



Pacific Seed System Roadmap



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List of Abbreviations

NCDs: Non-Communicable Diseases
PGR: Plant Genetic Resources
PPB: Participatory Plant Breeding
PVS: Participatory Varietal Selection
OP: Open-Pollinated
OPV: Open Pollinated Varieties
NGOs: Non-Governmental Organizations
Geographic and Political Entities:
FSM: Federated States of Micronesia
RMI: Republic of Marshall Islands
PICTs: Pacific Island Countries and Territories
PNG: Papua New Guinea
SPC: Pacific Community
LRD: Land Resources Division
PAPGREN: The Pacific Agricultural Plant Genetic Resources Network
PIRAS: Pacific Islands Rural Advisory Services
PIFON: Pacific Island Farmers Organisation Network
POETCom: Pacific Organic and Ethical Trade Community
PS4L: Pacific Seeds for Life
PSSR: Pacific Seed Systems Roadmap
TAG: Technical Advisory Group
FAO: Food and Agriculture Organization
PPPO: Pacific Plant Protection Organisation
MoA: Ministry of Agriculture
NWC: Nature's Way Cooperative
NARI: National Agricultural Research Institute
FPDA: Fresh Produce Development Agency
VARTC: Vanuatu Agricultural Research and Technical Centre
DARD: Department of Agriculture and Rural Development
NAQIA: National Agriculture Quarantine and Inspection Authority
CePaCT: Centre for Pacific Crops and Trees
USP: University of the South Pacific
ITPGRFA: International Treaty on Plant Genetic Resources for Food and Agriculture
MLS: Multilateral System
PGS: Participatory Guarantee System
QDS: Quality Declared Seed
QDPM: Quality Declared Planting Material
Miscellaneous:
PMN: Planting Materials Network

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1. Introduction

Plant genetic resources (PGR), consisting of seeds and planting materials, play a crucial role in food security, nutrition, livelihoods, and the provision of environmental services. They are key components of sustainability, resilience, and adaptability in agricultural production systems. Therefore, access to and availability of PGR are essential for coping with the many challenges facing the Pacific, including climate change and the increasing prevalence of lifestyle-related diseases such as non-communicable diseases (NCDs). In the Pacific, a region characterized by its fragmented geography, where PGR diversity significantly varies by country, enhanced national, regional, and international movement and exchange are vital. Such efforts ensure that adapted germplasm meets the evolving production environments and needs. Effective seed systems, which guarantee the provision of affordable, high-quality seeds to farmers, are crucial for the availability and accessibility of PGR to the farming community.

At the Pacific Seed¹ Forum (June 2018)² country representatives, NGOs and development agencies concurred that movement and exchange of PGR in the Pacific region would be optimally facilitated by an integrated seed system model. The objective of any seed system is not merely to maintain its current state but to foster a dynamic system capable of managing various stresses and shocks. Thus, enabling a seed system to support participatory varietal selection (PVS) and participatory plant breeding (PPB) underscores the significance of the informal seed system. This approach will aid in generating new varieties that help farmers meet the challenges of climate change while sustaining food diversity for nutritional benefits and income generation.

2. Roadmap formulation process

The concept of a Pacific Seed Systems Roadmap (PSSR) was developed during the Pacific Seed Forum (June 2018)³ – a five-day consultation aimed at enhancing seed systems for resilience, livelihoods, food and nutritional security in the Pacific region. This significant consultation welcomed high-level and senior officials from the Ministries of Agriculture across various Pacific Island Countries and Territories (PITCs) including, Cook Islands, Federated States of Micronesia (FSM), Fiji, French Polynesia, Kiribati, Nauru, Niue, Palau, Republic of Marshall Islands (RMI), Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

The 2018 Pacific Seed Forum identified the need for a more systematic approach to address regional seed issues. This approach would involve engaging key stakeholders and fostering linkages between and amongst countries and community-based seed systems, thus conceptualising the Pacific Seed Systems Roadmap. A short-term consultancy was used to progress the Roadmap based on insights from the Pacific Seed Forum, consultations with the Land Resources Division (LRD) of the Pacific Community (SPC), key regional network focal contacts, including the Pacific Islands Rural Advisory Services (PIRAS), and the [Pacific Agricultural Plant Genetic Resources Network \(PAPGREN\)](#). It was further informed by an analysis/review of seed systems detailed in Section 3. The Roadmap also aligns with the strategic objectives of the SPC-CePaCT Investment Plan, particularly 'Increase in the availability and utilisation of highly nutritional, disease-resistant, and climate-smart crop and tree varieties', aiming to enhance 'Local capacity to test, manage, and distribute planting materials to farmers' (referenced as Outcome 2, Output 2).

¹The term 'seed' is used here to include any type of planting material that is intended for use in producing a crop, i.e. either generative or vegetative, such as roots, tubers, bulbs, cuttings, rhizomes and apomictic seed.

²The Pacific Seed Forum was organized by the Land Resources Division (LRD) of the Pacific Community (SPC). The key sponsors of the workshop are the Government of Australia (DFAT), the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), and the SPC.

A subsequent event, the Pacific Seeds for Life Validation workshop⁴ was hosted in Nadi, Fiji, from November 26 to 30, 2018. Its objective was to validate the priority focus areas of the PSSR, and the Pacific Seeds for Life project (PS4L). Government officials from Cook Islands, Fiji, French Polynesia, Kiribati, RMI, Nauru, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu attended the workshop. The Validation workshop considered the draft Roadmap and overall agreed with the main points and general direction of the draft Roadmap. The feedback received during this workshop, particularly regarding partnerships and PAPGREN, was integrated into the revised version of the Roadmap.

The Roadmap's finalization was shaped through a series of follow-up virtual consultations with the Pacific Island countries and territories (PICTs) and other key stakeholders. These discussions leveraged insights from the Pacific Seeds for Life (PS4L) implementation process and included a thorough analysis of seed systems within the region. This comprehensive approach ensured that the Roadmap reflects the most current developments and addresses the prevailing challenges in agricultural practices and seed management throughout the Pacific. The outcomes of this seed systems analysis are detailed in Section 3.

3. Status of seed systems and key actors

The seed sector in the PICTs encompasses a blend of formal and informal systems. In certain countries, integrated systems—those combining elements of both formal and informal frameworks—are notably more effective in meeting the diverse seed requirements of smallholder farmers.

3.1. Formal seed systems

The reach and effectiveness of the formal seed system, identified by the production of modern varieties and certified seeds, vary across countries, often influenced by geographical size; its presence is notably sparse in remote areas. The oversight of the vegetable seed sector, heavily reliant on imported seed, lacks a dedicated national or regional institute or agency. Furthermore, a comprehensive list of recommended crop varieties, vetted by recognized research bodies for the Pacific region, is conspicuously absent. Consequently, the supply of imported vegetable seeds—spanning diversity, suitability, viability, and continuity—is primarily at the discretion of the seed seller (importer/retailer), with minimal direct engagement between farmers and suppliers.

3.2. Informal Seed Systems

Quantitative data on the informal seed sector's magnitude and capability remain scarce. This sector is characterized by farmers' direct production, dissemination, and access to seeds through personal harvest, exchange, barter, and local markets. Notably, open-pollinated (OP) vegetable seeds circulate within farming communities and social circles. Some countries witness support from non-governmental organizations (NGOs) for OP seed production, like the Solomon Islands' Planting Materials Network (PMN) since 1996. Challenges such as low seed quality, inadequate storage and packaging, unreliable supply, and sparse documentation mirror those in the formal sector.

Informal exchanges of vegetatively propagated crops, such as yams and taro in Vanuatu, perpetuate through traditional exchange networks.

3.3. Integrated seed systems

Integrated seed systems in the Pacific blend elements from both formal and informal frameworks, facilitating a more holistic approach to seed management. These systems are pivotal in introducing new, often disease-free, genetic material that is adaptable to the diverse local conditions prevalent

⁴ The Pacific Seeds for Life Validation Workshop was organized by the Land Resources Division (LRD) of the Pacific Community (SPC) and funded by Government of Australia (DFAT), the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), and the Pacific Community (SPC).

across the region, including various climate and disease challenges. Concurrently, the informal aspects of these systems play a crucial role in multiplying and selecting varieties that are locally adapted, ensuring that the unique agricultural needs of different areas are met.

In Fiji, the Ministry of Agriculture (MoA) is notably proactive in supporting open-pollinated (OP) seed production for selected crops and varieties, engaging farmers directly through contracts for seed multiplication. This initiative is part of a broader effort to enhance local seed availability and quality. Additionally, the MoA collaborates with Nature's Way Cooperative (NWC) to provide certified seeds for Red Papaya, encouraging farmers engaged in papaya export to participate as seed producers. This collaboration exemplifies the potential for integrated systems to support both local food security and export markets.

Papua New Guinea showcases another model of integrated seed system through the collaboration between the National Agricultural Research Institute (NARI) and the Fresh Produce Development Agency (FPDA). Together, they provide clean planting materials for Irish potatoes. Further support for the agricultural sector comes from an Australian Centre for International Agricultural Research (ACIAR)-funded project aimed at boosting commercial sweet potato production in the Highlands, demonstrating the benefits of international partnership in enhancing local agricultural practices.

Vanuatu's approach to integrated seed systems is embodied in its root crop breeding program, led by the Vanuatu Agricultural Research and Technical Centre (VARTC). This program uses true botanical seeds to produce seedlings of sweet potato and yam, which are then distributed to farmers during field days organized by the Department of Agriculture and Rural Development (DARD) and VARTC. This initiative not only supports the diversification of crops but also contributes to the resilience of local agricultural systems.

The seed systems analysis highlights the involvement of a broad spectrum of stakeholders across the region, especially in the realm of capacity building. However, it also underscores the relatively weak linkages between these actors outside the direct value chain. While there are examples of successful integration around specific crops, such as sweet potato in Vanuatu and Papua New Guinea, and Red Papaya in Fiji, these systems often face challenges related to infancy and potential funding constraints. Timor-Leste's National Seed System for Released Varieties (NSSRV) stands out as a model of successful integration, with strong linkages established between formal and informal systems, serving as a valuable example for other countries looking to enhance their seed systems.

3.4. Regional Seed Centres

The [Centre for Pacific Crops and Trees \(CePaCT\)](#) at the Pacific Community (SPC) is the cornerstone of regional efforts to distribute vegetative planting material, specifically virus-free tissue culture plantlets. The [Pacific Agricultural Plant Genetic Resources Network \(PAPGREN\)](#) plays a crucial role in facilitating the importation of CePaCT materials into PICTs. Despite the commendable distribution efforts by CePaCT, the actual on-ground impact, as delineated by reviews from the Crop Trust ([August 2017](#)) and Jackson and Walton (2016), has been less than optimal. These analyses revealed a limited farmer uptake and subsequent evaluation of the germplasm distributed over a six-year span (2009-2015), underscoring a fundamental issue: farmers are not deriving expected benefits from the CePaCT germplasm. A significant barrier to this is the limited national capacity, highlighting the broader challenges within the seed systems at both the national and regional levels, necessitating a focused approach to bolstering these foundational agricultural structures.

3.5. International Seed Instruments

The landscape of international policies relevant to Plant Genetic Resources (PGR) and seed systems is complex, with various treaties and agreements shaping how countries manage and share these critical resources. Central to these international efforts is the [International Treaty on Plant Genetic Resources for Food and Agriculture \(ITPGRFA\)](#), commonly referred to as 'the Treaty.' Its primary aim is to ensure

the conservation and sustainable use of PGR for global food security. Furthermore, the Treaty establishes frameworks for fair and equitable access to plant genetic materials and the sharing of benefits arising from their use. A crucial component of the Treaty is the [Multilateral System \(MLS\) of access and benefit-sharing](#), which facilitates access to plant genetic resources for food and agriculture (PGRFA) for research, breeding, and training purposes. The MLS specifically includes genetic resources from 64 crops listed in [Annex I of the Treaty](#), covering all major staple crops significant to the Pacific region.

In June 2009, during the [Third Session of the Treaty's Governing Body](#), the Pacific region, represented by the Minister of Agriculture for Samoa at the time, took a decisive step by formally placing the regional ex-situ collections of Annex 1 crops, maintained by the SPC CePaCT, into the Multilateral System (MLS) of the Treaty, under Article 15. This critical action, signifying the collective resolve of the Pacific region, highlights a deep commitment to the global strategy for the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA). Marking a significant milestone in the Treaty's implementation, this initiative has empowered CePaCT to lead efforts in assisting Pacific Island countries and territories (PICTs) to effectively conserve and utilize PGRFA at global, regional, and national levels.

Among the Pacific Island countries and territories (PICTs), nine—Cook Islands, Fiji, Kiribati, Marshall Islands, Palau, Papua New Guinea, Samoa, Tonga, and Tuvalu—are Contracting Parties to the Treaty. Several other PICTs have expressed interest in joining, indicating a growing regional commitment to PGRFA conservation and sustainable use. However, disparities exist, as territories like French Polynesia, New Caledonia, Wallis and Futuna, Guam, American Samoa, Northern Marianas, and Pitcairn Island maintain varying degrees of autonomy, leading to diverse management practices for PGRFA. These nuances reflect the complex interplay between national sovereignty, regional collaboration, and global agreements in managing plant genetic resources, underscoring the need for coordinated efforts to navigate the multifaceted landscape of international seed policies.

3.6. Key Stakeholders – roles and responsibilities

The Pacific seed sector is supported by a wide range of stakeholders, essential for its growth and sustainability. Key players include seed producers, traders, agriculture ministries, farmer and community organizations, and networks such as The Pacific Organic and Ethical Trade Community ([POETCom](#)) and the Pacific Island Farmers' Organisation Network ([PIFON](#)). Additionally, advisory networks, emergency response agencies, regional development partners, and educational institutions contribute significantly to the sector's ecosystem.

Mapping the sector at both national and regional levels will clarify roles and identify collaboration opportunities, particularly in capacity building and research. Capacity building efforts focus on leveraging existing community and farmers' organizations programs, including those aimed at women and youth, to extend their impact and facilitate scaling. Collaborative efforts with partners like the Ministry of Agriculture in Fiji, Nature's Way Cooperative (NWC), and the Fresh Produce Development Agency (FPDA) are aimed at enhancing the capacity of decentralized seed producers efficiently.

Research collaboration is vital for developing and diversifying the seed system, emphasizing participatory varietal selection and plant breeding to improve seed multiplication. Institutions such as the University of the South Pacific (USP), the National Agricultural Research Institute (NARI) of Papua New Guinea, and the Vanuatu Agricultural Research and Technical Centre (VARTC) are key partners in driving innovation in plant genetic resources and seed systems.

4. Key challenges facing the seed sector in the Pacific region

In 2016, the Pacific Community (SPC) carried out a regional survey to identify key challenges within seed systems (PAFPNet "[Rebuilding the Agriculture sector and Farmer Livelihoods – Post Disaster](#)"). This effort, complemented by additional surveys and consultations outlined in the seed systems review, has illuminated the primary obstacles facing the sector. The Pacific Seed Forum has further deliberated on these challenges, achieving a consensus on the critical issues that need addressing.

4.1. Availability

The challenge of seed availability in the Pacific is marked by significant gaps in local seed production, importation, and dissemination efforts. This situation is partly reflective of an overarching lack of supportive policy and regulatory frameworks. Geographical remoteness further exacerbates availability issues, placing rural and isolated areas at a distinct disadvantage. Unlike access, seed availability is not directly influenced by a farmer's socioeconomic status. Addressing this requires the identification and development of regional seed suppliers capable of breeding and testing new varieties that are well-suited to the Pacific's unique tropical and subtropical agro-ecological conditions. Moreover, there's an imperative to establish and adhere to effective seed distribution protocols, ensuring a seamless flow from regional bodies like the SPC-CePaCT, through national ministries, down to the farmers themselves.

4.2. Storage and packing of seed.

The integrity of seeds in the Pacific is compromised by inadequate packing and storage solutions, leading to a swift decline in seed quality and viability. This issue is exacerbated by the region's humid climate conditions. Furthermore, in vitro plant propagules, due to their perishability, necessitate meticulous care to ensure successful growth. Centralized storage facilities like the Centre for Pacific Crops and Trees (CePaCT) are pivotal for maintaining seed quality over time. It's essential to inform recipients about any proprietary rights associated with stored seeds, which may restrict their ability to retain or share these seeds.

4.3. Access

Access to affordable, high-quality seeds of new and improved varieties remains a significant challenge for Pacific farmers. These seeds, crucial for enhancing local agricultural productivity and resilience, should be tailored to the specific agro-ecological conditions of the region. A farmer's ability to acquire seeds often hinges on their financial means or their integration within social networks that facilitate seed exchange. Geographical remoteness further exacerbates the difficulty of accessing seeds, underscoring the need for comprehensive strategies to improve seed distribution systems across the Pacific.

4.4. Utilisation

Utilization of seeds in the Pacific is hindered not only by their limited availability and access but also by inadequate information on seed characteristics and performance. Knowledge gaps regarding the field performance of both improved hybrid and open-pollinated vegetable varieties, including CePaCT germplasm, impede informed decision-making by farmers, researchers, extension agents, and retailers. Despite the significant distribution of tissue cultures by CePaCT, their adoption by farmers remains low. This issue is exacerbated by insufficient information exchange across sectors, including between agricultural ministries, NGOs, farmer associations, and other community-support organizations. Enhancing information dissemination, with a focus on inclusivity and targeting underrepresented groups such as women and youth, is critical for improving seed utilization. The challenge is compounded by the poor suitability, quality, and diversity of seeds, which negatively affects their use.

4.5. Suitability, Quality and Diversity

The suitability, quality, and diversity of seeds are paramount for meeting the specific needs of Pacific farmers. However, seeds that are theoretically available and accessible might still fall short due to suboptimal quality and limited genetic diversity. Poor handling, storage, and transport conditions further degrade seed quality, leading to challenges in crop establishment, increased susceptibility to pests and diseases, and, ultimately, reduced yields. Promoting a broader diversity of crops can enhance the resilience of agricultural systems and contribute to a more nutritious and varied diet, which is crucial for the health of Pacific communities. The current emphasis on yield as the primary selection criterion often leads to a narrow focus on certain varieties, risking genetic erosion and neglect of varieties with potentially valuable traits such as drought tolerance and nutritional benefits. Criticism is particularly directed at imported vegetable seeds and those distributed in response to natural disasters, which may not always align with local conditions and needs. Addressing these issues requires a concerted effort in breeding programs at community, national, and regional levels to ensure a suitable, high-quality, and diverse seed supply.

4.6. Research and Development to Enhance Breeding of New Varieties

The resilience of most landraces to both biotic and abiotic stresses, along with their stable yields, is invaluable for regions prone to climate change. Yet, factors like export market demands, the introduction of new crops, and urbanization are eroding this genetic diversity. Emphasizing the conservation and exploration of Pacific genetic resources, including landraces and traditional cultivars, is crucial for developing crops with enhanced nutritional value and stress resilience. CePaCT, national genebanks, and community seed banks play key roles in these efforts. Molecular characterization of existing germplasm should support breeding programs to document and utilize the allelic diversity of local food crops. By adopting both traditional and participatory breeding methods, and expanding the genetic pool, the introduction of climate-smart traits in crops can significantly bolster sustainable agriculture across the Pacific.

Development projects should focus on strengthening the collaborative capacity within the seed system, enhancing practices such as nursery multiplication protocols. This approach will ensure the effective distribution and utilization of high-quality planting materials from CePaCT.

4.7. Policy and regulatory environment

The Pacific seed sector's growth is hampered by an insufficient policy and regulatory framework at both national and regional levels. The absence of dedicated seed policies undermines the ability to ensure smallholder farmers' access to quality seeds, despite the recognized importance of seeds for food and nutritional security in regional agricultural strategies and/or sector plans. Fiji and Vanuatu have successfully established national seed policies, representing significant progress in the region's efforts to enhance seed system governance and support agricultural development.

Concerns around GMOs and biosafety also loom large within the PSSR context. Notably, the Asia-Pacific region has seen progress in biosafety system development, supported by the Global Environment Facility (GEF) of the United Nations Environment Programme (UNEP). This initiative led to the creation of National Biosafety Frameworks (NBFs) across 35 countries, integrating biosafety into broader biosecurity measures, such as in Fiji's biosecurity legislation, which emphasizes stringent border controls to manage biosafety and biosecurity risks effectively.

4.8. Capacity

Addressing the challenges within Pacific seed systems necessitates bolstering human and institutional capacities. This enhancement is crucial across various facets of the seed sector, including policy development, seed production, handling, storage, quality assurance, and the evaluation and documentation of seeds or PGR. Such capacity building should leverage existing infrastructures at both national and community levels, ensuring alignment with regional support mechanisms to facilitate comprehensive national activities. The enhancement of these capacities is fundamental to overcoming

the systemic challenges identified earlier, paving the way for a more robust and resilient seed sector in the Pacific.

4.9. Partnerships

Efficient and effective partnerships are essential for streamlining seed system operations, minimizing overlap, and maximizing resource use. The National Seed System of Timor-Leste exemplifies the benefits of collaborating with farmer associations, individual growers, and community seed groups. This model, alongside Africa's success with the dissemination of orange-fleshed sweet potatoes, underscores the critical role of partnerships across various levels of the seed value chain in ensuring widespread seed distribution.

To realize the Roadmap's goals and enhance seed system efficacy, a preliminary step involves the thorough analysis of existing seed systems at both national and regional tiers. Identifying and subsequently strengthening or establishing partnerships will address current gaps, enhancing connectivity and cooperation within the seed sector. These strategic alliances are vital for fostering a cohesive and efficient approach to seed system improvement in the Pacific.

5. The Pacific Seed Systems Roadmap

The seed systems across the Pacific region currently face significant challenges that hinder their effectiveness and efficiency. Recognizing these challenges, as outlined in this document and through other assessments, there is a critical need for concerted efforts. These efforts must aim not only to address the myriad issues plaguing the seed systems but also to foster the creation of an integrated seed system. Such a system would require a synergistic approach, harmonizing the operations of both formal and informal seed sectors to maximize their collective impact.

Adopting a regional approach is indispensable for several reasons. Firstly, it promotes a standardized methodology for analyzing and assessing seed systems, aligning the efforts of diverse stakeholders, including development agencies, for coherent and coordinated action. Secondly, it enables the leverage of insights and best practices from other regions through south-south collaboration, instrumental in addressing local challenges. Lastly, it supports the development of both national seed policies and business plans, which are essential for enhancing seed production and distribution standards across the Pacific. This multifaceted strategy aims to catalyze substantial improvements in seed quality, availability, and accessibility, meeting the overarching goals of food security, agricultural resilience, and economic sustainability in the region.

5.1. Vision/Goal

A sustainable and innovative Pacific Seed System that ensures broad access to diverse, suitable, and locally adapted quality seeds and planting materials, vital for resilient farming and food and nutrition security across Pacific communities.

5.2. Purpose

The Pacific Seed Systems Roadmap (PSSR) aims to foster a decentralized and cohesive seed sector, guaranteeing the provision of safe, affordable, and premium seeds. This sector will meet demand promptly and adequately, supporting the agricultural needs of the region.

5.3. Objectives

- Ensure PICTs have enhanced availability of adaptable, resilient, nutritious, and climate-smart crop and tree varieties at both regional and national levels.
- Increase PICTs' access to high-quality seeds of resilient food, feed crops, and tree species.
- Bolster national and regional capabilities in seed production, dissemination, and conservation within the PICTs, thereby improving yields and elevating incomes.

5.4. Outcomes

- Partnerships and connections within seed supply chains and among key stakeholders are strengthened, fostering a collaborative seed sector across the Pacific.
- Communication, data gathering, documentation, awareness, and reporting on seed systems in PICTs and their communities are enhanced, ensuring a well-informed and engaged agricultural community.
- The adoption and utilization of quality seeds in PICTs are increased, resulting in improved productivity and stabilized incomes for farmers.
- A supportive enabling environment for sustainable seed systems is established through comprehensive policies, legislation, strategies, and technologies, underpinning the long-term resilience and sustainability of agricultural practices in the region.

6. Strategic Priorities

The strategic priorities outlined below are critical to realizing the vision, achieving the objectives, and fulfilling the purpose of the Roadmap.

6.1. Strengthened partnerships and linkages.

Enhancing the effectiveness of seed systems across the Pacific necessitates reinforcing partnerships and linkages within the seed supply chain and among key stakeholders. The geographical expanse and resource limitations of PICTs underscore the need for collaborative efforts to address the challenges faced by the seed sector.

6.1.1. Map key actors in seed systems at the national and regional level.

Mapping key actors within national and regional seed systems is crucial for identifying potential partnerships and improving system efficiencies. This detailed mapping clarifies the roles and responsibilities of major stakeholders, fostering effective collaboration and identifying synergy areas. It also sheds light on operational roles within the seed system, covering essential aspects like seed delivery, variety development, multiplication, quality maintenance, marketing, and information systems, along with learning, monitoring, evaluation, and accreditation processes.

Building on the analysis and consultation outcomes highlighted above, this section underlines the importance of developing scalable, diverse, and sustainable strategies to tackle the challenges previously identified. The aim is to develop a comprehensive framework that not only delineates the responsibilities of various stakeholders but also fosters broad-based collaboration to significantly enhance the Pacific seed systems.

Through such a framework, regions can collaborate more effectively, understanding where efforts may overlap or where gaps in the system might exist. This comprehensive approach is essential for aligning stakeholder efforts towards common goals, ensuring a robust and resilient seed sector across the Pacific.

6.1.2. Developing national and regional plans

The creation of national and regional plans is a critical next step in enhancing seed systems, grounded in the comprehensive mapping of key actors. These plans should adopt a standardized approach at the regional level, incorporating training to ensure uniformity and efficacy. By facilitating better coordination and support across different levels of governance and operations, such plans emerge as invaluable assets for development agencies and other stakeholders contemplating investments in the seed sector. This standardized strategy ensures that improvements are systematically addressed, enhancing the sector's overall resilience and capacity.

6.1.3. Investing in public/private partnerships and farming communities

Public/private partnerships (PPPs) and cooperative ventures are fertile grounds for advancing seed systems, particularly in settings where the government supports and invests in private sector and cooperative contributions. The Nature's Way Cooperative (NWC) in Fiji exemplifies a successful cooperative model within a PPP framework. NWC manages the certification scheme and seed sales for the Fiji Red Papaya Seed scheme, with the Fiji Ministry of Agriculture Research Division providing auditing and certification. This cooperative approach not only streamlines the process but also ensures local farmers are directly involved in and benefit from the scheme. Similar cooperative-based PPPs could be encouraged across the Pacific to develop and test new varieties that meet the unique needs of the PICTs. The cooperative model fosters community involvement and investment, essential for the sustainable multiplication of CePaCT germplasm and the production of commercial/certified seeds, thereby broadening access to quality seeds and accelerating the introduction of new varieties.

6.1.4. Investing in and strengthening networks.

Investing in networks and establishing effective mechanisms is crucial for bolstering partnerships and linkages within the Pacific seed sector. Networks serve as vital connectors between decentralized producers and overarching structures, facilitating a clear understanding of the roles, linkages, and functions of various actors within the seed system.

The PAPGREN plays a central role in importing materials from the CePaCT into countries. However, its impact is limited by insufficient partnerships at the national level and beyond, highlighting the need for stronger and more extensive collaborations. Acknowledging this, participants of the Pacific Seed Forum have recommended enhancing PAPGREN's capacity and formalizing its structure to better support the Pacific Seed System. A charter for PAPGREN is envisaged to solidify its mission in promoting the conservation, availability, and utilization of crop diversity, contributing to food security and the sustainability of the agricultural sector.

Furthermore, the mapping of networks should outline their responsibilities and explore ways to incentivize specific roles within an integrated seed system, aiming for efficient and effective linkages. Examples of impactful networks include:

- POETCom, which directly engages with farmers and farmer organizations to support the organic and ethical trade movement, including the certification and supply of seeds.
- PIFON, which strengthens linkages between farmers and farmer organizations, enhancing the dissemination of pertinent information and resources.
- PIRAS, focused on partnership and linkage strengthening, policy support, and capacity development, advocates for national partnership platforms like the Fiji Agricultural Advisory Services (FAAS), potentially integrating networks like PAPGREN into national frameworks.

Additionally, national networks such as the Kastom Gaden Association (KGA) in the Solomon Islands, the Farm Support Association (FSA) in Vanuatu, and the Mainstreaming of Rural Development Innovation (MORDI) in Tonga play critical roles at the community level, facilitating project-based collaborations and support.

These networks and mechanisms are integral to creating a cohesive and collaborative seed system across the Pacific, ensuring a unified approach to addressing the challenges within the sector.

6.1.5. Research partnerships for development.

Mapping key research partners is a foundational step in identifying and fostering collaborations that drive technological innovation within the Pacific seed systems. These partnerships are pivotal for research and development projects aimed at improving practices such as nursery multiplication protocols for tissue culture plantlets from CePaCT, significantly enhancing the distribution and utilization of these materials.

Supporting decentralized multipliers with alternative quality control systems and standards is crucial, especially for crops requiring clean seed protocols, like sweet potatoes. Understanding re-infection rates in the field is essential for ensuring seed quality and supporting farmers in managing pest and disease outbreaks through the development of simple, cost-effective disease detection techniques.

National and regional platforms, like PAPGREN, play a critical role in setting research priorities that align with the region's needs, facilitating targeted funding from development agencies. Establishing a priority research agenda at the regional level also opens avenues for leveraging university students—both within and outside the Pacific—for carrying out relevant research projects.

Reflecting on past engagements, such as SPC's involvement with the Asian Pacific Seed Association, offers insights into the benefits of access to information, technology, and innovation. This historical perspective underscores the potential for renewed collaboration, research partnerships, and learning exchanges. PIFON's OP Seed Learning Exchanges highlight the value of collaborative research in open-pollinated and hybrid seed production.

To foster a culture of innovation in plant genetic resources and seed systems, strengthening partnerships with regional research institutes like the USP; NARI, VARTC and other research centres in the region and beyond is crucial. These collaborations are instrumental in developing and disseminating new technologies and practices, elevating the Pacific region's seed systems to new heights of productivity and sustainability.

6.2. Enhancing communication, awareness, and documentation within Pacific Seed Systems.

Recognizing communication and outreach as critical components in the effectiveness of seed systems, it's essential to enhance the flow of information regarding seeds within the Pacific Island Countries and Territories (PICTs) and their communities. A strategic approach to improving communication, awareness, and outreach is proposed to address identified weaknesses.

6.2.1. Analysis of communication and outreach practices

Evaluating the impact of diverse communication and outreach activities, such as diversity fairs and agricultural shows, is vital to understanding their effectiveness in fostering behavioral change and enhancing seed system engagement. This evaluation should explore the potential for scaling up successful practices and innovating outreach methods to encourage farmer participation in open-pollinated (OP) seed usage and seed enterprise development. Leveraging existing experiences and best practices could yield significant improvements in impact through minor adjustments to these events.

6.2.2. Communication and outreach at the regional level

Enhancing seed systems' visibility and understanding on regional platforms demands an improved online presence for initiatives like the Centre for Pacific Crops and Trees (CePaCT). Developing a robust web presence and utilizing platforms such as Facebook or the Pacific Agricultural Information System (PAIS) Community Page/Blog will facilitate easier access to information on available Plant Genetic Resources (PGR) and new diversities. Cross-sectoral collaboration, especially with the SPC Public Health Division, is recommended to amplify the impact of seed systems beyond agricultural boundaries, emphasizing their relevance to health and nutrition sectors. This collaboration could materialize in the form of policy briefs that underscore the multifaceted importance of robust seed systems.

6.2.3. Improved documentation and information

Effective documentation of seed-related information is vital for facilitating communication, awareness, and outreach, essential components for the success of any integrated seed system. Comprehensive documentation encompasses the collection, recording, reporting, storage, and dissemination of data, which are crucial at various stages of the seed value chain. One notable weakness identified in consultations is the lack of information regarding imported seeds and field evaluation data. To address these gaps, the following action areas are recommended: exploring different approaches to improve the process of collecting information from farmers, employing electronic methods for collecting and recording information in the field, and developing user-friendly crop evaluation forms and standardized descriptors.

6.2.4. Sharing and storing information

Internet connectivity is a major problem in remote islands, which makes any electronic form of data gathering difficult; however, [KoBo Toolbox](#) can be used offline to facilitate field recording, and that information can later be uploaded once connectivity is available. Database compatibility between national and regional systems must be addressed so that information held in national systems can be transferred to a regional system such as the PAIS. At the national and regional levels, efforts must be invested in the digitization of data to enable sharing and secure storage.

6.2.5. Regional information system

A regional approach to documentation and information can succeed by simplifying and standardizing crop descriptors. Similarly, the digitization of data and compatibility between databases at the national and regional levels can benefit from regional support. PAIS could be supported and used to maintain digital documents, fostering collaboration and information-sharing across the region. Sufficient funding to ensure effective documentation is often not allocated to projects and programmes; it is essential that the importance of documentation is emphasised in project development to remedy the lack of information that exists in the seed sector. Efforts can be invested in improving the availability of and access to seed, but if similar efforts are lacking in the gathering of associated information, then it is unlikely that gains will be realised in the uptake and utilisation of seed by farmers.

6.3. Strengthened national and regional capacities on quality seed production, dissemination and conservation.

To bolster the Pacific region's seed systems, targeted capacity-building efforts are crucial. Significant strides have been made, particularly in training related to the production and processing of open-pollinated (OP) seeds. The following areas are highlighted for further capacity building and enhancement:

6.3.1. Analysis of capacity building needs for implementation of the PSSR

A thorough analysis of capacity-building needs is essential to tailor interventions to each country's specific requirements while avoiding duplication of efforts. The value chain approach, as employed by PIFON, offers a robust model for conducting such an analysis, ensuring that capacity-building efforts are efficiently targeted and implemented.

6.3.2. OPV seed production.

Standardisation of Open Pollinated Varieties (OPV) seed production, processing and storage will be a practical Roadmap intervention within a capacity-building programme. It would strengthen future opportunities for seed exchange across countries. There is already significant activity in this area by a range of different actors, which the mapping process will indicate; therefore, collaboration and partnerships will be essential. A directory of experts for conducting OPV seed production training could be a valuable output of this intervention.

6.3.3. Seed quality control

Developing seed quality assurance schemes for the informal seed sector, such as [Participatory Guarantee Systems \(PGS\)](#), [Quality Declared Seed \(QDS\)](#), and [Quality Declared Planting Materials \(QDPM\)](#), and certification schemes for the formal seed sector, is critical for the success and sustainability of any seed system. Ideally, schemes should be harmonized to support seed exchange and to simplify the process, enhancing understanding and acceptance among stakeholders. Strengthening the capacity of national programs for monitoring and supporting quality seed production is essential. If consensus is reached, entities like the SPC could provide backup monitoring for seed quality. Training in seed quality control is also crucial for informing farmers about specific agricultural practices that maximize the benefits of clean seeds, such as the strategic removal of virus carrier weeds.

6.3.4. Decentralised seed producers – seed enterprises

Supporting the establishment and development of decentralized seed producers at the regional level can pave the way for standardized and sustainable seed business development. Analysing existing seed enterprises through [SWOT](#) analyses can uncover insights into leveraging strengths and addressing vulnerabilities. Identifying potential seed entrepreneurs within local networks and through extension services is a crucial step, with a particular focus on fostering public-private partnerships and community seed groups, including those led by women and youth. Regional dissemination of best practices, drawn from successful cases in Fiji, PNG, and Timor-Leste, can inform and inspire seed enterprise development across the Pacific.

6.3.5. Crop improvement.

The challenges posed by genotype vs environment interactions are exacerbated by the diverse and often marginal environmental conditions across the Pacific. Addressing these challenges is essential for climate change adaptation, necessitating the availability of seeds suited to a variety of environmental conditions. Experiences from initiatives like the Taro Improvement Programme and the VARTC highlight the potential of involving farmers in variety selection, trait identification, and on-farm evaluation and breeding. Embracing Participatory Crop Improvement can enhance farmers' ability to select high-performing plants and integrate these practices into seed enterprise development, underscoring the importance of viewing seed production as both a business and a technical endeavour from the outset.

6.4. Improved enabling environment to support sustainable seed systems.

The establishment of a supportive policy and regulatory framework is essential for developing an effective and efficient integrated seed system across the Pacific Island Countries and Territories

(PICTs). Engaging in policy dialogue and advocacy is crucial to address and navigate the complexities surrounding policy and regulatory issues that impact seed distribution and exchange across borders, including proprietary rights that may restrict seed saving and reuse by farmers. Additionally, developing mechanisms for emergency response in case of natural disasters is necessary. The Roadmap aims to guide and assist in the development of national seed policies, emphasizing the importance of a conducive environment for seed systems.

6.4.1. National seed policies and plans

It is imperative for countries to either formulate national seed policies or amend existing agricultural policies, sector plans, and legal frameworks to foster the availability of diverse and quality seeds. Such policies should support integrated seed systems and encourage the production and dissemination of open-pollinated seed varieties. Biosecurity concerns, including GMOs, food safety, and the management of plant diseases, pests, and invasive alien species, should be addressed comprehensively. Cross-sectoral partnerships necessitate a review of existing policies to identify and resolve any conflicting statements regarding seed systems. Strengthening policy frameworks involves enhancing the capacities of governments and stakeholders to develop sectoral and cross-sectoral policies, investment plans, and programs that recognize the critical role of integrated seed systems in food security and nutrition. The FAO stands as an important partner in bolstering seed sector policies at the national level.

6.4.2. Quality assurance schemes

Seed quality underpins the success of any seed system. Addressing quality standards and assurance schemes comprehensively is crucial for strengthening and, wherever possible, harmonizing these across the region. Effective seed production enterprises depend on establishing robust, technically sound, and practical standards. The challenge of ensuring seed quality extends from imported seeds, which may be compromised by poor handling by retailers and farmers, to Open Pollinated Varieties (OPV) seeds, where quality assurance is vital for ensuring viability, yield, and fostering trust among farmers.

The establishment of quality assurance schemes that could be regionally standardized is essential. A consensus on the need for a regional centre for seed quality and assessment is pivotal, with CePaCT potentially overseeing plant materials originally sourced from its genebank. The development of seed quality assurance and certification mechanisms raises the question of whether to employ regional or national inspectors or to encourage farmer/community-based standards. The latter approach could involve practices such as self-certification and labelling through systems like the PGS, QDS and QDPM, possibly integrating different levels of quality assurance.

The Pacific Seed Forum has proposed that CePaCT could serve as a regional hub for overarching seed quality assessment. This suggestion underscores the need for a coordinated approach to seed quality, leveraging regional strengths and capacities.

6.4.3. Harmonisation of phytosanitary standards

Identifying market opportunities and conducting cost of production studies are essential steps towards expanding trade in seeds within the region. Positive outcomes from these studies could pave the way for implementing stringent quality assurance based on a comprehensive understanding of the risks posed by quarantine pests and diseases. Countries have expressed a desire for more transparent, simplified, and standardized biosecurity processes. Harmonizing phytosanitary standards for seed importation could significantly facilitate seed exchange between countries. The Pacific Plant Protection Organization (PPPO), facilitated by the SPC, could support initiatives aimed at accrediting

NGOs, private sector entities, farmer organizations, and associations to import seeds directly from CePaCT, thereby streamlining the dissemination of germplasm in the PICTs without compromising biosecurity.

7. Implementation arrangements

The identification of priority areas above is foundational to the PSSR, aiming to foster the development of an efficient and effective integrated seed system. The Roadmap's initial initiatives and interventions are designed to tackle early challenges while laying a foundation for addressing future issues through established changes, particularly in strengthening partnerships and network mechanisms.

The structure of the SPC Land Resource Division (LRD), which encompasses four pillars including Genetic Resources and Sustainable Agriculture for Food and Nutrition Security, suggests that the Roadmap's implementation will primarily align with the Sustainable Agriculture for Food and Nutrition Security Pillar. However, its relevance spans across other pillars, notably the Genetic Resources Pillar. This structural alignment within LRD ensures that the Roadmap's initiatives will integrate into LRD's broader activities and contribute to the diverse impact pathways related to seed use, as outlined in the Pacific seed systems Theory of Change (see annexes).

Successful implementation of the Roadmap hinges on sufficient resourcing, including the dedication of staff specifically to seed systems work. It also requires comprehensive coordination among agencies and ongoing or planned projects at both national and regional levels. Establishing a steering committee or a Technical Advisory Group (TAG) comprising representatives from key Pacific Seed Sector actors—including SPC, FAO, PAPGREN, PIRAS, PIFON, and POETCom—may facilitate this coordination. The necessity of such a committee or group will need evaluation, especially in the Roadmap's early developmental stages.

At the national level, implementation should adopt a people-centred and community-led approach, empowering farmers to identify and prioritize needs, thus ensuring ownership and sustainability. Community seed banks are one example of this approach. Coordination can leverage PAPGREN's focal points, which, as suggested during the Pacific Seed Forum, should include representatives from both the Ministry of Agriculture and non-governmental sectors to adequately cover both formal and informal seed systems. The potential establishment of a National Seed Steering Committee may be required for policy development and implementation, supporting the integrated seed system's establishment and effectiveness.

8. Sustainability

The sustainability of the Pacific Seed System is intricately tied to the availability of financial resources to support the initial implementation phases of the Roadmap. Recognizing the inherently finite nature of external funding, it becomes imperative to establish mechanisms for fund sourcing and generation at both regional and national levels. Experiences from other regions have demonstrated that microfinancing can offer seed producers short-term credit solutions to alleviate cash flow constraints. Furthermore, Business Trade Investment Boards, where available, should engage in providing soft loans to producers. Considering a user-pays approach for seed material could ensure the long-term self-sustainability of seed enterprises. Additionally, the creation of a competitive grant scheme could further bolster seed enterprises.

National endorsement and ownership of the Roadmap's priorities, facilitated through policy development, are fundamental for enduring sustainability. Concurrently, the critical need for ongoing regional support in technology, communication, and information underscores the broad-based nature of the sustainability challenge.

Emphasizing the pivotal role of seeds or PGR and seed systems in ensuring food and nutritional security, particularly in the context of climate change adaptation, is likely to enhance funding opportunities at both national and regional levels. This argument gains additional weight when presented across different sectors, highlighting the necessity for cross-sectoral platforms at both the regional and national levels. Should PAPGREN be envisioned to play a significant role in the Pacific Seed System, its formalization and integration into national frameworks and institutions will significantly contribute to sustainability.

To further underpin the Roadmap's implementation and its strategic priorities, the development of an investment plan is envisaged. This plan will not only support the Roadmap's rollout but also encompass conservation efforts for local crop diversity, pivotal for breeding programs in genebanks. This comprehensive approach aims to establish a robust foundation for the sustainable development of the Pacific Seed System, ensuring its resilience and adaptability in the face of evolving challenges.

9. Monitoring and evaluation

A detailed monitoring and evaluation (M&E) framework will be developed in accordance with the logical framework in Annex 2. A checklist for countries to facilitate tracking of the M&E process has been recommended.

10. Annexes

Annex 1. Pacific Seed Systems Theory of Change

<p>Long-term goal: A sustainable and innovative Pacific Seed System that enhances access to diverse, quality seeds and planting materials, contributing to resilient farming systems, and ensuring food and livelihood security for Pacific communities.</p>
<p>Impacts</p> <ul style="list-style-type: none"> • Increased availability of adaptable, resilient, nutritious, and climate-smart crop and tree varieties at the community, national, and regional levels. • Improved access to high-quality seeds of resilient food crops and tree species for Pacific communities. • Expanded use and adoption of high-quality seeds, leading to enhanced yields and increased incomes for Pacific communities.
<p>Outcomes</p> <ul style="list-style-type: none"> • Strengthened partnerships and linkages among seed supply chains and key stakeholders. • Enhanced documentation, awareness, and communication regarding seed systems within countries and communities. • Boosted national and regional capacities for quality seed production, dissemination, and conservation. • Fostered an improved enabling environment through supportive policies, legislation, and strategies, underpinning a sustainable seed system.
<p>Outputs</p> <ul style="list-style-type: none"> • At the sub-national (community) level: Enhanced community engagement, identification of knowledge gaps, creation of advocacy and knowledge products, and strengthened communication and outreach efforts. • At the national level: Capacity building for national stakeholders, establishment, and formalization of partnership platforms for seed systems, comprehensive capacity building on seed systems, improved information documentation and management, and development of policy and regulatory frameworks. • At the regional level: Increased awareness, buy-in, and commitment among regional and development partners; establishment and formalization of partnership platforms for seed systems; strengthened regional capacities for seed production, testing, management, and distribution; and the enactment of seed production guidelines and a research framework aligned with country priorities.
<p>Risks/assumptions</p> <ul style="list-style-type: none"> • Favourable country environments for the implementation of seed system initiatives. • Potential disruptions due to cyclones, volcanoes, pandemics, and international travel restrictions. • Availability and commitment of staff to support in-country activities. • Technical capacity of staff in countries, alongside procurement and logistics challenges. • Acceptability and adoption of integrated seed systems by the countries.
<p>Inputs/activities</p>

- *Capability and Influence:* Capacity development for seed champions at both national and regional levels; establishment and maintenance of networks among seed champions, farmers, research institutions, and other stakeholders in PICTs.
- *Policy to Action:* Advocacy and policy dialogue to foster an enabling policy environment for sustainable seed systems in PICTs.
- *Innovation and Research:* Implementation of participatory varietal selection and plant breeding; development and execution of national and regional research frameworks and seed business plans for the production and utilization of quality seeds.
- *Data, Statistics, and Knowledge:* Collection of data on seed champions and their roles, seed production and market dynamics, crop characteristics, and varieties.

Annex 2. Monitoring and Evaluation Framework

RESULTS CHAIN		INDICATORS	BASELINES	TARGETS	MOVs	R&A
GOAL	A sustainable and innovative Pacific Seed System that improves access to a diversity of quality seeds and planting materials, contributing to resilient farming systems for food and livelihood security of the Pacific communities.	<ul style="list-style-type: none"> Increased diversity of seed systems in countries 	<ul style="list-style-type: none"> To be established 	<ul style="list-style-type: none"> Functional seed systems operational at the national and regional levels contributing to food and livelihood systems in countries 	<ul style="list-style-type: none"> Survey reports. National agro biodiversity reports 	<ul style="list-style-type: none"> Commitment from governments in enhancing seed systems
IMPACTS	1. Pacific communities have increased availability of adaptable, resilient, nutritious and climate-smart crop and tree varieties at the regional, national and in communities.	<ul style="list-style-type: none"> Number of cultivars selected against stress traits. Number of high nutritional varieties. 	<ul style="list-style-type: none"> To be established 	<ul style="list-style-type: none"> At least 1 drought, 1 water logging and several pests and disease-resistant varieties promoted to countries. At least three nutritional varieties promoted to countries. 	<ul style="list-style-type: none"> CePaCT annual reports Annual reports Publications 	<ul style="list-style-type: none"> Capacity of countries to do proper evaluation and screening of crop varieties

	2. Pacific communities have increased access to high-quality seeds of resilient food crops and tree species.	<ul style="list-style-type: none"> • Number of open pollinated and clonal varieties developed and released. • Number of seed enterprises. 	<ul style="list-style-type: none"> • To be established 	<ul style="list-style-type: none"> • Governments have increased access to technologies to support ongoing seed production. • Seed enterprises sdecentralised to support ongoing access to seeds 	<ul style="list-style-type: none"> • PAPGREN reports • Annual reports 	<ul style="list-style-type: none"> • Strong support to inter-agency collaboration on seed systems
	3. Pacific communities have wider use and adoption of high-quality seeds, boosting yields and raising incomes, leading to improved food and nutritional security and livelihoods.	<ul style="list-style-type: none"> • No. of community seed banks and no. of operating units. 	<ul style="list-style-type: none"> • To be established 	<ul style="list-style-type: none"> • Communities and farmers have increased access to diverse portfolio of quality seeds 	<ul style="list-style-type: none"> • Annual reports • Knowledge products 	<ul style="list-style-type: none"> • Strong commitment and participation from communities in seed
OUTCOMES	1. Strengthened partnerships and linkages among seed supply chains and key stakeholders.	<ul style="list-style-type: none"> • Regional and national stakeholders mapping • partnership platforms for seed systems established and formalised. • Business case for partnerships 	<ul style="list-style-type: none"> • Weak linkages among stakeholders • Limited funding to support networks 	<ul style="list-style-type: none"> • PAPGREN sformalised with linkages to relevant national stakeholders on seed stakeholders established. • National seed partnership platforms with linkages to communities and farmers. 	<ul style="list-style-type: none"> • PAPGREN Reports • SPC annual reports 	<ul style="list-style-type: none"> • Commitments to partnerships • Conducive environment supporting seed systems.

		(PAPGREN) established.		<ul style="list-style-type: none"> Regional and national strategies developed with sustainable funding on seed systems in the Pacific. 		
	2. Improved documentation, awareness and communication on seed systems in countries and communities.	<ul style="list-style-type: none"> Analysis of communication and outreach practices Communication and outreach at the national and regional level Documentation and information guidelines in place to support research capacities 	<ul style="list-style-type: none"> Limited research capacities Limited access to information on seed systems 	<ul style="list-style-type: none"> Availability of targeted advocacy and knowledge products Regional information system in place Information dissemination channels established and operational. Knowledge retention secured 	<ul style="list-style-type: none"> Communication materials Project reports Annual reports Media and social media outlets 	Willingness to support information sharing amongst stakeholders
	3. Enhanced national and regional capacities on quality seed production, dissemination and conservation.	<ul style="list-style-type: none"> Analysis of capacity building needs Capacity building plan for seed systems developed. Training guidelines developed. 	<ul style="list-style-type: none"> Limited capacity of stakeholders Limited access to training opportunities on seed systems 	<ul style="list-style-type: none"> Documentation of knowledge gaps Improved capacities of stakeholders on seed production Seed quality control operational in countries Seed distribution mechanisms operational in countries 	<ul style="list-style-type: none"> Training reports Training guidelines Project reports 	Availability of staff in countries supporting seed systems

	4. Improved enabling environment (policies, legislations, strategies) to support sustainable seed system.	<ul style="list-style-type: none"> • Review of national seed systems policies • National seed policies and strategies developed 	<ul style="list-style-type: none"> • Existing biosecurity regulations on seeds 	<ul style="list-style-type: none"> • Quality assurance schemes • Harmonisation of seed-related policies 	<ul style="list-style-type: none"> • Policy framework • Annual reports 	Strong political will and support on seed systems
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