

*Promoting Excellence In Agricultural Research For Sustainable Development*

# **NARI Annual Implementation Plan 2023 Corporate Plan**

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# **NARI Annual Implementation Plan 2023**

**(Corporate Plan 1/2023)**

**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](mailto:naripng@nari.gov.pg)

## Acronyms and Abbreviations

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

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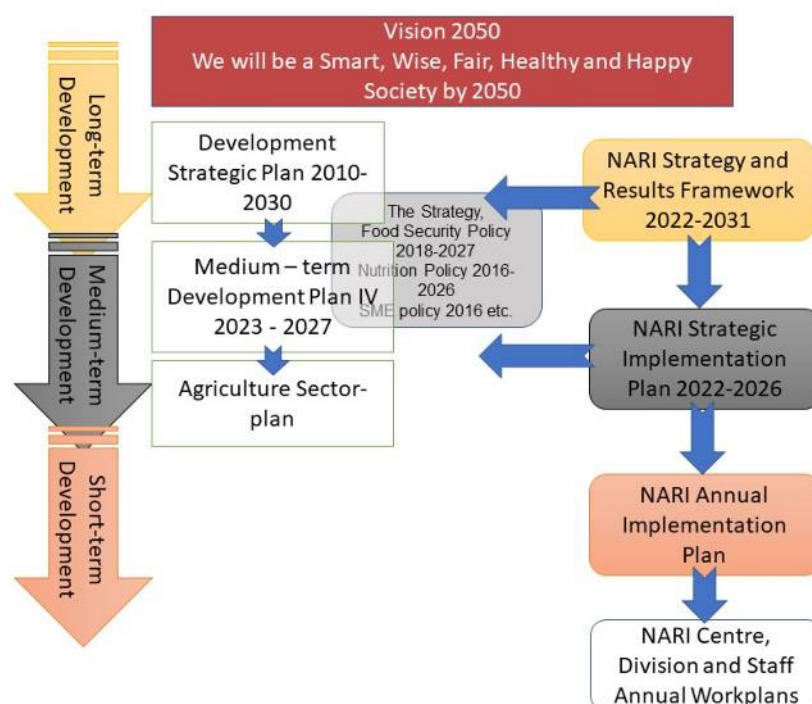
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# NARI Corporate Annual Implementation Plan 2022

## 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 long and medium-term plans viz. Papua New Guinea Vision 2050, the Development Strategic Plan (2010-2030), the Medium Term Development Plan IV 2023-2027 and other national policies. NARI's institutional objectives are well aligned with the national and sector plans (Figure 1).



**Figure 1: NARI Planning Framework and alignment with National Development Plans**

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. Alignment with the Medium-term Implementation Plan IV

The Department of National Planning and Monitoring is in the process of developing the new MTDP IV. The theme of this plan is "Getting the preconditions right for national growth and development through structural transformation, deliberate interventions and responsible citizenship". The MTDP IV is a 5-year planning framework for the Governments priority development agenda. It serves as the blueprint for the alignment of Sector, Provincial, District/LLG and other Institutional Plans with GoPNG priorities in the medium-term (Figure 1 and 2).



Figure 2: MTDP IV Planning Framework

It is based on the Structural Change Theory Model (Annex 1) that has also been used in various other countries around the world which aims to shift society from being a primarily agrarian to a primarily industrial one. The planning framework shows eight major goals that are to

be achieved through investment in eight Strategic Priority Areas (SPAs) (Annex 1). In consultation with stakeholders DNPM then identified Deliberate Intervention Programs (DIPs) relevant to Sectors. GoPNG Departments and agencies are now tasked to contribute to the framework with Interventions Projects aligned with DIPs. NARI's contribution is shown in Annex 2 and will also be referred to in the following sections on 2023 priorities and planned achievements.

### **3. Structure of the Annual Implementation Plan**

The AIP 2023 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 highlighting the anticipated achievements coming from the implementation of the various projects and studies funded by donor grants, the GoPNG Public Investment Program and the Institute's own resources (Annex 1) while more details on the planned achievement of Institute Results can be found in Annex 2. 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 RA Foresighting and Advocacy**

The Result Area Foresighting and Advocacy is broadly 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 worked with the International Food Policy Research Institute (IFPRI) funded by DFAT on a number of studies with results that are information GoPNG agricultural transformation strategies. Some results have already been published (<https://www.ifpri.org/project/papua-new-guinea-food-policy-strengthening-project>). This project will be wrapped up in 2023 and final recommendations made available to stakeholders.

An important area is the development and upkeep of databases on research investment using Agriculture Science and Technology Indicators (ASTI). NARI will take up the task to institutionalise this in the Institute in collaboration with the Research, Science and Technology Secretariat.

The second sub-result area revolves around the assessment of economic feasibility of market and production opportunities at scale but also for novel or underutilised crop and livestock products. In 2023, the socio-economic team taking lead will generate information on economic feasibility of novel crops such as sugar fruit, breadfruit or selected temperate fruits, as well as assess large scale farming opportunities including downstream processing of staple crops such as taro, rice, wheat. In 2023, the team will initially focus on desktop studies. This work is captured in the submission to DNPM under the DIP Innovative Research and Development.

The key results to be achieved in 2023 in this Result Area include:

- Technical publication on Mini Feed Mill Value Chain mapping



- ASTI Database established and awareness raised with stakeholders on regular data collection
- Information on market opportunities and production requirements for selected novel crops
- Information and understanding on key scaling factors for selected staple crops

More details can be found in Annex 4.

### **2.1.2 RA 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.

NARI has been developing a range of innovations to support the sweetpotato value chain over many years. This includes the development of the Pathogen-tested (PT) sweetpotato variety technology, sweetpotato weevil (*Cylas formicarius*, *Eucepes postfasciatus*) management strategies. NARI with its main partner the University of Queensland have been working together over a long period of time to put together a soil management package that is suitable for use of farmers moving from subsistence production towards a commercial production of sweetpotato. In 2023, this work should come to a conclusion with the final recommendations on soil management options.

In support of the potato value chain, NARI will generate information on the attainable yield of some of the major potato varieties as well as releasing recommendations on 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 sweetpotato 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. In 2023, NARI aims at offering quality tissue-cultured plantlets of popular banana varieties for larger scale production by stakeholders. Other work will be initiated to understand the attainable yield of such popular cooking banana varieties and to develop recommendations on management practices for small scale commercial banana production.

The key outputs from the RA Value chain support for 2023 include:

- Soil management recommendations for improved sweetpotato production
- Information on attainable yield of potato, banana and sweetpotato varieties in a commercial setting
- Quality planting material for banana, sweetpotato and potato production

Further details on planned achievements in RA 2 can be found in Annex 4.

### ***Galip value chain support***

Over the past 20 years, NARI has conducted applied research to explore the potential of the Galip nut (*Canarium indicum*) as an alternative cash crop for domestic and export markets. A host of information has been generated on various areas in the emerging value chain and commercial Galip nut products are now available in retail outlets in Port Moresby and Lae. The currently implemented suite of studies supported by ACIAR will conclude at the end of 2023. The following key results are expected to be achieved (see Annex 4 for more details):

- Information package summarising achievements and lessons learnt on building a sustainable Galip Nut Value chain;
- The use of Galip nut in domestic markets expanded to wider range of users including Food services and food processing businesses
- Understanding on enabling factors for gender sensitive microenterprise development in the Galip Value Chain
- Information on improved production practices (harvest systems, pest management, tree improvement);
- Key achievements of NARI's investment into Galip value chain development available on the NARI Website

### ***Pork Product value chain support***

Despite the high cultural value of pigs in the country especially the Highland Provinces, commercial production of pigs is still primarily done by only very few large operators with some SMEs slowly emerging. The incursion of the African Swine Fever Virus in 2020 has highlighted the need to improve management practices using a whole-value-chain approach. In 2022, NARI will be focusing on 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.

The key results anticipated for 2023 in this sub-RA (see more details in Annex 4) include:

- Information and maps available on the impact of ASF in local household of Tambul District and disease areas
- Improved understanding of status of the pork value chain and gaps in research
- 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

## **2.2 Priority 2 Resilient Systems**

### **2.2.1 RA Household Resilience**

Result Area 3 is focusing on addressing household resilience issues to increase capacity of households and communities to engage in agricultural 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. There are two major sub-objectives in this RA, viz. Climate Smart Solutions and Disaster Response.

### ***Climate Smart Solutions***

In the past over 10 years, NARI has focused a lot of its efforts on participatory action research working with communities and local partners in GO and NGO across the country to introduce understand their needs in responding to climate and socio-economic changes and increase their skills and knowledge in using climate smart crop and livestock technologies and farming practices.

In 2023, the Institute will shift its focus to concentrate more on the development new innovations or the adaptation of climate smart innovations that have been successfully applied in other regions with similar socio-economic setting. At the same time, NARI will continue to build on the partnerships it has established with partners in Provinces across the country and further assist in building capacities of extension agents supporting the smallholder communities.

The major expected results in this RA are as follows (details are in Annex 4):

- Climate resilient crop varieties and technologies assessed (NERICA rice, Disaster Seed Kit)
- Climate smart farm practices and strategies assessed and recommendations available
  - Traditional Cropping calendars documented
  - Crop intervention matrix and seasonal advisories developed
- Capacity of extension agents in vulnerable districts in climate smart use of agriculture production technologies and practices built;

### ***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 contributing to the improvement of weather data and other climate forecast information and agricultural rehabilitation efforts with the supply of foundation planting materials and breeding stock.

The following key results are to be delivered in 2023:

- Key agricultural rehabilitation crops identified and processes in place for deployment in disaster situations;
- Weather data captured from the AWS at all Centres and captured in central database
- Climate forecast information sharing platform for Hela and SHP;

### **2.2.3 RA Biosecurity**

NARI contribution to the country's Biosecurity management is 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***

The focus in 2023 will remain on management options for the Diamond-back moth, a serious pest in vegetable production, the Fall Army Worm, a new serious pest in larger scale corn production, the Galip weevil (see Section 2.1.2), Banana Wilt-Associated Phytoplasma (BWAP) affecting bananas especially in Madang and Morobe as well as work on ASF (see Section 2.1.2).

### ***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.

The major achievements planned for 2023 in this RA include:

- Fall Army Worm Management Package relevant to corn production at different scales;
- Baseline sensitivity information on novel insecticide for control of Diamondback Moth
- Management strategies for control of BWAP
- Biocontrol facility established at SRC
- Priorities for biocontrol for invasive weeds and pests established

Further details on expected outputs in this RA can be found in Annex 4.

## **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 *ex situ* collections at its various regional centres. The maintenance is an on-going responsibility and the major aim is to conserve the accessions with the aim to use them in future crop improvement programs. Hence, on-going characterisation of the collections as part of pre-breeding activities and maintenance of databases that capture the passport and characterisation data are important tasks for NARI. A number of activities are in progress to update characterisation data for sweetpotato collections and upload data into international databases for wider access to stakeholders. NARI will also trial a new approach for the conservation of sweetpotato diversity in form of true seed and the Institute is working with partners to send SP seed generated from the National SP Germplasm Collection at Aiyura to the Svalbard Vault in Norway, a long-term international seed storage facility.

The update of databases with relevant information on breeds, stock numbers etc is also planned for the livestock genetic resources maintained at NARI centres.

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.

In 2023, further work will be done in standardising operating procedures for foundation material production and access for stakeholders.

#### ***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 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.

The major results expected for the RA Genetic Resources with the two sub-objectives are as follows (see Annex 4 for more details):

- Sweetpotato PGR data made available on Genesys and the Global Information System with DOIs assigned;
- All PGR collections at NARI captured with a full set of accession and passport data in a database;
- Livestock Breeding stock data captured in a database;
- Reports to FAO Commission on PGR and ITPGRFA submitted in timely manner;
- Diversity of SP varieties increased in pilot sites in Morobe, Madang, EHP, Central;
- System established at NARI to capture production and distribution of breeding stock and planting material;
- Infrastructure improved to produce, process and store planting material safely at NARI Centres;

### **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 malnutrition 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.

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.

In 2023, the following major results are expected to be achieved (see Annex 4 for details):

- Information on needs and baseline on status of food and nutritional security generated in districts in Morobe and Madang pilot sites;
- Information materials on nutritional properties of crop and livestock products

## **2.4 Cross-cutting Areas:**

Three Result Areas, viz Scaling, GESI and Communication for Change, have been considered cross-cutting to the above Result Areas, 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 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 (see Section 2.2.4, Table A4b) . 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.

The major expected achievements as part of Cross-cutting areas include (see details in Table A4d).

- Mutual understanding reached with Provincial and District Administrations on scaling of skills and knowledge and access to technologies formalised in MOUs;
- Active engagement with GOs and NGOs on upskilling of extension workers and increasing access to technical information on crop and livestock production;

- NARI's approach to TOT formalised and relevant modules taking into account Gender and literacy levels;
- Annual Innovations Show relaunched;
- Communication Strategy developed;
- Increased information digitisation;
- Priority research management databases developed.

### **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 remain as follows:

- 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.

A major achievement in 2022 was the formal appointment of a new Council and initiate proceeding for the substantive appointment of a new Director General which is expected to be concluded in early 2023.

A priority for 2023 is to finalise the NARI organisational structure and associated management processes that will help to deliver the SRF II, SIP and Annual Plans and get the approval from DPM and SCMC to implement.

The review of NARI Management Standards has already started in 2022 and will continue into 2023 including development of new Standards as necessary.

While the Institute received generous support from the GoPNG PIP and the Research, Science and Technology Council Secretariat to strengthen research infrastructure in its various centres, the Institute did not actually receive any funding in 2022. Once allocations are received, the Institute will work on improving targeted research infrastructure.

The implementation of the AIP 2023 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 2023 Income and Expenditure Plan is presented in Annex 5. 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.

The major achievements planned for 2023 in terms as part of improving Institutional Efficiency and Effectiveness include (see more details in Annex 4, Table A4e):

- Review of organisational structure and proposal for adjustments approved through Council and SCMC;
- NARI Management Standards reviewed and revised and new Standards developed for arising areas of need;
- Business plans for core revenue activities and Chemistry lab developed;
- Training plan for NARI staff developed including cadetship program;
- Online leave and assets management system operating;
- New Accounting Software operating across NARI Centres



## Annex 1. Information on the MTDP IV Planning Framework

### a) Structural Change Theory Model

	STAGES OF DEVELOPMENT	ECONOMIC STATUS	WHAT HAPPENS	PNG /YEARS OF DEVELOPMENT
STAGE 1	TRADITIONAL SOCIETY	<ul style="list-style-type: none"> <li>a) Agriculture Based Economy</li> <li>b) Labor Intensive</li> <li>c) Unlocked land/Customary Landownership</li> <li>d) Low level of trading</li> <li>e) Less scientific Perspective</li> <li>f) Unskilled &amp; illiterate Population</li> </ul>	<ul style="list-style-type: none"> <li>• Over 80 per cent of Population still dwell in Traditional Society</li> </ul>	1970s to Current. 40 years of Journey through the wilderness.
STAGE 2	PRECONDITIONS FOR TAKE OFF	<ul style="list-style-type: none"> <li>a) Increase Public Investments in enabling Infrastructures</li> <li>b) Skilled, healthy and Productive Population</li> <li>c) Rule of Law</li> <li>d) Deliberate investments in Manufacturing and entrepreneurial Sector</li> <li>e) Availability of Minimum Services</li> </ul>	<ul style="list-style-type: none"> <li>• List specific <b>Deliberate Investments</b> for take off</li> </ul>	2022-2027
STAGE 3	TAKE OFF	<p><b>(Short Term)</b></p> <ul style="list-style-type: none"> <li>a) Beginning of Industrialization. Birth of new industries</li> <li>b) Citizens participation in industrialization</li> <li>c) Boom in the SME sectors</li> </ul>	<ul style="list-style-type: none"> <li>• Identify New Industries to strategically /Deliberately</li> </ul>	2027- 2030
STAGE 4	DRIVE TO MATURITY	<p><b>(Long Term)</b></p> <ul style="list-style-type: none"> <li>a) Improved Standard of Living</li> <li>b) Use of Technology increases</li> <li>c) Diversification of National Economy</li> </ul>	<ul style="list-style-type: none"> <li>• Basic Minimum Services Achieved.</li> <li>• Critical Enablers Achieved</li> </ul>	2030 - 2049
STAGE 5	HIGH MASS PRODUCTION & CONSUMPTION	<ul style="list-style-type: none"> <li>a) Mass Production and Consumption</li> <li>b) Economic is able to withstand economic shocks</li> </ul>	Free Market	V2050

### b) MTDP IV Goals and Strategic Priority Areas



Strategic Priority Areas (SPAs) and Deliberate Interventions Programs (DIPs)

# Strategic Priority Areas (SPAs) & their DIPs

**SPA 1 (Strategic Economic Investments):** 1) Comm. Ag. & Livestock Dev 2) Downstream Processing 3) Food Security & Supply Chain 4) MSME 5) Tourism 6) Green Investments 7) FDIIs 8) Land Dev

**SPA 2 (Critical Infrastructure Investments):** 1) Connect PNG 2) NEROP 3) Nat. Telecommunication 4) National WaSH 5) Transport Infra

**SPA 3 (Quality Education & Skilled Human Capital):** 1) ECE, Basic Primary & Secondary Education 2) Post Secondary Skilled Training 3) Quality Assurance & Accreditation

**SPA 4 (Quality & Affordable Health Care):** 1) Primary Health Care 2) Specialized Health Care 3) Quality Assurance & Accreditation

**SPA 5: (Law & Justice):** 1) National Policing & Rule of Law 2) Judiciary Independence & Justice 3) Community Restorative Justice & Correctional Services

**SPA 6: (National Security):** 1) National Surveillance & Immigration 2) National Intelligence 3) Bio Security 4) Cyber Security 5) Business Protection 6) Social Identity & Security

**SPA 7 (Good Governance & Public Service Transformation):** 1) PSMS 2) PFMS 3) e-Government Systems

**SPA 8 (Adaptation of Innovation & Technology):** 1) Innovative R&D 2) e-Tech 3) Climate Change & Waste Management

## Annex 1. NARI Contribution to the MTDP IV Framework Development

5 YEAR AGRICULTURAL RESEARCH RETURN ON INVESTMENT (ROI) ON MTDP IV ALIGNED IMPACT PROJECTS: 2023 -2027						
GOAL	SPA	DIP	INTERVENTION PROJECTS	TOTAL INVESTMENT (K'm)	ROI	JUSTIFICATIONS ON KEY OUTCOMES OF INTERVENTION PROJECTS
1. Broad-Based Economic Growth	1. Strategic Economic Investments	Commercial Agriculture	Information, capacity development and mechanisation as key drivers for scaling SME agricultural production	20.4	The benefits will exceed the investment through export and import replacement gains from new SME startups, increased commercial agriculture uptake, increased productivity in production.	The smallholder farm sector is key to increasing agricultural production. An enabling environment is needed for agricultural enterprise to develop and progress under its own momentum, improve productivity, and allow people to achieve better returns on their investment. Information, capacity development and inputs such as mechanisation are key drivers of commercial agriculture.
		Food and Nutrition Security & Supply Chain	Sustainable poultry, aquaculture and goat farming for economic and nutritional well-being of rural communities throughout PNG	25.2	The nutritional improvements will counter the negative influence of the high rates of malnutrition on the economy, currently the cost of malnutrition is estimated at USD508m annually.	PNG is facing a severe nutritional crisis with a triple burden of malnutrition, i.e. under nutrition, micro-nutrient deficiencies, and overweight/obesity. The threat of a lost generation that is impaired in contributing gainfully to economic and social development and to sustain their own livelihoods is a major threat to the nations future. Changes are required in all aspects of food and nutritional security, i.e. availability, access and use of nutrient dense food at all times including food safety considering the prevalence and impact of food borne diseases, malnutrition and mortality of children
		Infrastructure, Land and	Equipping and positioning NARI to	61.25	Improvements to research infrastructure	This investment is essential to an active research input to emerging commercial agriculture. Overseas analysis of

		Assets Development and Maintenance	better deliver research results for PNG economic and development outcomes		essential to facilitate the research for development.	research benefit has shown a 10:1 ROI from agricultural research (CGIAR). 50% of this investment is taken up by re-establishment of a key National research asset at Kuk Research and Development Centre, Jiwaka Province.
	8. Adaptation of innovation & technology	Innovative Research & Development (R&D)	Market and Production Opportunities (Economic feasibility of fresh, processed and non-food agricultural production at different scales)	22.5	This investment in new crops and products will increase the agricultural contribution to GDP through a diversified portfolio of agricultural and related off-farm enterprises.	Foresighting ensures PNG can take advantage of emerging opportunities Novel crops and niche markets often show higher rates of return Diversity of agricultural export opportunities
			Genetic Resources Management and Use (Diversity of PNG Genetic Resources for Food and Agriculture documented and conserved and used)	58.05	Improved crop varieties and livestock breeds will return more than 100% on the investment.	Biodiversity is a national asset. Conservation of this agricultural biodiversity resource is essential to underpin agricultural development and national food security both now and into the future.
		Climate change & waste management	Climate change resilience and mitigation	16.0	Resilient communities with less demands on state resources for emergency relief.	Resilient communities will continue to contribute to the economy, food security, and ecosystem services.
			<b>Total</b>	<b>203.4</b>		

## Annex 2. List of implemented projects and studies in Result Areas 1-7 from 2022

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	ACIAR SLAM/2017/041	31/05/23
5	B40325	Banana (Musa sp) and Sweet potato in vitro mutagenesis in Papua New Guinea	Joel Pilon	IAEA/NARI Research Fund	31/12/23
67	B40333	<i>In situ Conservation and Utilization of Sweetpotato (Ipomoea batatas) for Climate Smart Agriculture Vulnerable Farmers in Papua New Guinea</i>	Gure	ITPGRFA BSF	01/06/23
7	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
8	T20330	Investigating the epidemiology and economic impact of the African Swine Fever (ASF) in Tambul, WHP	Stanely Amben	NARI Research fund	28/02/24
9	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
10	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

11	B402328	On-station evaluation and selection of suitable 64 new rice varieties in PNG	Charlie Suruban	NARI Research fund	31/08/23
12	T20329	Wheat varieties	Stanly Amben/Jonah Anton	NARI/PIP CC	31/12/22
13	B40323	Investigation into Banana Wilt Associated Phytoplasma in the Markham valley	Gou Rauka	NRI/PIP CC	30/06/22
14	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
15	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
16	HQ40214	Equipping and positioning NARI to better deliver research results for PNG economic and development outcomes	T. Omot	PIP Infrastructure	31/12/24
17	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
18	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
19	U10014	Rearing Black Soldier Fly Larvae (BSFL; <i>Hermetia illucens</i> ) 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
20	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
21	U10017	Case study on how a Rural Village Chicken Hatchery could be sustained through Family Farm Teams in communities displaced by volcanic eruptions in Bogia District, Madang Province	Janet Pandi	ARSF III	01/07/23
22	L0026	Determination of pro-vitamin (p-VAC) and carotene levels in 20 yellow/orange fleshed banana landraces	Janet Paofa	Bioversity/Crop Trust	01/02/23

### Annex 3. Expected Results in 2023 from implementation in Result Areas

**Table A3a: Priority 1 - Expected outputs in 2023 against Result Area Priorities in Result Areas 1 and 2**

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2023	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
<b>Result Area 1 – Foresighting and Advocacy</b>			
Information on costs and benefits of key agri-food system and investment options that are inclusive, pro-poor and targeted to promote economic growth;	<ul style="list-style-type: none"> <li>• Technical publication on Mini Feed Mill Value Chain mapping;</li> <li>• Policy recommendations on investment options and strategies for agricultural development</li> </ul>	Final project reported	C. Gwabu, R. Ovah MRC B40332  C. Gwabu
Relevant databases on research investment, Agriculture Science and Technology Indicators (ASTI) and other information developed and maintained	<ul style="list-style-type: none"> <li>• ASTI Database established and awareness raised with stakeholders on regular data collection</li> </ul>	Email communications with stakeholders; database	C. Gwabu, R. Ovah MRC
Information on economic feasibility for selected crop and livestock for large scale farming (e.g. rice, spices, breadfruit, taro, yam, tropical and temperate fruits and nuts etc.)	<ul style="list-style-type: none"> <li>• Information on market opportunities and production requirements for sugar fruit, apples, spices;</li> </ul>	Technical publications	C. Gwabu
	<ul style="list-style-type: none"> <li>• Information and understanding on key scaling factors for selected staple crops</li> </ul>	Technical publications	C. Gwabu and NARI Centres
<b>Result Area 2 – Value Chain Support - Value chain innovations for sweetpotato, potato and banana</b>			
In-depth value chain mapping and research needs assessment for sweetpotato, potato and banana	Soil fertility improvement in banana production systems in PNG (Literature review)	Technical Report/Publication	W. Sirabis/HRC
Soil management package for sweetpotato production systems	<ul style="list-style-type: none"> <li>• Recommendations on soil management in SP systems in PNG Highlands released</li> <li>• Extension Booklet on options of farm by-products as nutrient source in SP systems</li> <li>• Information on economic benefit of the use of locally available fertilisers in vegetables, corn and</li> </ul>	Scientific and Technical Publications	W. Sirabis/HRC/A10226
			P. Seta-Waken, R. Baiga/SRC, MRC/L10025

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
	sweetpotato available		
Potato and sweetpotato varieties meeting end-user requirements;	<ul style="list-style-type: none"> <li>Review of available information on potato, banana and sweetpotato varieties</li> <li>First round of trials established</li> </ul>	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;	<ul style="list-style-type: none"> <li>Protocols for Potato Rapid propagation technique available to stakeholders</li> <li>Protocols for tissue culture propagation for 3 diploid banana types developed</li> </ul>	Technical Report/Extension Bulletin Technical report/Scientific publication	W. Maso/HRC/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	<ul style="list-style-type: none"> <li>PT varieties produced and supplied according to demand;</li> <li>Quality Potato plantlets supplied as per agreement</li> </ul>	PT production and sales records	NARI TC lab Aiyura (Technical Services)
<b>Result Area 2 – Value Chain Support – Galip value chain</b>			
Commercial viability of business models for galip nut processing improved;	<ul style="list-style-type: none"> <li>Financial analysis of operating cost at the factory and primary processing to factory gate;</li> <li>Cost of production of nuts and various by-products</li> <li>Options for use of by-products assessed</li> </ul>	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;	<ul style="list-style-type: none"> <li>financial analysis for female smallholders selling galip or from micro-enterprises</li> <li>Training modules and learning materials appropriate for micro-enterprises and female smallholders for galip production and processing</li> <li>Key factors that enable microenterprises and female entrepreneurs to effectively participate in canarium value adding and processing</li> </ul>	Annual reported Learning materials Annual report/technical report	Project partners/S.Kapi/IRC/K1006
Improved production technologies developed (harvesting practices, on-farm processing;	<ul style="list-style-type: none"> <li>Information and protocol for effective and affordable off-station drying methods and protocols;</li> </ul>	Technical reports and publications	D. Hannet/IRC/K1006 G. Hannet/IRC/K1006



<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
	<ul style="list-style-type: none"> <li>• Harvesting system at different scales of operation;</li> <li>• Information on reproductive biology of trees and implications for tree improvement; development of a cropping calendar</li> <li>• Information on tree variability</li> </ul>		G. Hannet/IRC/1006
Information on management options and strategies for the Galip weevil	<ul style="list-style-type: none"> <li>• Information on Galip Weevil life cycle stages and protocols for in-vitro rearing of weevil;</li> <li>• Information on natural enemies of GW;</li> <li>• Information on population structure and vertical distribution maps of GW in infested trees;</li> <li>• Information on origin and dispersal of GW;</li> <li>• Information on alternative hosts of the GW;</li> </ul>	Technical reports/scientific publications	J. Yombai/IRC/K1006
Suitable mechanisation options available for different scales of operation;	<ul style="list-style-type: none"> <li>• Information on efficiency, suitability of depulping methods and equipment for on-station and off-station processing;</li> </ul>	Technical reports	D. Hannet/IRC/K1006 G. Hannet/IRC/K1006
Advocacy and Awareness on Galip production	<ul style="list-style-type: none"> <li>• Media articles on areas of production, processing and marketing in print and social media</li> </ul>	Copies of articles	W. Mollo, S. Kapi, G. Hannet, D. Hannet/IRC/K1006
<b>Result Area 2 – Value Chain Support – Pork Value Chain</b>			
Effective research collaboration and networks between NARI and NAQIA on animal health & diseases.	<ul style="list-style-type: none"> <li>• Participation and contribution to African Swine Fever Taskforce</li> </ul>	Meeting reports and minutes	M. Dom, S. Amben/MRC, HHRC
Capacity of selected smallholder farmers on improved production practices and animal Health & welfare management and production increased.	<ul style="list-style-type: none"> <li>• Information available on the impact of ASF in local household of Tambul District and disease areas</li> <li>• Maps documenting spatial distribution of ASF in the Mt. Giluwe LLG of Tambul based on epidemiological information</li> </ul>	Technical Progress reports, Quarter reports	S.Amben, HHRC/T20330
Value chain mapping and key determinants influencing output across the value chain documented;	<ul style="list-style-type: none"> <li>• Improved understanding of status of the pork value chain and gaps in research (Literature review)</li> </ul>	Technical Report/Publication	S. Amben, M. Dom/HHRC, MRC

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
Demand & key requirements in production, processing and marketing to support niche markets for pork meat determined;	<ul style="list-style-type: none"> <li>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</li> </ul>	Technical Report/Publication	M. Dom/MRC/U100010

**Table A3b: Priority 2 - Expected outputs in 2023 against Result Area Priorities in Result Areas 3 – 6**

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
<b>Result Area 3 – Household resilience – Climate Smart Solutions</b>			
Vulnerability assessment information and maps	<ul style="list-style-type: none"> <li>Needs of higher risk provinces in relation to preparedness to cope with climate induced stresses established;</li> </ul>	Technical Report/Publication	J. Pakatul, S. Amben, P. Seta-Waken, R.Baiga/HRC, HHRC, SRC, MRC/A10228
Diversified climate resilient portfolios of crop varieties and species as well as livestock strategies and technologies adapted to climate risks available to stakeholders;	<ul style="list-style-type: none"> <li>Information on promising NERICA rice varieties;</li> </ul>	Technical report/Publication	P. Seta-Waken/SRC/L10024
	<ul style="list-style-type: none"> <li>Information on the use of Disaster response vegetable seed kits;</li> <li>Information on use of BSFL as low cost protein source to supplement diets in village chicken</li> </ul>	Technical report/Publication Technical report/Publication	J. Waki/MRC/B40331 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;	<ul style="list-style-type: none"> <li>Crop calendars documented for selected areas in the country</li> </ul>	Technical Publication	R. Baiga/MRC B40329; J. Waki/MRC/B40331; /MRC/B40333, J. Pakatul/HRC/PIP;

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
	<ul style="list-style-type: none"> <li>Key crop advisories for NWS seasonal climate forecasts</li> </ul>	Technical report/Publication	R. Baiga/MRC/B40329
Scaling approaches applied for wider awareness and adoption on use of climate smart innovations in target areas;	<ul style="list-style-type: none"> <li>Capacity of extension agents in vulnerable districts in climate smart use of agriculture production technologies and practices built;</li> </ul>	Technical report	J. Pakatul,J.Laraki/HRC,HQ/ (PIP, A10228)
<b>Result Area 3 – Household resilience – Disaster Response</b>			
Sufficient quality planting material and breeding stock available as foundation material for rehabilitation after disaster events;	<ul style="list-style-type: none"> <li>Key agricultural rehabilitation crops identified and processes in place for deployment in disaster situations</li> </ul>	Technical Bulletin Quarterly and Annual reports	J. Pakatul,P. Seta-Waken/,R.Baiga/HRC,SRC,M RC (PIP, A10228)
Weather data available from all NARI Centres to stakeholders	<ul style="list-style-type: none"> <li>Weather data captured from the AWS at all Centres and captured in central database</li> <li>National Climate forecast information sharing platform;</li> </ul>	Data base records  Web record / Technical report	E. Kupe, Centre Managers  R. Baiga,E.Kupe/ MRC,HQ/B40329
<b>Result Area 4 – Agro-ecosystem resilience</b>			
No outputs planned for 2023			
<b>Result Area 5 – Biosecurity – Management of Biosecurity Threats</b>			
Fall Army Worm Management Package and associated information available and capacity built for use by different stakeholders;	<ul style="list-style-type: none"> <li>Information on FAW baseline sensitivity for pesticides used in control and efficacy under lab conditions;</li> <li>Information on presence and identity of FAW natural enemies in selected areas in PNG</li> </ul>	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;	<ul style="list-style-type: none"> <li>Information on Diamond Back moth baseline sensitivity for novel insecticides (BT and others) and information on efficacy of two best performing insecticides;</li> </ul>	Technical Report/Publication	R. Geno/HRC/A10225

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2023	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Improved understanding of the biology, population dynamics and management options of the Galip Weevil;	<ul style="list-style-type: none"> <li>• Information on Galip Weevil life cycle stages and protocols for in-vitro rearing of weevil;</li> <li>• Information on origin and dispersal of GW;</li> <li>• Information on natural enemies of GW;</li> <li>• Information on alternative hosts of the GW;</li> </ul>	Technical reports/scientific publications	J. Yombai/IRC/K1006
Effective management strategies of Banana-associated phytoplasma in affected areas in Morobe and Madang;	<ul style="list-style-type: none"> <li>• Information on spread of BWAP in the Markham Valley;</li> <li>• Information on vectors involved with transmission of BWAP in the Markham Valley</li> </ul>	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;	<ul style="list-style-type: none"> <li>• Manual for planting material propagation and biosecurity procedures for field and horticultural food crops</li> </ul>	Technical document	L. Fooks / Technical staff
Relevant information on other pest and disease management issues	<ul style="list-style-type: none"> <li>• Information on baseline sensitivity of <i>Phytophthora infestans</i> isolates to Chlorothalonil;</li> <li>• Information on causal agent(s) of Sago decline in AroB;</li> <li>• Management strategies for ascites in broiler chicken in the Highlands of PNG</li> </ul>	Technical reports/scientific publications  Technical Report	G. Rauka/MRC  J. Ahizo/HHRC/T20331
Capacity built in invasive weed and pest management	<ul style="list-style-type: none"> <li>• Biocontrol laboratory established at SRC</li> <li>• Review on existing and current invasive weeds and pests that are posing threats to agro-ecosystems</li> </ul>	Building renovated and equipped  Information Bulletin/Publication	C. Dahl/R. Miti  C. Dahl
<b>Result Area 5 – Biosecurity – Biosecurity Preparedness</b>			
Contribution to data bases developed for pest alert and incursion threats by NAQIA for stakeholder advise and planning.	<ul style="list-style-type: none"> <li>• Specimen in the NAIC maintained and 500 specimen digitised in an electronic database;</li> </ul>	Quarterly and Annual report	C. Dahl,/ Technical Services
Pest & Disease diagnostic capacity in-	<ul style="list-style-type: none"> <li>• Potential for use of LAMP diagnostic technology</li> </ul>	Technical Report/Scientific	W. Maso/HRC/A10227

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2023	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
creased in supporting the sector;	assessed in Sweetpotato diagnostics	publication	
<b>Result Area 6 – Genetic Resources – Genetic Resources Management</b>			
A pilot in-situ conservation approach to sweetpotato genetic resources is tested in four districts;	<ul style="list-style-type: none"> <li>• <i>In-situ</i> conservation training manual developed;</li> <li>• <i>In-situ</i> conservation training conducted in 4 communities;</li> </ul>	Manual document; Training report; Technical progress report to donor	J. Waki, J. Paofa/SRC/B40333
Sweetpotato cultivars characterised, phenotyped, evaluated, documented, pre-bred for traits of importance to adaptation and resilience;	<ul style="list-style-type: none"> <li>• Sweetpotato cultivars in national collections characterised and phenotyped;</li> </ul>	Database records (NARI)	J. Paofa, B. Wera,MRC, SRC/B40333  B. Wera, A10232
Information on GRFA is available to stakeholders in PNG and international community;	<ul style="list-style-type: none"> <li>• Sweetpotato PGR information captured in a local database and kept current capturing all PGR kept in ex-situ collections at NARI stations;</li> <li>• Information on sweetpotato accessions held in NARI <i>ex-situ</i> databased incl new breeding lines assigned DOIs from upload into Genesys/GLIS;</li> <li>• Information on genetic and phenotypic diversity of PNG Amaranth accessions;</li> <li>• Fact sheets on poultry breeds kept at NARI</li> </ul>	Data base records; Genesys/GLIS records; Annual report; Progress report to donor  Final Project Report  Publication	J. Paofa, E.Kupe, SRC,HQ/B40333  P. Seta-Waken/SRC/L10026  J. Pandi, F. Besari, J. Ahizo
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;	<ul style="list-style-type: none"> <li>• All PGR collections in NARI are documented with basic passport data and other pre-breeding information as available;</li> <li>• all PGR collections are numbered with respective accessions numbers in the field and field plans available;</li> <li>• Seeds of 550-600 SP accessions stored at Svalbard Vault</li> </ul>	Records in the database; field maps and plan	<u>J. Paofa</u> , A. Galus, B. Wera, C. Walter, J. Anton/all centres  B. Wera, A10232
Breeding stock of village chicken, cross-breeds, ducks, goats and pigs maintained at NARI centres;	<ul style="list-style-type: none"> <li>• Data base of livestock GR set up;</li> <li>• Chicken and duck breeds characterised;</li> <li>• Breeders clearly marked with rings or ear marks and</li> </ul>	Data base records	J. Pandi/MRC; F. Besari, L. Lapauve, S. Sangi, S. Amben/SRC, IRC, MRC,

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
	corresponding Stock number		HHRC
Compliance with PGR reporting obligations to ITPGRFA and CPGR FAO	<ul style="list-style-type: none"> <li>ITPGRFA compliance report updated and submitted to the Secretariat;</li> <li>Annual report on status of PGR collections in PNG submitted to CPGR FAO against SDG indicators</li> </ul>	Compliance reports	B. Komolong, J. Paofa
<b>Result Area 6 – Genetic Resources – Genetic Resources Use and Access</b>			
Locally adapted sweetpotato varieties (early maturing, drought tolerant, purple and orange fleshed) bred with farmers' participation;	<ul style="list-style-type: none"> <li>Farmer preferred SP landraces from the NARI SP collections</li> <li>Workshops conducted in 4 sites and shared learning on breeding of sweetpotato using polycross;</li> <li>C1 evaluation at MRC and HRC completed;</li> </ul>	Technical reports; Quarterly and Annual reports; Technical Progress reports to donor	J. Waki, B. Wera, J. Paofa/MRC, HRC, SRC/B40333
Seed systems enhanced to promote adapted sweetpotato varieties and other crops;	<ul style="list-style-type: none"> <li>New sweetpotato varieties introduced to target communities;</li> <li>Increased knowledge on quality planting material of sweetpotato by target communities;</li> </ul>	Technical reports;	J. Waki, B. Wera, J. Paofa/MRC, HRC, SRC/B40333
Improved rice and corn varieties released;	<ul style="list-style-type: none"> <li>64 introduced rice varieties assessed and most promising accessions identified for on-farm trials;</li> </ul>	Technical report; quarterly and Annual Report	C. Suruban/MRC/B402328
New spice and essential oil varieties introduced and basic information generated;	<ul style="list-style-type: none"> <li>Priority list of spice PGR</li> <li>Import permits and export approvals organised for supply from India for selected spice PGR</li> </ul>	Associated documentation and permits	B. Komolong
Standard operating procedures operating in all NARI centres for production of foundation crop planting materials and breeding stock;	<ul style="list-style-type: none"> <li>Standard operating procedures for poultry breeding stock production</li> </ul>	SOP document;	J. Pandi/MRC
Facilities, equipment and infrastructure in place for production and post harvest processing and safe storage of seed and	<ul style="list-style-type: none"> <li>Multipurpose shed incl seed processing set up at MRC</li> <li>Seed laboratory developed at MRC,SRC/ICDF</li> </ul>	Photo records, quarterly and annual reports;	T. Omot, L. Fooks,/MRC/PIP infrastructure L. Fooks, A.Beko, R.Miti, Mr

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2023	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
planting material at NARI centres	<ul style="list-style-type: none"> <li>Seed handling system at HARC, HRC, MRC SRC IRC</li> <li>Facility established at MRC; 2 TOs have capability to conduct grafting on <i>I setosa</i>, NCM test and maintain PT materials;</li> </ul>	SOPs	<p>Lee/ICDF</p> <p>L. Fooks, A.Beko, S. Amben, J. Pakatul, R.Miti , N.Bokame/A10230, A10228</p> <p>Jeffrey Waki, Cecily Walters, Lawrence Uberawa</p>
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;	<ul style="list-style-type: none"> <li>NARI internal system developed to capture production and distribution of breeding stock and planting material and baseline established</li> <li>Online portal for ordering planting material, breeding stock, and information resources;</li> </ul>	<p>Production and Distribution records;</p> <p>Online portal accessible</p>	<p>J. Maima, T. Pewa, R. Miti, K. Kobila, N. Bokame</p> <p>L. Fooks, E. Kupe</p>

**Table A3c: Priority 3 - Expected outputs in 2023 against Result Area Priorities in Result Area 7**

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2023	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
<b>Result Area 7 – Nutritious Food and Health – Improved Diets</b>			
Improved capacity of households to practice sustainable village poultry farming and other appropriate livestock systems in target communities and districts;	<ul style="list-style-type: none"> <li>Information on needs and baseline on status of food and nutritional security generated;</li> </ul>	Survey report	J. Pandi, M. Dom and team/MRC/U10015

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
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;	<ul style="list-style-type: none"> <li>Family Farm Team Training units delivered;</li> </ul>	Training reports	External consultant input
<b>Result Area 7 – Nutritious Food and Health – Advocacy on safe and nutritious food</b>			
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

**Table A3d: Expected outputs in 2023 in Cross-cutting Areas**

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
<b>Cross-cutting Areas</b>			
<b>2.4.1 Scaling of outcomes and impacts of R4D innovations</b>			
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;	<ul style="list-style-type: none"> <li>Operational provincial didiman centres with selected provinces for climate change adaptation support</li> </ul>	Quarterly and Annual Reports Technical Reports	J. Pakatul, S. Amben, P.Seta-Waken, J. Laraki /HRC, HARC, SRC, MRC/A10230, A
	<ul style="list-style-type: none"> <li>Districts/Provinces in Madang and Morobe operating model livestock breeding centres supporting for livestock development</li> </ul>	Quarterly and Annual Reports Technical Reports	J. Pandi, M. Dom/MRC/U10015
	<ul style="list-style-type: none"> <li>Documentation of rice production mechanisation model</li> </ul>	Technical report	L. Fooks, A. Boko with ICDF



<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
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, Australian Partners/IRC/K1006
Systems and processes in place for upscaling of supply of planting material and breeding stock;	<ul style="list-style-type: none"> <li>Provincial administration and relevant stakeholders are engaged to manage and promote sustainable farming of village poultry, fish and goats at households in selected communities;</li> <li>Provincial administration and relevant stakeholders are engaged to support resilient farming in selected higher risk provinces</li> <li>Facilities at NARI MRC and SRC upgraded</li> </ul>	Project progress reports; Annual Report; Meeting minutes	<p>J. Pandi, M. Dom/MRC/U10015</p> <p>J.Pakatul/HRC, S.Amben/HHRC/A10230, A10228</p> <p>T. Omot/HQ42014</p>
Innovative learning approaches and activities in knowledge transfer and information access to reach rural communities in ADDs developed and applied;	<ul style="list-style-type: none"> <li>Mobile app for information dissemination developed and launched;</li> <li>TOT modules incl suit of learning materials fully developed for 5 modules</li> </ul>		<p>J. Laraki, E. Kupe</p> <p>J. Laraki and other scientific and technical staff/B40331, A10230</p>
Events organised enabling exchange and sharing of insights into lessons learnt from R4D interventions among stakeholders and policy makers;	<ul style="list-style-type: none"> <li>Stakeholder workshop on climate adaptation action in highlands</li> </ul>	Workshop report	J. Pakatul, S. Amben/HRC, HHRC/A10228, A10230
Stakeholders supported with efficient and affordable diagnostic and analytical services;	<ul style="list-style-type: none"> <li>Increase of sample submission and analysis compared to baseline (2022)</li> <li>Reduction in sample turnover time compared to baseline (2022)</li> <li>TC delivery targets met</li> </ul>	Laboratory records; quarterly and Annual reports	M. Oromu, J. Kerage/Chemlab C. Seseaga/NAIC , W.Maso/TC – Technical Services
<b>2.4.2 Gender, Youth and Social Inclusion</b>			

<b>Result Area/Targeted Output in SIP</b>	<b>Outputs from projects/studies to be delivered in 2023</b>	<b>MOV</b>	<b>Lead Officer or team/ Implementation Centre(s)/Project Code</b>
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	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 building and communication appropriate for the targeted age groups;	Youth of both gender feature in target population	Evidence from current project portfolio	Project leaders
<b>2.4.3 Communication for Change</b>			
Communication Strategy	Draft strategy developed	Document	J. Laraki, L. Fooks
GIS databases and applications	Updated ADD GIS	ADD GIS	M.Tinah, Research staff
Scientific, technical and general information accessible from on-line and other media platforms;	<ul style="list-style-type: none"> <li>• Online platform</li> </ul>	Online platform accessible	L.Fooks, E.Kupe, I.Okpul
	<ul style="list-style-type: none"> <li>• Funding proposal for digitisation and extended e-doc availability</li> </ul>	Funding proposal	L.Fooks
	<ul style="list-style-type: none"> <li>• Ongoing updating and increased access of stakeholders to records in the National Agricultural Information System;</li> </ul>	Database records	I. Okpul, E.Kupe/HQ
Internal Information system with on-line databases on research management,	<ul style="list-style-type: none"> <li>• Research management database</li> <li>• Trip and activity report database</li> </ul>	Reports from the database Online project activity map	L.Fooks, E.Kupe, B.Samor

Result Area/Targeted Output in SIP	Outputs from projects/studies to be delivered in 2023	MOV	Lead Officer or team/ Implementation Centre(s)/Project Code
Finance, HT and Assets management			

**Table A3e: 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
<b>3.1 Results-based Management</b>			
Annual reporting	Annual report 2023	Documents, Council minutes	Directors, FC, MAP, HRM
Annual Corporate Implementation Plan	Annual Corporate Implementation Plan 2024 endorsed by Council in the last meeting;	Council minutes	Directors, FC, HRM, MAP
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
<b>3.2 Resourcing the Institute</b>			
<b>3.2.1 Advocacy and Visibility</b>			
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	<ul style="list-style-type: none"> <li>Media articles (Radio, TV, Newspaper, );</li> <li>Video clips; Social media posts; Press releases reporting on NARI key activities</li> <li>NARI Overview Video revised</li> </ul>	Quarterly and Annual Reports	PR office/Info team
<b>3.2.2 Diversifying Funding Sources</b>			
Business plans for internal revenue activities completed and implemented	<ul style="list-style-type: none"> <li>Business plans for key income earning activities developed</li> <li>Annual revenue targets met as per Business plan</li> </ul>	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

Result Area/Targeted Output in SIP	Milestones in addressing critical areas in Institutional Management and Development	MOV	Lead officer/team
NARI centre management structure and systems adjusted for improved delivery on assigned functions including revenue generation	Restructuring plan submitted to Council	Council minutes	HR Manager, Directors, DG office
Active engagement with GoPNG and donors result in annual award of diverse research for development grants and funding support	<ul style="list-style-type: none"> <li>• 2 new PIP proposals developed</li> <li>• new proposals submitted to donors</li> <li>• engagement with ACIAR and DFAT for new project(s)</li> </ul>	Proposal documents	Directors, Scientists..
<b>3.2.3 Investing in Human Talents</b>			
Human Talent Management and Development Strategy (HTMDS) developed	<ul style="list-style-type: none"> <li>• Review and revisions to position designations, career path progression completed and submitted to Council for endorsement;</li> <li>• Training plan established and implemented for NARI staff in all categories;</li> <li>• Concept note for NARI Cadetship Program completed</li> <li>• Position of Senior M&amp;E officer scoped</li> </ul>	Review document	HRM, Directors
		Council minutes	
			HRM, Directors
			HRM, Directors
Performance based Appraisal system operating	<ul style="list-style-type: none"> <li>• Staff Annual Workplans submitted through rank and file by set deadlines;</li> <li>• Annual PDR review time table implemented</li> </ul>	Workplan records PDR records	HRM, all staff
On-line HT Management system operating	Leave management system operating	Leave records	HRM, E. Kupe
<b>3.2.4 Management of financial and material resources</b>			
Finance management system in NARI improved with online access to reporting and project management information	New Accounting Software operational across NARI Centres;	Progress reports	A,Amoi, C. Mathew, J. Wamine
Medium-term assets and facility management and development plan developed and annual targets met	<ul style="list-style-type: none"> <li>• Online fixed assets management register</li> <li>• NARI land use mapping and zoning plan developed</li> <li>• Field research area mapped, demarcated and land</li> </ul>		T. Omot, J. Gagau, E. Kupe T. Omot, M. Tinah, Centre Managers Centre Managers, T. Omot, M.

Result Area/Targeted Output in SIP	Milestones in addressing critical areas in Institutional Management and Development	MOV	Lead officer/team
	<ul style="list-style-type: none"> <li>use history database developed in all Regional Centres</li> <li>Infrastructure Development Strategy and Implementation Plan for NARI Centres developed and implemented</li> </ul>		<p>Tinah</p> <p>T. Omot, Centre Managers</p>
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
<b>3.3 Governance, Policies, Processes</b>			
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	<ul style="list-style-type: none"> <li>All current policies updated</li> <li>Child Protection Policy- developed</li> <li>Occupational Health and Safety Policy developed</li> </ul>		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

## **Annex 4. NARI Income and Expenditure Plan 2023**

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](mailto:naripng@nari.gov.pg);

Website: <https://www.nari.gov.pg>



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