiency, suitability of depulping methods and equipment for on-station and off-station processing;	Technical reports	D. Hannet/IRC/K1006 G. Hannet/IRC/K1006
Advocacy and Awareness on Galip production	• Media articles on areas of production, processing and marketing in print and social media	Copies of articles	W. Mollo, S. Kapi, G. Hannet, D. Hannet/IRC/K1006
Result Area 2 – Value Chain Support – Pork Value Chain			
Effective research collaboration and networks between NARI and NAQIA on animal health & diseases.	• Participation and contribution to African Swine Fever Taskforce	Meeting reports and minutes	M. Dom, S. Amben/MRC, HHRC
Capacity of selected smallholder farmers on improved production practices and	• Information available on the impact of ASF in local household of Tambul District and disease	Technical Progress reports, Quarter reports	S.Amben, HHRC/T20330

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
animal Health & welfare management and production increased.	areas • Maps documenting spatial distribution of ASF in the Mt. Giluwe LLG of Tambul based on epidemiological information		
Value chain mapping and key determinants influencing output across the value chain documented;	• Improved understanding of status of the pork value chain and gaps in research (Literature review)	Technical Report/Publication	S. Amben, M. Dom/HHRC, MRC
Demand & key requirements in production, processing and marketing to support niche markets for pork meat determined;	• Information on the most cost-efficient feeding regimes for weaner and for grower-finisher pigs using different commercial feeds and blended diets based on local feeds available	Technical Report/Publication	M. Dom/MRC/U100010

Galip value chain support

The Galip nut (*Canarium indicum*) is an indigenous resource, unique to only a few countries in the Pacific with a proven potential to become an important crop for income generation at different scales. A current project funded by the Australian Centre for International Agricultural Research (ACIAR) is generating a host of further information on various areas in the value chain that will be important for potential investors in production and processing of the nut. Other research is generating information to manage the currently most important pest, the Galip weevil and the use of by- and waste-products from the processing process to improve overall profitability in the value-chain.

Pork Product value chain support

The pork production value chain is a new commitment in terms of the breadth of scope that NARI will engage in for this important commodity. The incursion of the African Swine Fever Virus in 2020 has significantly impacted on pig production in the Highland provinces. NAQIA has led so far the countries response to the new disease but effective future management requires a whole-value-chain approach. NARI will be focusing in 2022 gaining a better understanding of the impacts of the ASF outbreak in WHP province and will examine further research needs along the value chain while mobilising further funding to address other important research needs to support this industry.

Further details of planned outputs in Priority 1, RA 1 and 2 can be found in Table 1.

2.2 Priority 2 Resilient Systems

Priority 2 is addressing threats and risks to livelihoods and agro-ecosystem arising from climatic, economic and demographic changes the country is experiencing.

2.2.1 RA Household Resilience

Result Area 3 is focusing on addressing household resilience issues exacerbated by Global Climate Change and increasing the adaptive capacity of vulnerable communities.

Climate Smart Solutions

Climate smart solutions are aimed at developing the technical, policy and investment conditions to sustainably adapting and building resilience from household to national level and contribute to mitigate Green House Gas (GHG) emissions. Such solutions may involve technologies and practices that are more efficient in resource use and have a reduced carbon footprint. But it also involves being climate smart and to practice agriculture production using a combination of technologies, strategies and practices that enable more stable production in the face of climate change and other indirect impacts from intensification of commercial crop and livestock production on food and eco-systems exacerbated by climate change.

This year, NARI and its partners will conclude a large project funded by the EU that supported nearly 20 LLGs/districts in 10 provinces in strengthening the adaptive capacity to respond to abiotic stresses arising from seasonal weather patterns and climate change. The final assessments will show a wide range of outputs achieved that have addressed the various dimensions of household resilience, such as increase of skills and knowledge of extension providers and targeted communities in use of improved agricultural practices, supply new or improved technologies such as staple crop and vegetable varieties, breeding stock. A model for a rural hatchery using solar incubators was introduced to improve supply with poultry breeding stock. NARI will also continue to be active in the Highland provinces with establishing partnerships with provinces to address household resilience. The planned work will include assessments of vulnerability and needs of communities in the targeted areas. In response to the findings customised support will be provided to extension providers in the area with upskilling and the supply with planting material and breeding stock. An important part of this process is also the identification of constraints and opportunities and gaps in information, technology or strategy that ,can be addressed through research (Table 2).

Table 2: Expected outputs in 2022 against Result Area Priorities in Result Areas 3 and 4, Priority 2 Resilient Systems

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Result Area 3 – Household resilience – Climate Smart Solutions			
Vulnerability assessment information and maps	• Information on vulnerability status and needs to improve for 10 LLGs previously worst affected by El Nino impacts	Technical Report/Publication	C. Gwabu/MRC/B40331
	• Information on traditional knowledge and risk management in selected communities	Technical report/publication	J. Laraki/MRC/B40331
	• Needs of 7x Highland provinces in relation to preparedness to cope with climate induced stresses established;	Technical report on needs assessments	J. Pakatul, S. Amben/HRC, HHRC/A10228
Diversified climate resilient portfolios of crop varieties and species as well as livestock strategies and technologies adapted to climate risks available to stakeholders;	• Information on promising NERICA rice varieties;	Technical report/Publication	P. Seta-Waken/SRC/L10024
	• Information on the use of Disaster response vegetable seed kits;	Technical report/Publication	J. Waki/MRC/B40331
	• Information on use of BSFL as low cost protein source to supplement diets in village chicken	Progress report	A.Roberts/MRC/U10014
Relevant farm practices and strategies from production to marketing (e.g. soil fertility and moisture management, storage, on-farm processing, use of seasonal farm advisory) to mitigate risks to household resilience developed and adapted;	• Effective sweetpotato storage system available for scaling and adoption by stakeholders;	Technical report/Publication	T. Kui/HRC/B40331
	• Crop calendars documented for selected areas in the country	Technical Publication	R. Baiga/MRC B40329; J. Waki/MRC/B40331; G. Tumae/MRC/B40333, J. Pakatul/HRC/PIP;
	• Crop intervention matrix for seasonal climate forecasts	Technical report/Publication	R. Baiga/MRC/B40329, J., Pakatul/HRC/PIP
	• Key crop advisories for NWS seasonal climate forecasts	Technical report/Publication	R. Baiga/MRC/B40329
	• Information on soil water dynamics in sweetpotato mounds established;	Technical report/Publication	T. Kui/HRC/A10220
	• Information on economic benefit of the use of locally available fertilisers in vegetables, corn and	Progress report	P. Seta-Waken, R. Baiga/SRC, MRC/L10025

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
	sweetpotato available		
Scaling approaches applied for wider awareness and adoption on use of climate smart innovations in target areas;	• Capacity of extension agents in vulnerable districts in climate smart use of agriculture production technologies and practices built; • Evidence of adoption of technologies and practices for climate smart use in local agricultural food production systems in 18 LLGs in vulnerable areas; • Information on contributions and economic benefits of drought tolerant sweet potato cultivars for strengthening household food resilience against droughts made available; • Rural hatcheries and nurseries set up in 7 locations	Final Project reports Final Project report Technical report/Publication Final project report	J. Waki and team/MRC, SRC, IRC/B40331; J. Pakatul/HRC/ (PIP, A10228) J. Waki and team/MRC, SRC, IRC/B40331 C. Gwabu/MRC/B40226 J. Waki and team/MRC, SRC, IRC/B40333
Result Area 3 – Household resilience – Disaster Response			
Sufficient quality planting material and breeding stock available as foundation material for rehabilitation after disaster events;	• Increased capacity in production of quality planting material and breeding stock at NARI Centres	Quarterly and Annual reports	Facilities team, Centre Managers/all centres/(PIP Infrastructure)
Weather data available from all NARI Centres to stakeholders	• Weather data captured from the AWS at all Centres and captured in central database • Climate forecast information sharing platform for Hela and SHP;	Data base records Final project report	E. Kupe, Centre Managers J. Pakatul, S. Amben/HRC, HHRC/A10228
Result Area 4 – Agro-ecosystem resilience			
No outputs planned for 2022			

Disaster response

NARI will continue to strengthen its internal capacity as well as capacity of partners to make a contribution as part of disaster response. The major contribution will be made in the agricultural rehabilitation efforts with the supply of foundation planting materials and breeding stock. In 2022, further work will be done on addressing internal constraints and development of Standard operating procedures in provision of quality material (Table 2).

2.2.3 Result Area Biosecurity

NARI has a major role in Biosecurity management in conducting relevant research in the management, monitoring and surveillance especially of endemic biological pest and disease threats to agricultural, horticultural, agro-forestry, and aquaculture production systems, as well as natural eco-systems. NARI's contribution will be in two major areas, viz. Biosecurity management and Biosecurity preparedness

Biosecurity Management

As part of Biosecurity management, NARI is working on generating information on efficacy and baseline sensitivity of novel Bt-based insecticides introduced to control the Diamond back moth, a serious pest in vegetable production. A similar study will be conducted on newly introduced insecticides for the control of the Fall Army worm, a serious pest that causes devastation in larger scale corn production areas. This information is important for monitoring the effectiveness of the pesticides. Another focus area for pest and disease management is on the Galip weevil (see section 2.1.2 Galip Value Chain) and the Banana-wilt-associated-phytoplasma (BWAP) disease that is affecting especially the important cooking bananas of the ABB genotype, such as Kalapua and Yawa in the Markham Valley.

Biosecurity preparedness

The National Agricultural Insect Collection facility at Kilakila in Port Moresby, is an important service that the Institute is providing to stakeholders in term of diagnostics but also for the purpose of trade facilitation. The national insect collection is a reference collection for a wide range of agricultural pests that has been built up over the past 30 and more years. While physical specimen are maintained, the collection will also be gradually digitised so records become available on-line for easier access to stakeholders. Disease diagnostic is another important service for the Institute to provide and internal capacity is being built in virus diagnosis in sweetpotato and potato.

Further details on expected outputs in this RA can be found in Table 3.

2.2.4 Result Area Genetic Resources

NARI is the custodian of the Genetic Resources for Food and Agriculture diversity which is an important heritage and basis for food security and the advancement of commercial crop and livestock production in the country. This RA covers a range of core activities of NARI under the two sub-headings of Genetic Resources Management and Genetic Resources Use and Access.

Genetic Resources Management

NARI is maintaining a number of PGR collections at its various regional centres. The maintenance is an on-going responsibility. Equally important is the on-going characterisation of the collections as part of pre-breeding activities and maintenance of databases that capture the passport and characterisation data. NARI is working with the Secretariat of the International Treaty of Plant Genetic Resources (ITPGRFA) on a project that will involve the uploading of sweetpotato PGR data into international databases for wider access to stakeholders. The update of databases with relevant information on breeds, stock numbers etc is also planned for the livestock genetic resources maintained at NARI centres.

Table 3: Expected outputs in 2022 against Result Area Priorities in Result Areas 5 and 6, Priority 2 Resilient Systems

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Result Area 5 – Biosecurity – Management of Biosecurity Threats			
Fall Army Worm Management Package and associated information available and capacity built for use by different stakeholders;	• Information on FAW baseline sensitivity for pesticides used in control and efficacy under lab conditions; • Information on presence and identity of FAW natural enemies in selected areas in PNG	Technical report/Publication Technical Report/Publication	R. Geno/HRC/A10225
Additional environmentally safe options available to vegetable producers for effective management of Diamond-back moth;	• Information on Diamond Back moth baseline sensitivity for novel insecticides (BT and others) and information on efficacy of two best performing insecticides;	Technical Report/Publication	R. Geno/HRC/A10225
Improved understanding of the biology, population dynamics and management options of the Galip Weevil;	• Information on Galip Weevil life cycle stages and protocols for in-vitro rearing of weevil; • Information on origin and dispersal of GW; • Information on natural enemies of GW; • Information on alternative hosts of the GW;	Technical reports/scientific publications	J. Yombai/IRC/K1006
Effective management strategies of Banana-associated phytoplasma in affected areas in Morobe and Madang;	• Information on spread of BWAP in the Markham Valley; • Information on vectors involved with transmission of BWAP in the Markham Valley	Technical reports/scientific publications	G. Rauka/MRC/B40323
Standard operating manuals and procedures applied for production of quality, and pest- and disease-free planting material and breeding stock;	• Draft manual for planting material biosecurity procedures	Draft document	L. Fooks
Relevant information on other pest and disease management issues	• Information on baseline sensitivity of *Phythophthora infestans* isolates to Chlorothalonil; • Information on causal agent(s) of Sago decline in AroB; • Management strategies for ascites in broiler chicken	Technical reports/scientific publications Progress report	G. Rauka/MRC J. Ahizo/HHRC/T20331

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
	in the Highlands of PNG		
Result Area 5 – Biosecurity – Biosecurity Preparedness			
Contribution to data bases developed for pest alert and incursion threats by NAQIA for stakeholder advise and planning.	• Specimen in the NAIC maintained and 500 specimen digitised in an electronic database;	Quarterly and Annual report	C. Sesega/NAIC/ Technical Services
• Pest & Disease diagnostic capacity increased in supporting the sector;	• Use of LAMP diagnostic technology applied in Sweetpotato virus diagnostic; • Status of virus infection in common potato varieties • Capacity in virus diagnostic using DAS-ELISA and LAMP improved;	Technical Report/Scientific publication Technical reported/Scientific publication Staff successfully perform tests –	W. Maso/HRC/A10227 G. Tumae/MRC/B40330 G. Tumae/MRC/B40330
Result Area 6 – Genetic Resources – Genetic Resources Management			
A pilot in-situ conservation approach to sweetpotato genetic resources is tested in four districts;	• *In-situ* conservation training manual developed; • *In-situ* conservation training conducted in 4 communities;	Manual document; Training report; Technical progress report to donor	J. Paofa/SRC/B40333
Sweetpotato cultivars characterised, phenotyped, evaluated, documented, pre-bred for traits of importance to adaptation and resilience;	• Sweetpoato cultivars in national collections characterised and phenotyped;	Database records (NARI)	J. Paofa, B. Wera, M. Deros/MRC, SRC/B40333
Information on GRFA is available to stakeholders in PNG and international community;	• Sweetpotato PGR information captured in a local database and kept current capturing all PGR kept in ex-situ collections at NARI stations; • Information on sweetpotato accessions held in NARI ex-situ databased incl new breeding lines assigned DOIs from upload into Genesys/GLIS; • Information on genetic and phenotypic diversity of PNG Amaranth accessions; • Baseline data on goat breeding stock at NARI available	Data base records; Genesys/GLIS records; Annual report; Progress report to donor Final Project Report Publication	J. Paofa, Myla Deros/SRC/B40333 P. Seta-Waken/SRC/L10026 P. Kohun/MRC/U10012

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Germplasm of root and tuber crops, fruits and nuts, rice, wheat, maize, OP vegetable seed, spices maintained for further research and development purposes with minimum losses;	• All PGR collections are documented with basic passport data and other pre-breeding information as available; • all PGR collections are numbered with respective accessions numbers in the field and field plans available;	Records in the database; field maps and plan	J. Paofa, A. Galus, M. Deros, B. Wera, C. Walter, J. Anton/all centres
Breeding stock of village chicken, cross-breeds, ducks, goats and pigs maintained at NARI centres;	• Data base of livestock GR set up; • Chicken and duck breeds characterised; • Breeders clearly marked with rings or ear marks and corresponding Stock number	Data base records	J. Pandi/MRC; F. Besari, L. Lapauve, S. Sangi, S. Amben/SRC, IRC, MRC, HHRC
• Compliance with contracting parties to ITPGRFA obligations	• ITPGRFA compliance report updated and submitted to the Secretariat	Compliance report	B. Komolong, J. Paofa
Result Area 6 – Genetic Resources – Genetic Resources Use and Access			
Locally adapted sweetpotato varieties (early maturing, drought tolerant, purple and orange fleshed) bred with farmers' participation;	• Selection of preferred varieties from 16 new sweetpotato varieties introduced into 4 communities in Central, Morobe, Madang and EHP Provinces from participatory variety selections; • Polycross nurseries established in selected primary schools in 4 communities and seed harvested; • Workshops conducted in 4 sites and shared learning on breeding of sweetpotato using polycross; • C1 evaluation at MRC and HRC completed;	Technical reports; Quarterly and Annual reports; Technical Progress reports to donor	G. Tumae, B. Wera, J. Paofa/MRC, HRC, SRC/B40333
Seed systems enhanced to promote adapted sweetpotato varieties and other crops;	• New sweetpotato varieties introduced to target communities; • Increased knowledge on quality planting material of sweetpotato by target communities; • Effective sweetpotato root storage system available for scaling and adoption by stakeholders; ;	Technical reports; Technical Bulletin publication and extension materials	G. Tumae, B. Wera, J. Paofa/MRC, HRC, SRC/B40333 T. Kui/HRC/B40331
Improved rice and corn varieties released;	• 64 introduced rice varieties assessed and most promising accessions identified for on-farm trials;	Technical report; quarterly and Annual Report	C. Suruban/MRC/B402328
New spice and essential oil varieties	• Priority list of spice PGR	Associated documentation and	B. Komolong

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
introduced and basic information generated;	• Import permits and export approvals organised for supply from India for selected spice PGR	permits	
Standard operating procedures operating in all NARI centres for production of foundation crop planting materials and breeding stock;	• Standard operating procedures for poultry breeding stock production	SOP document;	P. Kohun, J. Pandi/MRC
Facilities, equipment and infrastructure in place for production and post harvest processing and safe storage of seed and planting material at NARI centres	• Multipurpose shed incl seed processing set up at MRC • Seed laboratory developed at MRC/ICDF • Seed stores developed at HHRC, HRC, MRC • Facility established at MRC; 2 TOs have capability to conduct grafting on *I setosa*, NCM test and maintain PT materials;	Photo records, quarterly and annual reports;	T. Omot, L. Fooks,/MRC/PIP infra L. Fooks, J. Maima, Mr Lee/ICDF L. Fooks, J. Maima, S. Amben, J. Pakatul/A10230, A10228 Jeffrey Waki, Cecily Walters, Lawerence Uberawa
Facilities, equipment and infrastructure in place for improved supply of poultry breeding stock at NARI Centres;	2 breeding sheds and hatchery set up at MRC	Photo records, quarterly and annual reports	T. Omot, J. Maima/MRC/U10015
Stakeholders access to and supply with quality breeding stock and planting material of priority crops and varieties improved;	• Foundation poultry breeding stock production and supply increased to baseline (2021) • Foundation planting material supply increased to baseline (2021) • Online portal for ordering planting material, breeding stock, and information resources;	Production and Distribution records; Delivery dockets for planting material Distribution records; Final project reports Online portal accessible	J. Maima, T. Pewa, A. Kola, K. Kobila, M. Lobao Centre Managers L. Fooks, E. Kupe

As part of promotion of PGR conservation, NARI is also working with four communities in EHP, Madang, Morobe and Central Provinces to pilot an approach of *in-situ* conservation of sweetpotato genetic resources that aims to encourage the maintenance of a greater diversity of sweetpotato varieties and hence, more robust production systems that improve availability of this staple crop throughout the year and seasons.

NARI will be honouring reporting requirements as part of PNG's international obligations as signatory to international treaties and membership with FAO Commission on PGR.

Genetic resources use and access

There are a range of activities planned in this sub RA. NARI expects to generate new promising orange and purple fleshed sweetpotato varieties as well as varieties with good performance under soil-moisture deficit conditions. The polycross nursery approach which will be used on-station but also piloted as an approach for communities to appreciate the available diversity to generate improved sweetpotato varieties. This work will be extended into primary schools and links closely to the before-mentioned in-situ conservation approaches to promote intra- and inter-specific diversity in farmer fields.

The other important area that NARI is focusing on is the improvement of access to quality foundation planting material and breeding stock. The Institute has received support from the Public Investment Program to improve its internal capacity for this important mandated technical service. The emphasis will be on having the facilities and processes in place to produce and supply quality which means that the material has high viability or vigour, is free from pest and diseases and true-to-type.

More details on planned outputs from RA6 can be found in Table 3.

2.3 Priority 3 Nutritious Food and Healthy Diets

Priority 3 is covering the contribution that NARI will make in addressing the serious systemic problem of malnutrition in the country. There are important linkages between agriculture and nutrition. This priority has one Result Area with two sub-objectives that NARI will be contributing to with relevant interventions.

With support from a grant from the GoPNG PIP, NARI will work with partners in Madang and Morobe to address the low level of production of livestock in various districts and pilot communities that show high levels of malnutriton in health statistics. The research is aimed at using participatory community development models such as the Family Farm team approach to effect changes in attitudes, habits and cultural norms to increase the production and consumption of more nutrient dense food especially livestock products. While there is a focus on livestock production, integrated livestock-crop systems will be promoted. This is a 4-year program and Table 4 shows achievements anticipated for 2022.

As part of advocacy and awareness, NARI will mainstream nutritional messages on production and consumption of nutrient dense food across other interventions and information materials.

Table 4: Expected outputs in 2022 against Result Area Priorities in Result Areas 7, Priority 3 Nutrition Food and Health

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Result Area 7 – Nutritious Food and Health – Improved Diets			
Improved capacity of households to practice sustainable village poultry farming and other appropriate livestock systems in target communities and districts;	• Communities in eight districts have basic skills and knowledge and foundation poultry breeding stock for increased production of ducks and chicken;	Project completion report;	J. Pandi, S. Sangi, F. Besari/MRC, SRC, IRC/B40333
Enhanced active involvement in households and community on equitable use and consumption of livestock and fish products from village poultry or other livestock/aquaculture systems;	• Information on needs and baseline on status of food and nutritional security generated; • Family Farm Team Training units delivered; will this happen this year	Survey report Training reports	J. Pandi, M. Dom and team/MRC/U10015 External consultant input
Result Area 7 – Nutritious Food and Health – Advocacy on safe and nutritious food			
Information materials produced and disseminated on nutritional properties of crop and livestock products	Information materials developed	Flyer, brochures, posters	J. Pandi, Michael Dom/MRC/ U10015

2.4 Cross-cutting Areas:

Three Result Areas, viz Scaling, GESI and Communication for Change, have been considered cross-cutting to the three Priorities and Result Areas within, because defined strategies are applicable across the whole research agenda.

Scaling in a wider context needs to encompass all factors that influence change processes necessary to achieve a larger scale impact while addressing GESI needs will require mainstreaming GESI dimensions into planning and implementation as well as targeted actions to specific needs. Communication for Change is a critical area for establishing successful partnerships, informing different stakeholders about and increasing their knowledge and understanding of innovations in AR4D. However, receiving feed-back from the different stakeholders is equally important to inform the Institute's strategies and priorities (see Figure 3 in the SIP).

The SIP indicates a range of targeted outputs in each of the cross-cutting areas that will have its own dedicated interventions and achievements. However, it also has to be understood that achievements in the cross-cutting areas would be reflected in the results achieved from interventions in the different RA due to its cross-cutting nature and the need for contribution towards achieving RA objectives.

NARI is mandated to provide a number of technical services. They are considered cross-cutting and aligned with the three cross-cutting areas. Such services include the production and supply of foundation planting material and breeding stock especially small livestock. Capacity building and up-skilling of partners and extension providers with new or improved agricultural technologies and practices or other areas of capacity building in improving awareness and understanding on addressing constraints and opportunities in the sector. Other important services include the provision of analytical and diagnostic services from NARI's Chemical Laboratory, the National Agricultural Insect Collection and information services that include access to scientific, technical, socio-economic databases that NARI is maintaining.

Table 5 shows expected outputs coming from cross-cutting areas in 2022.

3. Strengthening Institutional Efficiency and Effectiveness

As pointed out in the SIP 2022-2026, achievement of expected results by NARI cannot happen without a solid foundation of structures, systems and adequate resources. The critical areas mentioned include:

- The chronic under-funding of the Institute and support for delivery of AR4D, the need for diversification of income sources for the Institute and raising of the recurrent funding levels;
- The on-going need to manage change and promote changes in mindsets, attitudes and perceptions on what constitutes agricultural research and the role it plays in a system;
- Changes in the role of NARI regional centres from a research station to a multi-functional centre demonstrating best agricultural practice and serving as hubs for scaling of agricultural innovations;
- Changes in mobilising multidisciplinary and cross-organisational teams to address AR4D challenges and opportunities.

Table 5: Expected results coming from cross-cutting areas in 2022

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Cross-cutting Areas			
2.4.1 Scaling of outcomes and impacts of R4D innovations			
Inclusive and equitable partnership models and improved institutional arrangements for scaling of research outputs and providing sustainable support to target value chains, vulnerable communities and other target beneficiaries;	• MOUs developed and signed with provinces in 7x highland provinces on climate change adaptation support and provincial didiman centres • MOUs developed and signed with Districts/Provinces in Madang and Morobe on small livestock breeding centres and support for livestock development	MOU documents; Quarterly and Annual Reports	J. Pakatul, S. Amben/HRC, HHRC/A10230, A J. Pandi, M. Dom/MRC/U10015
Research outcomes and impacts assessed and key drivers of success determined;	Approach for Assessment developed	Document	Directors
Technical feasibility and commercial viability of research outputs determined;	Commercial viability of business models for galip nut processing improved;	See specific outputs in Table 1, Galip Value Chain	G. Hannet/IRC/K1006
Systems and processes in place for upscaling of supply of planting material and breeding stock;	• District administration and relevant stakeholders are engaged to manage and promote sustainable farming of village poultry, fish and goats at households in selected communities; • Provincial administration and relevant stakeholders are engaged to support resilient farming in seven highland provinces • Information and lesson's learned on set up of rural nursery and hatchery infrastructure concept including solar poultry egg incubators in selected districts in climate change vulnerable areas; • Facilities at NARI MRC and SRC upgraded	Project progress reports; Annual Report; Meeting minutes Final Project Report Quarterly Reports; Annual Report	J. Pandi, M. Dom/MRC/U10015 J.Pakatul/HRC, S.Amben/HHRC/A10230, A10228 J. Waki, J. Pandi/MRC/B40333 T. Omot/HQ42014
Innovative learning approaches and	• Mobile app for information dissemination		J. Laraki, E. Kupe

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
activities in knowledge transfer and information access to reach rural communities in ADDs developed and applied;	developed and launched; • TOT modules incl suit of learning materials fully developed for 5 modules		J. Laraki and other scientific and technical staff/B40331, A10230
Events organised enabling exchange and sharing of insights into lessons learnt from R4D interventions among stakeholders and policy makers;	• Stakeholder workshop EU CCR project • Stakeholder workshop on climate adaptation action	Workshop report/Final project reports	J. Waki, C. Gwabu, J. Laraki/MRC/B40331 J. Pakatul, S. Amben/HRC, HHRC/A10228, A10230
Stakeholders supported with efficient and affordable diagnostic and analytical services;	• Increase of sample submission and analysis compared to baseline (2021) • Reduction in sample turnover time compared to baseline (2021) • TC delivery targets met	Laboratory records; quarterly and Annual reports	M. Oromu, J. Kerage/Chemlab C. Seseaga/NAIC , W.Maso/TC – Technical Services
2.4.2 Gender, Youth and Social Inclusion			
Information access takes into account education and literacy (basic and technical literacy such as use of ICT) as well as a client friendly design of NARI's infrastructure.	Examples of learning materials for farmer level learning are suitable for learning by groups with low literacy	Documents	All NARI technical and scientific staff
Assessments on the specific needs of gender, youth and other vulnerable groups are incorporated in the design of projects and programs to ensure that interventions enable equal participation and opportunity to access benefits across different social groups	Gender analysis data captured from survey reports	Technical reports, project reports	Staff involved with survey data analysis and reporting/ B40332, A10228, A10230, U10015
R4D programs are tailored to capture the interest of young people in the rural areas using approaches in capacity	Youth of both gender feature in target population	Evidence from current project portfolio	Project leaders

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2022	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
building and communication appropriate for the targeted age groups;			
2.4.3 Communication for Change			
Communication Strategy	Draft strategy developed	Document	J. Laraki, L. Fooks
GIS databases and applications	Project activity map	Map	M. Tinah, B. Samor
Scientific, technical and general information accessible from on-line and other media platforms;	• Online platform • Funding proposal for digitisation and extended e-doc availability • Ongoing updating and increased access of stakeholders to records in the National Agricultural Information System;	Online platform accessible Funding proposal Database records	L.Fooks, E.Kupe, I.Okpul L.Fooks I. Okpul/MRC
Internal Information system with on-line databases on research management, Finance, HT and Assets management	• Research management database • Trip and activity report database	Reports from the database	L.Fooks, E.Kupe, B.Samor

Table 6 shows the priorities in addressing the various issues in improving efficiency and effectiveness of the Institute. It should be noted that those are considered key outputs from key interventions. The on-going routine activities in financial, HT, and Centre management are not listed here in detail.

For more than 12 months, NARI has been operating without a formally appointed Council. While this matter has been addressed now, the substantive appointment of a new Director General is still pending. The new planning framework of SRF II, SIP and AIP also requires some re-organisation of the management structure and processes to aid effective implementation of the plans. This is aside from the overdue review and revision of a range of NARI Management Standards so they are reflective of the changes in the external environment that occurred over the past 20 years since they were developed.

A major priority therefore is to start engagement with the Department of Personnel Management to discuss necessary steps in conducting a restructuring exercise and reviewing current position designations and associated career paths for further consideration by the NARI Council. Those discussions will also include a dialogue to gain a better appreciation and awareness of the needs of the Institute in terms of number of scientific, technical and support staff to deliver on its mandate better.

The Institute has received generous support from the GoPNG PIP and the Research, Science and Technology Council Secretariat to strengthen research infrastructure in its various centres and implementation of its Year 1 planned activities is another priority. The activities include as well the development of land use plans for NARI's regional centres and further efforts in securing the land from encroaching illegal settlements.

Aside from the above mentioned need to review and revise the existing NARI Management Standards, there is also a need to develop a number of new standards to address current gaps in the internal policy environment. Among such policies is the need to capture Occupational Health and Safety Standards, Allocation and Management of ICT equipment, the development of new strategies in HT management and development, assets management or the management of the NARI Housing estates.

The implementation of the AIP 2022 is supported by the grants given to the Institute from the GoPNG recurrent and development budgets, project grants from national and international donors as well as minor income from internal revenue generating activities. The 2022 Income and Expenditure Plan is presented in Annex 2. The Income and Expenditure Plan, however has to be considered in light of the assessment that has been presented in the SIP 2022-2026 on the considerable gaps between allocated and required funding.

Table 7 shows the current number of staff based on functional areas of the Institute and the allocation provided in 2022. In comparison is the estimated number of staff necessary to deliver on each of the functional areas at a basic level. Areas of concern are highlighted.

Table 8 shows the needs for operational funding support vs 2022 allocation and it shows clearly the significant shortfalls in funding that serious impact on the viability of the Institute.

Table 6: Expected outputs in Result Areas addressing Institutional Efficiency and Effectiveness

Result Area/Targeted Output in SIP	Milestones in addressing critical areas in Institutional Management and Development	MOV	Lead officer/team
3.1 Results-based Management			
Annual Corporate Implementation Plan	Annual Corporate Implementation Plan 2022 submitted for endorsement to 1st Council; Annual Corporate Implementation Plan 2023 endorsed by Council in the last meeting;	Council minutes	Directors, FC, HRM
Institute M&E system – Stage I Basic capacity for M&E at project level	Capacity building module for basic project M&E for NARI staff developed	Documents	R. Sabub
3.2 Resourcing the Institute			
3.2.1 Advocacy and Visibility			
Avenues for increased level of advocacy and dialogue at policy level created	Advocacy, partners and policy related networking strategy; Public Relation Officer established	Draft Strategy Document	Director level/DG office
NARI achievements presented in diverse media and its profile raised	Media articles (Radio, TV, Newspaper,); Video clips; Social media posts; Press releases reporting on NARI key activities	Quarterly and Annual Reports	PR office/Info team
3.2.2 Diversifying Funding Sources			
Business plans for internal revenue activities completed and implemented	• Business plans for key income earning activities developed • Annual revenue targets met as per Business plan	Document	J. Wamine, A. Amoi, Centre Managers
Chemistry laboratory Business plan developed	Business Plan developed that shows increasing level of cost coverage / decreasing operational subsidy by NARI recurrent funding	Document	M. Oromu/Chemlab/Technical Services
Legal and operational framework for establishment of a NARI Business arm developed	Review of current NARI Act and options to incorporate a Business arm under current legislation;		Council, DG office
NARI centre management structure and systems adjusted for improved delivery on assigned functions including revenue generation	Restructuring plan submitted to Council	Council minutes	HRManager, Directors, DG office
Active engagement with GoPNG and	• 2 new PIP proposals developed	Proposal documents	Directors, Scientists..

Result Area/Targeted Output in SIP	Milestones in addressing critical areas in Institutional Management and Development	MOV	Lead officer/team
donors result in annual award of diverse research for development grants and funding support	• new proposals submitted to donors • engagement with ACIAR and DFAT for new project(s)		
3.2.3 Investing in Human Talents			
Human Talent Management and Development Strategy (HTMDS) developed	• Review and revisions to position designations, career path progression completed and submitted to Council for endorsement; • Training plan established and implemented for NARI staff in all categories; • Concept note for NARI Cadetship Program completed • Position of Senior M&E officer scoped	Review document Council minutes	HRM, Directors P. Kohun, HRM HRM, Directors
Performance based Appraisal system operating	• Staff Annual Workplans submitted through rank and file; • PDR review time table implemented	Workplan records PDR records	HRM, all staff
On-line HT Management system operating	Leave management system operating	Leave records	HRM, E. Kupe
Annual targets in HTMDS achieved			
3.2.4 Management of financial and material resources			
Integrated finance management system in NARI established with online access to reporting and project management information	System scoped	Scoping report	A,Amoi, Directors, E.Kupe
Medium-term assets and facility management and development plan developed and annual targets met	• Online fixed assets management register • NARI land use mapping and zoning plan developed • Field research area mapped, demarcated and land use history database developed in all Regional Centres • Infrastructure Development Strategy and Implementation Plan for NARI Centres developed and implemented		T. Omot, J. Gagau, E. Kupe T. Omot, M. Tinah, Centre Managers Centre Managers, T. Omot, M. Tinah T. Omot, Centre Managers

Result Area/Targeted Output in SIP	Milestones in addressing critical areas in Institutional Management and Development	MOV	Lead officer/team
Housing estate management policy and strategy developed for NARI establishments	Policy document developed and submission made for Council endorsement	Council minutes	T. Omot, Centre Managers, HRM
Security risk mitigation strategy developed and implemented	Analysis of security risks and mitigation strategies	Document	T. Omot, Centre Managers
NARI land resources secured with title and ownership ascertained	6 portions of land at HRC to get titles and secure	Land title document, Council minutes	T. Omot, M. Tinah, Centre Managers
3.3 Governance, Policies, Processes			
Revised Organisational Structure at corporate level and regional centres in place	Restructuring plan submitted to Council	Council minutes	DG office, HRM, Directors, S. Tobel
HT Management policies updated or developed	• All current policies updated • Child Protection Policy- developed • Occupational Health and Safety Policy developed		HRM, Directors, S. Tobel
Financial Management and procurement policies and processes updated	Financial Management standard updated and submitted for endorsement by Council	Council minutes	FC, Directors, S. Tobel
ICT management policy developed	Policy developed and submitted to Council for endorsement	Council minutes	Directors, S. Tobel

Table 7: Current number of staff in 2022 and allocation from recurrent budget vs staffing requirement and associated cost

Functional areas under NARI mandate	Current staff numbers	Allocation in 2022 PGK in Million	Required staff number	Cost in PGK/year
Management	13	8.24	15	2.27
Management support	28		27	1.72
Scientific staff	35		44	3.42
Research Technical Officers	13		44	1.84
Technical and Analytical Services – Contract staff	24		36	1.97
Technical Services Support staff – Ancillary	n/a	n/a	40	0.34
Centre Maintenance, security and support staff - Ancillary	260	1.86	212	1.88
Total	**372**	**10.1**	**418**	**13.44**

Table 8: Estimated funding requirements and actual allocation for NARI operational cost by Budget Codes

Description	Budget Code	Actual allocation in 2022 budget	Estimated requirements 2022
Travel and Subsistence	222	102,000	214,800
Office Stationery	223	72,000	78,000
Operational Materials and Supplies	224	43,000	428,400
Transport and Fuel	225	96,000	1,193,400
Other operational expenses (security, insurance etc)	227	76,000	426,480
Utilities including internet cost	231	34,000	781,728
Routine Maintenance	233	1,137,000	1,992,000
Total		**1,560,000**	**5,114,808**

Annex 1. List of currently implemented projects and studies in Result Areas 1-7

No.	Project Code	Name of Project/Study	Project Leader and team	Funding body	Ending date
1	A10225	Responding to emerging pest and disease threats to horticulture in the Pacific islands	Robert Geno	ACIAR 2016/185	30/09/23
2	B40329	Climate Smart Agriculture opportunities for enhanced food production in PNG	Ruth Baiga	ACIAR ASEM/2017/026	31/12/23
3	K1006	Enhancing private sector- led development of the canarium industry in PNG (Phase II)	Godfrey Hannet	ACIAR FST/2017/038	01/07/23
4	A10226	Sustaining soil fertility in support of intensification of sweetpotato cropping systems Phase II	William Sirabis/Tai Kui	ACIAR SLAM/2017/041	31/05/23
5	B40330	Screening for potato (Solanum tuberosum) viruses in introduced varieties using DAS-ELISA and Loop-Mediated Isothermal Amplification (LAMP)	Gure Tumae	ARSF	30/04/22
6	L10026	Assessment of variation in the relationship and genetic diversity between and within Amaranthus from Papua New Guinea by Dart fingerprinting	Philmah Seta-Waken	ARSF	30/04/22
7	A10227	A reliable loop-mediated isothermal amplification (LAMP)technique for detection of Sweetpotato virus G (SPVG)	Winnie Maso	ARSF	30/04/22
9	B40331	EU Resilience project	Jeffrey/Rose	EU	29/04/22
10	B40226	Economic evaluation of introduced sweet potato cultivars in strengthening climate change resilience of vulnerable households' food security in Misima and Selepet	Clifton Gwabu	EU (EU CCR)	29/04/22

11	L10024	Evaluation of Promising NERICA rice Lines under Upland and irrigated Environmental Conditions in PNG (Laloki)	Philmah Seta-Waken	EU (EU CCR)	29/04/22
12	A10228	*Enhancing Disaster and Climate Resilient Agriculture in vulnerable communities in Papua New Guinea*	Johannes/Stanley	FAO	31/05/22
13	B40325	Banana (Musa sp) and Sweet potato in vitro mutagenesis in Papua New Guinea	Joel Pilon	IAEA/NARI Research Fund	31/12/23
14	B40332	Informing investment for an inclusive agricultural transformation strategy in PNG	Mark Ivekolia	IFPRI	30/06/22
15	B40333	*In situ Conservation and Utilization of Sweetpotato (Ipomoea batatas) for Climate Smart Agriculture Vulnerable Farmers in Papua New Guinea*	Gure	ÌTPGRFA BSF	01/06/23
17	A10224	Agro-morphological Characterization of PNG Highlands Sweetpotato Germplasm for Establishment of Core Collection and their Conservation	Boney Wera	NARI Research fund	31/12/24
18	T20330	Investigating the epidemiology and economic impact of the African Swine Fever (ASF) in Tambul, WHP	Stanely Amben	NARI Research fund	28/02/24
19	L10025	Assessing the effectiveness of Grow Hariap Foliar Fertilizer (GHFF) in managing crop productivity relative to conventional fertilizer practices.	Philmah Seta-Waken	NARI Research fund	30/11/23
20	U10013	Optimum switch over time from starter to finisher for two broilers genotypes fed different commercial feeds	Janet Pandi	NARI Research fund	31/08/24
21	B402328	On-station evaluation and selection of suitable 64 new rice varieties in PNG	Charlie Suruban	NARI Research fund	31/08/23
22	T20329	Wheat varieties	Stanly Amben/Jonah Anton	NARI/PIP CC	31/12/22
23	B40323	Investigation into Banana Wilt Associated Phytoplasma in the Markham valley	Gou Rauka	NRI/PIP CC	30/06/22

24	A10230	PNG Preparedness to Cope with Climate Change induced Stresses (Drought (frosts), Excess Moisture and Salinity)	HQ Coord / HRC/HARC/MRC	PIP R&D CC	31/12/23
25	U10015	Sustainable poultry, aquaculture and goat farming for economic and nutritional wellbeing of rural communities in Morobe and Madang Provinces	HQ Coord / MRC	PIP R&D Livestock	31/12/24
26	HQ40214	Equipping and positioning NARI to better deliver research results for PNG economic and development outcomes	T. Omot	PIP Infrastructure	31/12/24
27	T20331	Strategies to alleviate ascites in broiler chicken production in the high-altitude areas of Papua New Guinea (PNG).	J. Ahizo	NARI Research fund	01/09/23
28	A10229	Evaluation on the performance of two Potato Rapid Multiplication Techniques on growth, potato tuber yield and quality of three commercial potato varieties at Aiyura and Tambul Stations	W. Maso	PIP R&D CC	01/09/23
29	U10014	Rearing Black Soldier Fly Larvae (BSFL; Hermetia illucens) as an alternative source of high protein from regenerating organic farm wastes into feed for fish and chickens (Project U10008: Phase 2)	A. Roberts	PIP R&D Livestock	01/05/23
30	A10231	Emergency support to preventing the spread and mitigating the impacts of COVID-19 along the agricultural value chain and building resilience in food security, nutrition and livelihoods	J. Pakatul, S. Amben	FAO/JICA	31/12/22
31	A10232	Regeneration, Conservation and Safety Duplication of Papua New Guinea Sweetpotato Germplasm Collection through Botanical Seeds at the Svalbard Global Seed Vault	Boney Wera	BOLD/Crop Trust	31/01/24

Annex 2. NARI Income and Expenditure Plan 2022

Table 9: NARI Inflow and Expenditure Plan for Year 2022

Year 2022 Estimates	Inflow	Expenditure
Major Inflow Areas		
Carry over Balance from 2021 - Operational Accounts	967,616	
Recurrent budget 562-3101-1-105-143	11,659,000	
HR and Admin Contribution from EU Mega project	103,000	
HR and Admin Contribution from other Collaborative Donor Projects	1,167,000	
Asset disposal	140,000	
Sub total	**14,036,616**	
Personnel Emoluments		
Contract Staff salaries and allowances		10,290,344
Ancillary staff wages and benefits		2,460,851
Medical Insurance		152,724
Sub total		**12,903,920**
Operational Expenses		
Travel and subsistence + transfers		614,150
Utilities		1,013,360
Office Materials and Supplies		75,600
Operational Materials and Supplies		126,397
Transport and Fuel		150,600
Other operational expenses		265,000
Council expenses		246,150
Fees and Subscriptions		245,200
Security expense		980,800
COVID-19 Test Kits		100,000
Consultancy		100,000
Training		200,000
Sub-total		**4,117,257**
Capital Formation and Maintenance		
Refurbish Buildings and maintenance		1,068,426
Land Matters		200,000
Procurement of Capital Equipment		310,440
Sub total		**1,578,866**
Contingency		100,000
Total 2022	**14,036,616**	**18,700,043**
Negative Balance at Year End to Carry over to 2023		**(4,663,427)**

Table 10: Total Estimated Expenditure on Major Cost Centers - 2022 (PGK)

Cost Centre	Amount
Salary and Benefits (Contract Staff)	10,443,068
Wages and Benefits - Ancillary Employees	2,460,851
Operational Expenses	4,117,257
Assets maintenance and capital Formation	1,578,866
Contingency	100,000
Expenditure	**18,700,043**

Table 11: Detailed breakup of Deficit Balance of Inflow and Expenditure Plan

Specific Cost Item	Amount
Long Service Leave - Contract Staff	108361
Retirement - Contract	120000
Recruitment - Contract	1930000
Contract Review Increments	169226
Retirement - Ancillary Staff	75000
Total Personnel Emoluments Deficit	**2402587**
Legal Fees	100000
Security Expenses	950400
COVID-19 Test Kits	100000
Consultancy	100000
Training	200000
Bi-Annual Conference and Visitations to Centres	300000
Total Operational Expense Deficit	**1750400**
Procurement of Capital Equipment	310440
Land Matters	200000
Total Capital Formation Deficit	**510440**
Total Deficit	**4663427**

The **National Agriculture Research Institute (NARI**) was established by an *Act of the National Parliament of Papua New Guinea (PNG)* in July 1996 as a public funded, statutory research organisation to conduct and foster applied and adaptive research into:

I. any branch of biological, physical and natural sciences related to agriculture;

II. cultural and socio-economic aspects of the agricultural sector, especially of the smallholder agriculture; and

III. matters relating to rural development and of relevance to Papua New Guinea.

NARI is responsible for providing technical, analytical, diagnostic and advisory services and up-to-date information to the agriculture sector in PNG.

The Institute's purpose (strategic objective) is to accomplish enhanced productivity, efficiency, stability and sustainability of the smallholder agriculture sector in the country so as to contribute to the improved welfare of rural families and communities who depend wholly or partly on agriculture for their livelihoods. This is intended to be accomplished through NARI's mission of promoting innovative agricultural development in Papua New Guinea through scientific research, knowledge creation and information exchange.

In its vision for PNG, NARI sees ***"Prosperous PNG Agricultural Communities"***.

NARI Logo

The letters NARI are the initials of the National Agricultural Research Institute. The PEOPLE symbolise those included in the mandate of NARI such as farmers, researchers, extension agents, partners, NGOs etc., backed with BLUE to encompass the sky and the macro environment. The LEAF symbolises crops, backed with GREEN to depict the crop environment. The PIG and CHICKEN heads symbolise livestock. The RED background portrays the toil and sweat of the people.

For any further information, contact the NARI Head Office at Sir Alkan Tololo Research Centre, P.O. Box 4415, LAE 411, Morobe Province, Papua New Guinea

Phone: 675 – 79864776, 7606 1118

Email: naripng@nari.gov.pg; Website: https://www.nari.gov.pg

Promoting Excellence in Agricultural Research for Sustainable Development