Pacific Horticultural & Agricultural Market Access Plus Program

Supported by Australia & New Zealand

# Samoan Taro

PHAMA Plus Performance Story

Australian Aid

NEW ZEALAND FOREIGN AFFAIRS & TRADE
Manatū Aorere

**Samoan Taro - PHAMA Plus Performance Story**

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# Executive Summary

Taro is central to Samoa's food security, cultural identity and rural livelihoods, and has been a continuing focus of Australia and New Zealand's support for the agriculture sector through PHAMA and PHAMA Plus. This Performance Story assesses how the programs have contributed to rebuilding the taro industry after taro leaf blight, focusing on their role in strengthening biosecurity systems, supporting on-farm productivity through expanded access to improved planting material, and enhancing the capacity to export. The analysis draws on government data, market studies and interviews with farmers, exporters, officials and program staff.

PHAMA and PHAMA Plus, in partnership with the Samoan Ministry of Agriculture and Fisheries (MAF), Australian Department of Agriculture, Fisheries and Forestry (DAFF) and New Zealand Ministry for Primary Industries (MPI), have contributed to improved capacity to manage and adapt to biosecurity threats. Program investments in surveillance, diagnostics, fumigation and treatment systems, aligned with partner requirements, have helped Samoa avoid market access constraints driven by pests, diseases or compliance failures, and underpinned ongoing access for taro and other crops. These contributions are particularly important with the recent establishment of the Samoa Export Authority, signalling Samoa's commitment to sustain biosecurity and market access gains through its own systems.

There is strong evidence that taro farming capacity has increased significantly across both Upolu and Savai'i as a result of more planting material (tiapula) becoming available through coordinated efforts by PHAMA Plus and MAF, contributing to both production volumes and productivity gains. PHAMA Plus has played a central role in diagnosing the absence of commercial nurseries as a key constraint, supporting MAF nurseries and crowding in private nurseries and commercial farmers to participate in tiapula production. This has begun to close the gap between research plots and farmers' fields and has shifted perceptions of planting material from a welfare entitlement towards a paid, higher-value input that can underpin farm income growth. There is strong evidence that the nursery model and the emerging tiapula industry are on a sustainable trajectory, despite still being at an early stage.

There is also strong evidence that Samoa's technical capacity to export taro has improved, even though actual export volumes remain constrained by production levels, price signals and global competition. PHAMA and PHAMA Plus have supported MAF and exporters to strengthen processing infrastructure, coldchain facilities and compliance systems, including contributions to the central packhouse, reefer capacity and testing a hotwater treatment pathway for fresh exports. From a technical and regulatory perspective, Samoa is better prepared to meet the requirements of markets such as New Zealand, American Samoa and Australia. However, high domestic demand and prices, tight supply and strong competition from other Pacific suppliers mean that export capacity now outstrips available product; the binding constraint lies on-farm rather than in export systems. -chain -water treatment pathway for fresh exports.

For future support, several lessons and implications emerge. First, taro should be considered a strategic cash crop within Samoa's food and agriculture system, with export ambitions carefully sequenced behind genuine production and efficiency gains so that food security is not compromised. Second, consolidating and scaling the mixed public–private nursery model is a priority for the next phase, deepening coverage (including in Savai'i) and strengthening commercial incentives. Third, the next frontier lies in addressing on-farm constraints – particularly labour shortages, limited mechanisation options and feral pig damage – including through a national feral pig management strategy and targeted investments in fencing and context appropriate mechanisation. Fourth, export strategies could focus on consolidating and maintaining biosecurity and market access gains and finding efficiencies to improve competitiveness, including through export enabling infrastructure, rather than seeking further expansion ahead of securing increased supply.

# Contents

# Acronyms

| | |
|---|---|
| **ABC** | Australian Broadcasting Corporation |
| **ACIAR** | Australian Centre for International Agricultural Research |
| **DAFF** | Department of Agriculture, Fisheries and Forestry (Australia) |
| **DFAT** | Department of Foreign Affairs and Trade (Australia) |
| **FAO** | Food and Agriculture Organization of the United Nations |
| **GDP** | Gross domestic product |
| **GEDSI** | Gender Equality, Disability, and Social Inclusion |
| **GHG** | greenhouse gas emissions |
| **HACCP** | Hazard Analysis and Critical Control Point |
| **HWT** | hot water treatment |
| **HWHP** | hot-water, high-pressure treatment |
| **IMTS** | International merchandise trade statistics |
| **MAF** | Ministry of Agriculture and Fisheries (Samoa) |
| **MAWG** | Market Access Working Group |
| **MDF** | Market Development Facility |
| **MFAT** | Ministry of Foreign Affairs and Trade (New Zealand) |
| **MPI** | Ministry for Primary Industries (New Zealand) |
| **NZ** | New Zealand |
| **PALM** | Pacific Australia Labour Mobility (scheme) |
| **PHAMA** | Pacific Horticultural and Agricultural Market Access Program |
| **PHAMA Plus** | Pacific Horticultural and Agricultural Market Access Plus Program |
| **PPIU** | PACER Plus Implementation Unit |
| **PTI** | Pacific Trade Invest |
| **RSE** | Recognised Seasonal Employer (scheme, New Zealand) |
| **SAFPROM** | Samoa Agriculture & Fisheries Productivity and Marketing Project (World Bank) |
| **SBS** | Samoa Bureau of Statistics |
| **SEA** | Samoa Export Authority |
| **SPC** | The Pacific Community |
| **SROS** | Scientific Research Organisation of Samoa |
| **US ITC** | United States International Trade Commission |
| **WST** | Western Samoan tala |

# 1 Samoa's Taro Sector

## 1.1 Market Analysis

Taro remains a key cash crop in Samoa, with an estimated annual value of around WST3.8 million (approximately AUD2.1 million) in recent years and supporting over 18,000 households (Samoa Bureau of Statistics 2023; PHAMA Plus 2024a). It is central to food security, cultural identity and *fa'alavelave* obligations, while also providing one of the few scalable opportunities for smallholders to earn cash income from agriculture. This dual role as a staple food and a cash crop sits at the heart of the recent history of taro in Samoa and shapes how the market system works today.

The story of taro over the last half-century is one of deep disruption followed by gradual, uneven recovery. Older farmers and exporters recall that during the 1970s and 1980s Samoa was a dominant Pacific exporter, shipping some 30–40 containers of taro per month to overseas markets before taro leaf blight struck (McGregor 2012; MAF 2024; MAF CEO interview 2025). The taro leaf blight outbreak in the 1990s devastated production and exports, wiping out the dominant export variety and collapsing what had been a major Pacific export industry centred on Samoa. Subsequent investments by MAF, SROS, SPC and research partners such as ACIAR helped identify and introduce new taro varieties, restore on-farm productivity and reestablish basic market pathways. By the mid 2010s, Samoa had re-established production using these new varieties, and regained some capacity to export to key markets such as New Zealand and Australia. However, the scale and structure of the industry that emerged is very different from the pre-blight era.

Recent production data shows a sector that has partially recovered in volume but remains vulnerable to shocks. Peak taro production in 2015 reached around 28,457 tonnes, before dropping sharply and then recovering to an estimated 21,389 tonnes in 2023 (MAF 2024; Samoa Bureau of Statistics 2023). These headline numbers mask volatility at the farm-level driven by cyclones and extreme weather events, feral pig damage, labour shortages, land access, and shifting incentives between domestic and export markets. Production patterns also sit within a broader agricultural economy that remains relatively small and fragmented, with agriculture accounting for less than 10% of GDP through more than 70% of households (Samoa Bureau of Statistics 2023; FAO 2024). As one agribusiness leader reflected: "The agriculture sector is small in Samoa, less than 10% of GDP … it is very diversified because they need everything, but there is no scale" (Jim Liu, Sunfield Agriculture, interview 2025).

The composition of demand for taro has also shifted. Today, most taro in Samoa is produced for subsistence and domestic consumption, with only a relatively small share entering formal export channels. Domestic urban markets, hotels and food services, institutional buyers, and remittance-supported households all drive strong demand and underpin relatively high domestic prices. Domestic consumption alone is a driving market force: the most recent taro production peak of 28,457 tonnes (2015) is similar to production levels in the late 1980s/early 1990s, but the country's population – and consumption needs—has grown 25% during the same period.

In parallel, there is steady demand from overseas Samoan communities and nearshore markets. When exports resumed in 2013, sales of around 1,000 tonnes were recorded, increasing to 2,000 tonnes in 2015 and almost 3,000 tonnes in 2017, mostly absorbed by the New Zealand market. A significant portion of regional trade is now captured through the American Samoa market, with regular weekly ferry services facilitating shipment of fresh taro, alongside more informal consignments sent through personal logistics and family networks. As Jim Liu continued, "agriculture exports are mainly targeting overseas Samoans … the market is niche but sufficient for the scale they can produce" (Jim Liu, Sunfield Agriculture, interview 2025).

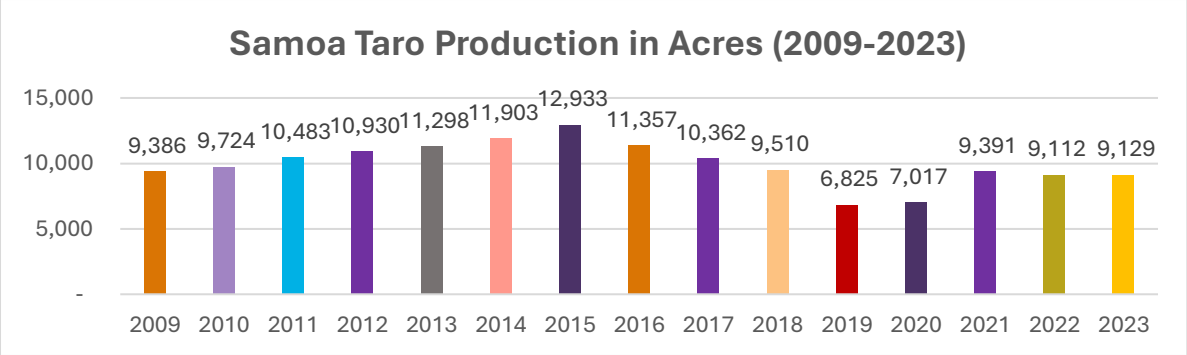
Formal exports to New Zealand, Australia and other Pacific markets remain important but are highly sensitive to changes in domestic supply and prices. In 2020, Samoa exported around 2,043 tonnes of taro, but this had fallen to approximately 796 tonnes by 2024 – less than the equivalent of 5 shipping containers per month (MAF 2024; Samoa Bureau of Statistics 2024). The sharp fall in export volumes in

2023–24 was driven less by market access issues than by a squeeze on available supply and domestic price signals, with high local prices and tight supply drawing taro away from the export market. A combination of adverse weather, feral pig damage, higher input and labour costs, and strong local demand made it harder for exporters and processors to secure sufficient volumes of the right quality at prices that remained competitive once processing and freight costs were factored in. One exporter noted "As recently as 2 years ago, we were exporting one shipping container a month to American Samoa and 3–4 per month to New Zealand. But now we are lucky if we do one to American Samoa and maybe one to New Zealand" (Foundations for Farming exporter, interview 2025).

Underlying value chain constraints have amplified these pressures. Exports are constrained by inconsistent supply, the limited number of commercially oriented farmers producing at scale, and a long tail of smallholders selling opportunistically into local markets. Quality planting material has not always kept pace with demand, and high costs of production – including land preparation, weeding, harvesting and transport from remote areas – have eroded margins. Processors face high fixed costs for labour, energy and compliance, which makes it difficult to operate packhouses and processing facilities at efficient capacity.

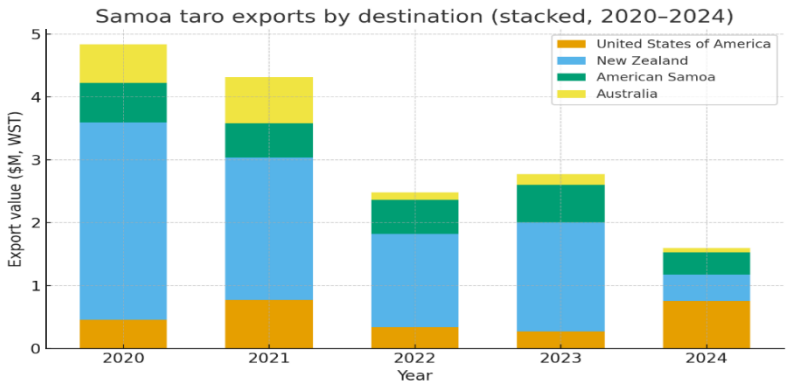
These dynamics have pushed producers to focus primarily on domestic and nearshore markets, where cash can be realised more quickly and price signals are stronger. Farmers and village suppliers can obtain higher returns per kilogram selling into local markets or to buyers shipping to American Samoa, compared to what exporters can afford to pay for product destined for New Zealand or Australia once processing and freight are considered. Domestic prices have remained significantly higher than export-equivalent prices, squeezing exporter margins and leading some to scale back or suspend operations. At the end of 2025, the estimated price for taro was approximately WST$9 per kilogram in the local markets, while American Samoa and New Zealand exporters were receiving approximately WST$5.5 and WST$6 for fresh product, respectively. This has further weakened incentives for farmers to specialise in export-grade production, reinforcing a cycle of undersupply for formal export markets (PHAMA Plus 2021; PHAMA Plus 2024a).

*Figure 1. Samoa taro production in acres (2009-2023).*



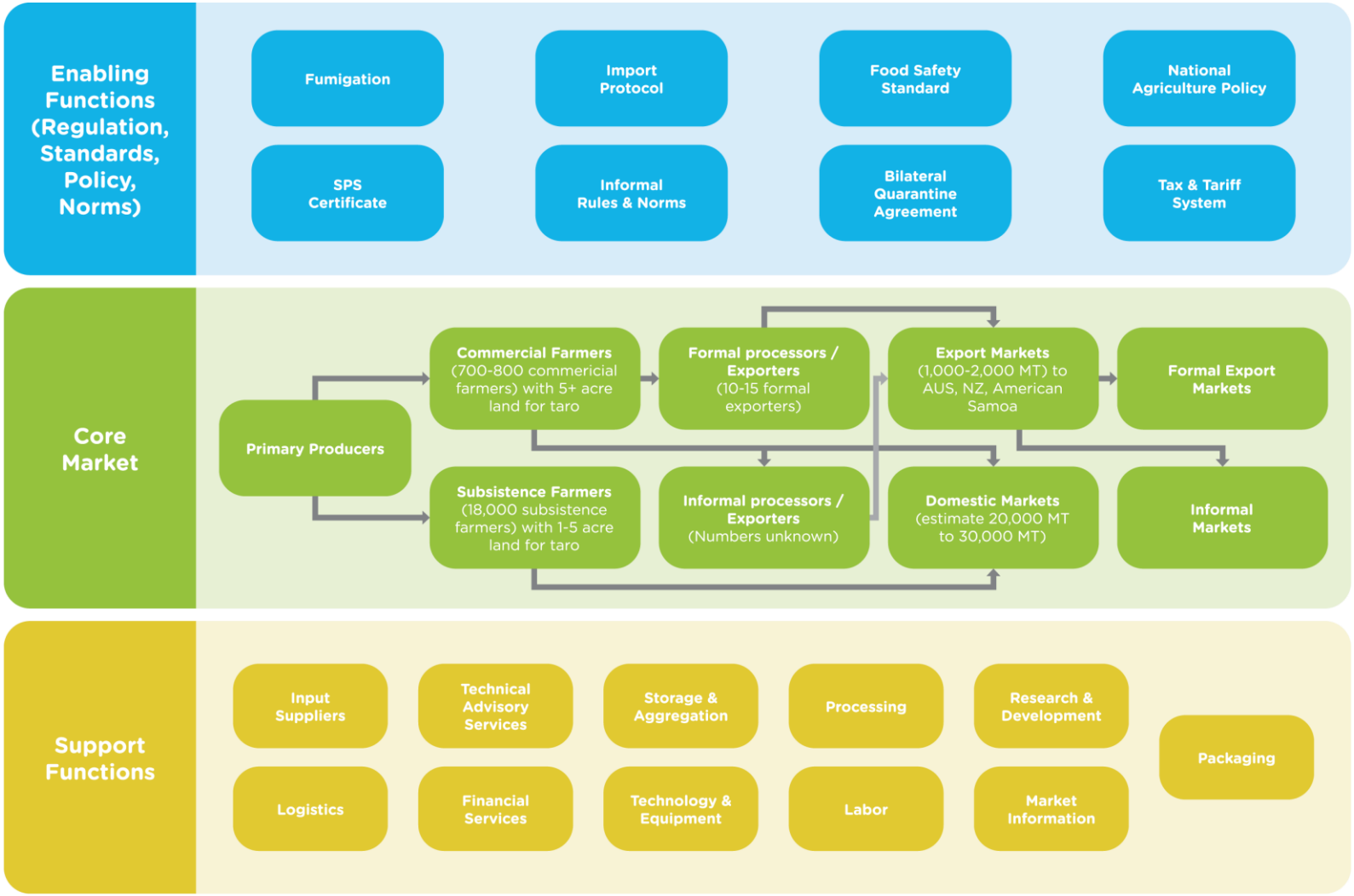

**Source:** *FAOSTAT (FAO 2024)*

*Figure 2. Samoa taro exports by destination (2020-24).*




**Source:** *ITC Trade Map (2025)*

*Figure 3. Market Analysis by PHAMA Plus showing competition between domestic and export markets (2024a).*




***Source:*** *Samoa Taro Sector Strategy (PHAMA Plus 2024)*

## American Samoa as a near-shore extension of the domestic market

The main Samoan export market of American Samoa effectively functions as an extension of the domestic market. Weekly shipping services allow exporters to move relatively small consignments – roughly 200 bags on pallets compared with around 600 bags required to fill a 20-foot container to New Zealand – reducing volume risk and enabling more flexible purchasing from farmers. For example, Saint Agriculture Produce & Export has pivoted towards American Samoa, selling around 100–200 bags of 22 kg bags of taro per week (equivalent to roughly 2–4 tonnes), sourcing 75–80% of supply from other farmers (Saint Agriculture, interview 2025). Because trade is conducted in US dollars, American Samoa can sometimes offer better returns than local markets, especially when domestic prices soften or when exchange rate movements are favourable. American Samoa offers a near-shore, cash-flow-friendly outlet that competes directly with domestic markets for available supply, often out competing longer-haul markets when taro is scarce.

## Australia and New Zealand offer under-utilised opportunity

Australia remains a medium term export opportunity for frozen taro, but realising this requires both technical compliance and sufficient production to justify the additional costs. Market analysis shows that Australia imports significant volumes of taro and other root crops from Pacific Island countries, with Fiji dominating while Samoa currently captures only a very small share despite strong diaspora demand for Pacific foods. The total volume being imported has remained steady for many years and an increasing share of the market is now being supplied from Vietnam, China and Indonesia. This suggests space for Samoan taro to grow but only if it can offer reliable volumes of competitively priced compliant product.

Similarly, in New Zealand, total imports of taro from all origins declined from 6,181 tonnes in 2020 to 4,395 tonnes in 2024 but began to increase again in 2025 to 4,921 tonnes (NZ Customs 2024; PHAMA Plus 2024b; ITC 2026). These trends suggest that overall demand remains substantial, particularly from diaspora communities. Imports from Fiji have remained relatively steady while those from Tonga have grown substantially; with small but consistent volumes from China and Vietnam. For Samoa, which currently supplies only a small share of this market, the key question again is not whether demand exists, but whether domestic production and export systems can deliver sufficient volumes of consistent, high-quality taro at competitive prices.

*Figure 4. Australia taro imports by source country, 2020-2024 (Pacific Trade Invest, 2025).*

# TARO

Australia sources the majority of its taro from the Pacific. In 2024, Pacific taro represented 83% of Australia's total import value and 74.1% of total import volume. Fiji supplied 81.3% of Australia's taro imports (by value), followed by Tonga, Samoa and PNG.

## FROM 2020 TO 2024

**Value** – Pacific taro dropped by 0.1 percentage point in the Australian market, representing a 0.1% relative decrease.

**Volume** – Pacific taro dropped by 5.7 percentage points in the Australian market, representing a 7.1% relative decrease.

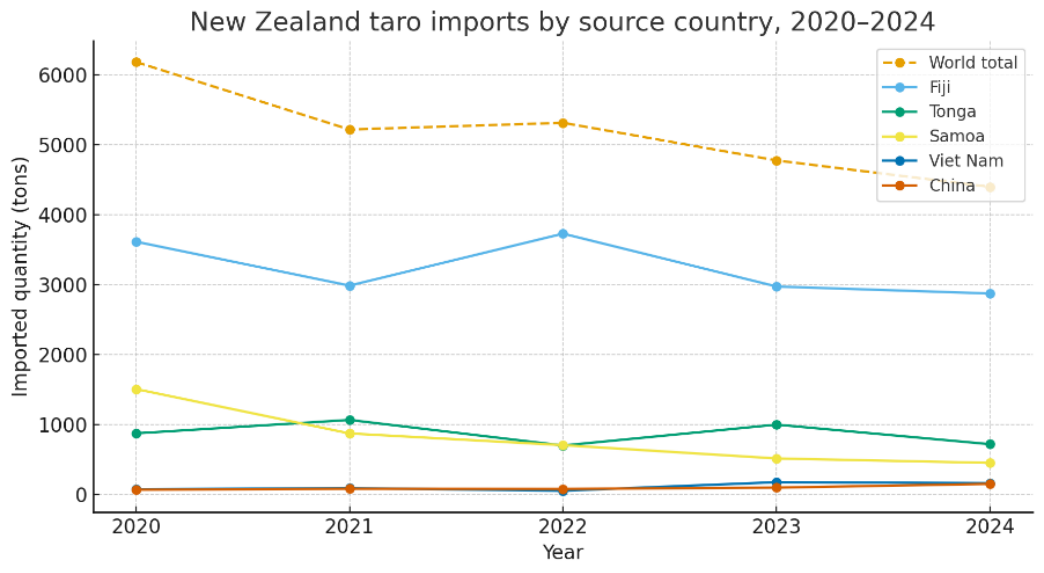
*Note: According to the FAO, in 2023, Australia imported 38% of the Pacific's total taro exports, the second-largest importer after New Zealand.*

KEY Value ($A) Volume (kg)

## TARO

| PARTNER | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| Fiji | 8,161,587 | 7,575,214 | 7,881,243 | 9,429,106 | 10,648,760 |
| | 2,013,408 | 1,954,310 | 2,083,384 | 1,700,630 | 1,835,922 |
| Niue | 28,763 | 108,253 | 105,026 | 0 | 0 |
| | 4,365 | 17,730 | 18,860 | 0 | 0 |
| Papua New Guinea | 11,314 | 0 | 0 | 0 | 45,533 |
| | 3,730 | 0 | 0 | 0 | 14,010 |
| Samoa | 123,056 | 667,333 | 179,134 | 132,854 | 77,376 |
| | 34,174 | 194,415 | 54,873 | 33,580 | 23,420 |
| Tonga | 127,074 | 118,097 | 101,828 | 140,422 | 97,577 |
| | 109,446 | 117,283 | 100,998 | 113,342 | 62,648 |
| Vanuatu | 0 | 3,958 | 19,011 | 5,468 | 0 |
| | 0 | 920 | 8,820 | 1,146 | 0 |
| **Total from the Pacific** | **8,451,794** | **8,472,856** | **8,286,242** | **9,707,849** | **10,869,245** |
| | 2,165,124 | 2,284,658 | 2,266,934 | 1,848,698 | 1,936,000 |
| **Global Total** | **10,169,656** | **10,358,003** | **10,082,783** | **11,772,149** | **13,090,825** |
| | 2,712,588 | 2,858,004 | 2,764,137 | 2,383,001 | 2,611,961 |
| **% Pacific** | **83.10%** | **81.80%** | **82.20%** | **82.50%** | **83.00%** |
| | 79.80% | 79.90% | 82.00% | 77.60% | 74.10% |

*Figure 5. New Zealand taro imports by source country, 2020-2024 (UN Comtrade Statistics, 2025).*



## 1.2 Industry leadership and strategy

Samoa's agriculture sector benefits from a relatively strong coordination architecture. Stakeholders across government, including MAF and SROS, development partners such as PHAMA Plus, FAO and the Market Development Facility (MDF), and the private sector and other agencies share a broadly aligned view of sector priorities and directions, reinforced by longstanding interpersonal relationships and regular dialogue platforms. As reflected in discussions with key stakeholders, there is a widely held sense that "the Samoan agriculture sector has a very good coordination system in place … [and] stakeholders, including MAF, PHAMA Plus and private sector, have a good shared understanding of the priorities and directions. This is complemented by interpersonal relationships" (PHAMA Plus Market Access Working Group stakeholder, interview 2025). This coordinated approach underpins the sector strategy to rebuild taro production while preparing the export system for future growth.

### 1.2.1 Clear policy and strategic framework

These coordination arrangements sit within an increasingly focused policy and strategic framework for food and agriculture. The Samoa National Food Systems Pathway 2030 and the National Food and Nutrition Policy 2021–2026 set out high-level objectives around nutrition, access to food and food quality, while the emerging root crop and horticulture strategies translate these into more specific priorities for crops such as taro.

During the course of PHAMA Plus, the program convened the Market Access Working Group (MAWG). This created a dedicated platform for public-private engagement and leveraged the existing relationships within the agricultural system so that the program's strategy was locally-led. This approach ensured strong relevance for Samoa's context, and heightened impact and sustainability for the long term.

New export-focused institutional arrangements also came into effect in 2024. The Government of Samoa established the Samoa Export Authority (SEA) with a Board and Chief Executive to provide a dedicated institutional home for export promotion and coordination. A recent letter from the MAWG to the SEA Board Chair highlights how SEA is viewed as a "natural avenue" through which to continue the public–private dialogue functions previously convened under PHAMA Plus (Samoa MAWG 2025). SEA's mandate – which includes supporting enabling policy and legislative settings, boosting production and productivity, and improving market access – is expected to complement MAF's technical and regulatory role and SROS's research functions (Government of Samoa 2024; SEA 2024). If these roles are clearly defined and well-coordinated, Samoa will have a stronger institutional platform for sustaining taro export growth beyond the lifetime of PHAMA Plus.

# Case Study: Local leaders drive local success

In Samoa's agriculture sector, things move more easily when people already know each other, trust each other, and understand how the system works. That is precisely the story behind Kuinimeri Finau, Pu'eata Tanielu, and their close working relationship with the Ministry of Agriculture and Fisheries (MAF) as part of the PHAMA Plus program.


Kuini, PHAMA Plus's Country Manager, previously spent 17 years at the Scientific Research Organisation of Samoa (SROS). She was one of the founding scientists and helped build the laboratories from scratch, pushing them through accreditation, starting the food and postharvest division and later the food science and technology division. Over those years, she worked with almost every part of the government, collaborated with numerous donors and the private sector on various projects. This meant that when she stepped into PHAMA Plus, she already had strong relationships with government stakeholders, exporters, and sector leaders. This connection supported genuine relationships in which both sides understood the challenges and worked together to develop solutions. She understood how farmers think, how exporters talk, and how ministries operate. "We already knew the people and the context," she says. "It made this role easier—because we knew what they meant even when they didn't say it directly."

For Pu'eata, PHAMA Plus's National Facilitator, the connection to MAF runs even deeper. He spent over 20 years in the ministry as a policy officer, researcher, and extension adviser. He has walked taro fields across Upolu and Savai'i, knows all the commercial farmers, and was part of the team that revived Samoa's taro industry after the blight, testing varieties and pushing the Samoa 1–5 varieties back into production.

When MAF asked PHAMA Plus for help during the recent shortage of taro planting material, the program responded quickly. The team recognised the urgency. "Helping MAF meant helping the whole country," Kuini explains. "It was a real food security issue."

The PHAMA Plus program has been committed to delivering through locally-led development approaches across the Pacific – focusing not just on what was done, but how it was done. The central Program Support Unit offered technical and operational support when it was needed, but the strategic directions and decision-making were firmly grounded with the local team and their Samoan networks. This leveraged key local relationships and knowledge to ensure activities were meaningfully contextualised and highly relevant. It also served to reinforce and build the leadership and networks for program staff as part of their local system; a lasting legacy that can continue to contribute to Samoa's agricultural development. Kuini has now been appointed to the Board of Samoa Export Authority, continuing to help drive sustainable change for the country's agriculture sector.

Working through and empowering local networks, which are built on long-standing cooperation and mutual understanding, has meant that PHAMA Plus has been able to offer support that works for Samoa. Proving that often, the success of a project isn't just the strategy behind it but good people who know their sector and know their community.

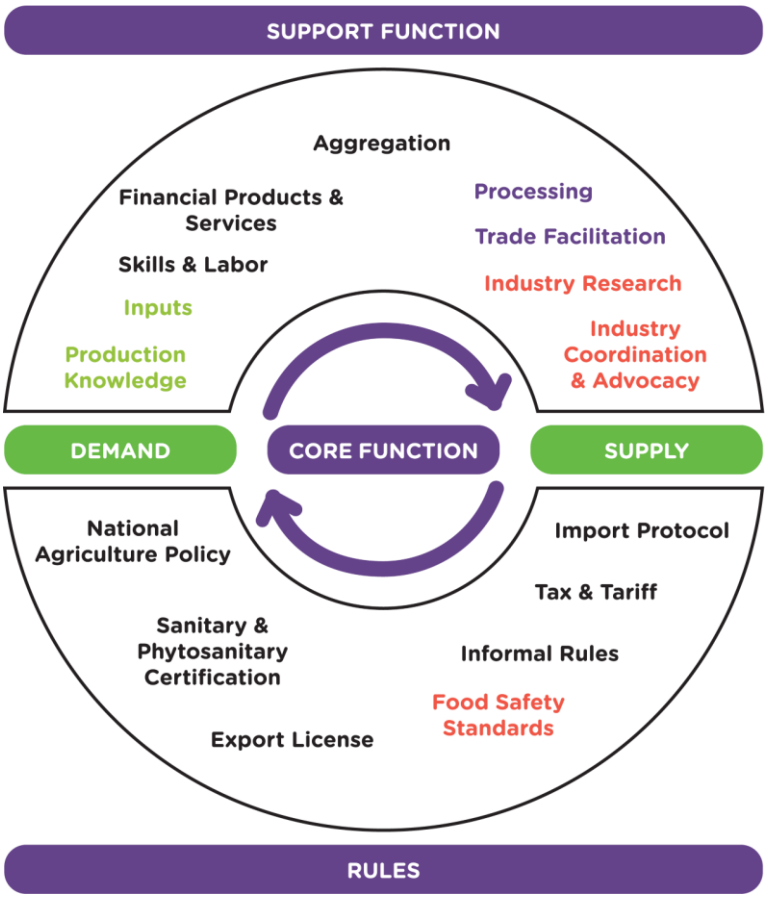
# 2 PHAMA Plus Interventions

Since 2011, PHAMA and PHAMA Plus have supported Samoa's taro sector across the full value chain – helping partners respond to binding constraints in the sector and embed practical systems and capability to build the resilience, reliability and recovery pathway for exports. The market system diagram for the Samoa taro sector (below) outlines the support and regulatory functions essential for the development, learning, adaptation and growth of the market. Notably the key support functions where PHAMA and PHAMA Plus have intervened, in partnership with both public and private sector stakeholders, are shown in coloured text. These investments have been committed across 3 mutually reinforcing pillars – addressing supply constraints; strengthening biosecurity systems for export pathways; and enabling market access and value-adding.

*Table 1. PHAMA Plus intervention focus areas for Samoa's taro sector.*

| Addressing supply constraints | Strengthening biosecurity systems for export pathways | Enabling market access and value-adding |
|---|---|---|
| Stimulate production by transitioning from a supply-oriented system to a sustainable mixed public–private nursery network. | Support institutional functions and regulatory credibility by strengthening surveillance, diagnostics, and treatment systems. | Enhance technical capacity for exports by strengthening processing infrastructure, cold-chain facilities, and compliance systems. |

*Figure 6. PHAMA Plus, Samoa Taro Market Systems Framework, 2025 (updated).*



Initially, the expectation within PHAMA Plus and among some partners was that support would focus primarily on increasing exports by addressing biosecurity, quality and market development constraints. However, early analysis and consultation with MAF, private sector stakeholders and other partners highlighted that input production – particularly the availability of quality planting material – had become a critical bottleneck. High domestic prices and tight supply meant that there was simply not enough taro being grown to meet both domestic food security needs and export potential.

As a result, PHAMA Plus's focus broadened from a narrow export lens to a more systemic approach centred on rebuilding the production base. In practice, this meant working with MAF and private nurseries to increase the availability of quality planting material, supporting government and private sector efforts to expand cultivated area, and helping exporters maintain core processing capacity so they are ready to respond as supply increases.

PHAMA and PHAMA Plus have contributed significantly to shaping the current state for Samoa's taro sector, through industry engagement, addressing taro supply shortages, supporting stronger biosecurity systems for export pathways, and enabling market access and value-adding for future export growth.

These interventions are outlined in the graphic below and in the following sections.

*Table 2. Overview of all PHAMA Plus interventions for Samoan Taro (PHAMA Plus, 2025).*

| | Addressing supply constraints | Strengthening biosecurity systems for export pathways | Enabling market access and value-adding |
|---|---|---|---|
| PHAMA | | • Established and supported Market Access Working Group (MAWG)<br>• Review of biosecurity factors affecting access for root crops to Australia and New Zealand markets<br>• Supported SROS to expand research capacity & develop good practice procedures to prepare frozen taro<br>• Installation of methyl bromide fumigation chamber for MAF & training of staff<br>• Supported SROS, PFR & MAF to develop and negotiate management options for taro leaf blight and development of export protocols for new access of fresh taro to Australia<br>• Supported SROS to improve lab testing capacity and achieve accreditation | • Supported exporters & MAF to expand processing capacity and promote frozen taro in Australia and New Zealand |
| PHAMA Plus Phase 1 | • Supported improved access to planting material for commercial farmers to alleviate COVID-induced food security concerns | • Supported piloting of procedures using high-pressure hot water treatment for exports of fresh taro to NZ pilot | • Review of status and opportunities of root crop exports, including Gender Equality, Disability, and Social Inclusion (GEDSI) considerations |
| PHAMA Plus Phase 2 | • Establishment of government nurseries to support access to planting material for taro exports<br>• Establishment of private nurseries with growers' groups to support access to planting material for taro exports<br>• Research and GEDSI analysis of smallholder farmers in root crops, kava and ornamental sectors | | • Co-invested with root crop exporters to increase capacity, diversifying exports into frozen product and expanding export volumes<br>• Provided training through the Samoa Business Hub on business management, including access to finance for business growth |

# 3 Strengthening Biosecurity Systems

There is strong evidence that PHAMA and PHAMA Plus, in partnership with MAF, PPIU, DAFF and MPI (New Zealand), have improved the capacity to manage and adapt to biosecurity threats. Following the devastation caused by taro leaf blight in the 1990s, Samoa's ability to re-enter high-value export markets such as New Zealand and Australia has rested on the capacity to comply with increasingly stringent biosecurity and food safety requirements. If not able to meet these requirements reliably and consistently, periods of rapid export growth can be followed by sharp contractions linked to biosecurity incidents and quality or compliance failures, significantly undermining market confidence and viability. PHAMA Plus deliberately built on the earlier work of PHAMA and national research partners to support the export of fresh and frozen taro that meets the quality, traceability and phytosanitary expectations of importing countries.

A key contribution of PHAMA and PHAMA Plus has been to strengthen Samoa's ability to treat and certify plant products in line with the evolving requirements of trading partners such as NZ MPI and Australia's DAFF. Biosecurity leadership noted the particular value of the program's technical and capital support to establish Samoa's fumigation facilities, ensuring market access with key trading partners (Biosecurity official, interview 2025).

Under PHAMA a new purpose-built fumigation chamber and associated training, equipment and operational procedures was provided to MAF. This was the first dedicated fumigation chamber in Samoa and a significant improvement in safety and efficacy. The new chamber now operates at high utilisation: "the fumigation chamber is being used every day and at full capacity" and has enabled Samoa to apply a "Samoa Biosecurity Seal" on all exports, signalling compliance to importing authorities (Biosecurity official, interview 2025). MAF has since dedicated staff and resources to sustain the chamber's operations, ensuring compliance for export but also for treating imported goods to protect the country from invasive pests and diseases. It has been so successful that the biosecurity team is now considering more fumigation chambers at the airport and in Savai'i, to reduce logistics costs for exporters (Biosecurity official, interview 2025).

Under PHAMA, a partnership with SROS to carry out technical research also led to the development of clear processing protocols for producing frozen taro that was cost effective while maintaining optimum quality. This was further supported with taro tasting promotion and marketing during a trade show in Sydney, Australia by the Samoa Association of Manufacturers and Exporters in 2015. Subsequently, the first container of frozen taro and breadfruit was accepted by Australia in 2016 for exporter Su'a Tanielu Su'a of Samoa Tradition Farmers and Growers marking a successful re-entry of Samoan taro in the Australian market.

Finally, the program has also supported increased uptake of Hazard Analysis Critical Control Point (HACCP) certification, to ensure exporters are able to meet international food safety requirements. PHAMA assisted many local businesses to become HACCP certified, including the MAF packhouse – used by many exporters - which achieved certification in 2018.

These investments have been part of a broader effort to align Samoa's export systems with the risk-based frameworks used by key partners. MAF has committed to setting its biosecurity and treatment standards to match or exceed those of MPI (New Zealand). Samoa now has the technical capacity and regulatory credibility to maintain and expand market access. "In the last 20 years, we have had over 22 crops added to market ... we have no issue with gaining market access. We need to have the production to supply the markets" (Biosecurity official, interview 2025).

## Trialling High Pressure Hot Water Treatment

PHAMA Plus worked in collaboration with Plant and Food Research (now the New Zealand Institute for Bioeconomy Science), private sector partner Farmer Joe, and SROS to support installation of required infrastructure and trials of high-pressure hot water treatment (HWT) for fresh taro exports. This treatment was an alternative biosecurity protocol against taro leaf blight, which had potential to allow Samoan fresh taro to gain access to the Australian market again.

The treatment was successfully trialled and piloted to treat surface-borne mites and nematodes for fresh taro to New Zealand. However, while the intervention demonstrated technical feasibility, the associated costs made HWT commercially unviable without heightened throughput, and so did not progress further.

Stakeholders note that American Samoa and much of the New Zealand trade are serviced with products that do not require HWT, while the Australian fresh pathway would entail additional costs that are difficult to justify until taro production increases and domestic prices ease (Biosecurity official, interview 2025; PHAMA Plus 2024a). However, this foundational piloting could pave the way for introducing HWT at a later date, if supply dynamics change or fumigation is phased out.

# 4 Establishing Taro Nurseries

## 4.1 Genetic improvements for disease tolerant cultivarstolerant cultivars-tolerant cultivars

PHAMA Plus deliberately built on the earlier work of PHAMA and national research partners, with a specific objective to increase the production of TLB-tolerant taro cultivars.

Genetic improvement of taro cultivars has been a critical, long-term response to TLB and an essential foundation for any sustainable export growth. ACIAR-supported breeding programs, working with MAF, SROS and regional partners, have developed a suite of TLB-tolerant cultivars, while PHAMA played a role in evaluating and supporting the release and promotion of these varieties for export markets. These new cultivars offer improved tolerance to TLB and, in some cases, larger corm size and better suitability for processing, making them more attractive for both fresh and frozen export markets.

Genetic selection has also been important for aligning production with market requirements. Export markets for fresh and frozen taro tend to favour larger corms and specific eating qualities, whereas domestic consumers often seek different attributes, including smaller sizes and particular taste or cooking characteristics.

However, prior to PHAMA Plus, these genetic gains were not being fully translated into farmers' fields. Improved cultivars existed in research plots and government nurseries, but the diffusion of planting material was patchy and slow, particularly beyond better-connected farmers on Upolu. Many farmers continued to rely on traditional varieties and on-farm recycling of planting material, limiting the spread of TLB-tolerant varieties and constraining productivity. As one nursery farmer observed, "many people still use traditional ways of growing, which means they are using the older varieties not the new ones" (Mano, nursery farmer, interview 2025).

The development and promotion of varieties that combine TLB tolerance with larger corm size and acceptable eating quality have therefore been central to PHAMA and PHAMA Plus's strategy to position Samoa as a premium taro supplier, particularly for Samoan and Pacific diaspora markets. As one technical stakeholder recalled, "PHAMA supported the distribution of cultivars for TLB-resistant varieties, building on many years of national research on disease response and yield" (Technical stakeholder, interview 2025). Nurseries are also increasingly focused on the improved varieties. Aialii's nursery "grows a range of different types of taro, but has started to focus on the newer varieties (export-focused, taro leaf blight-tolerant) as well as others" (Aialii Anapu, interview 2025).

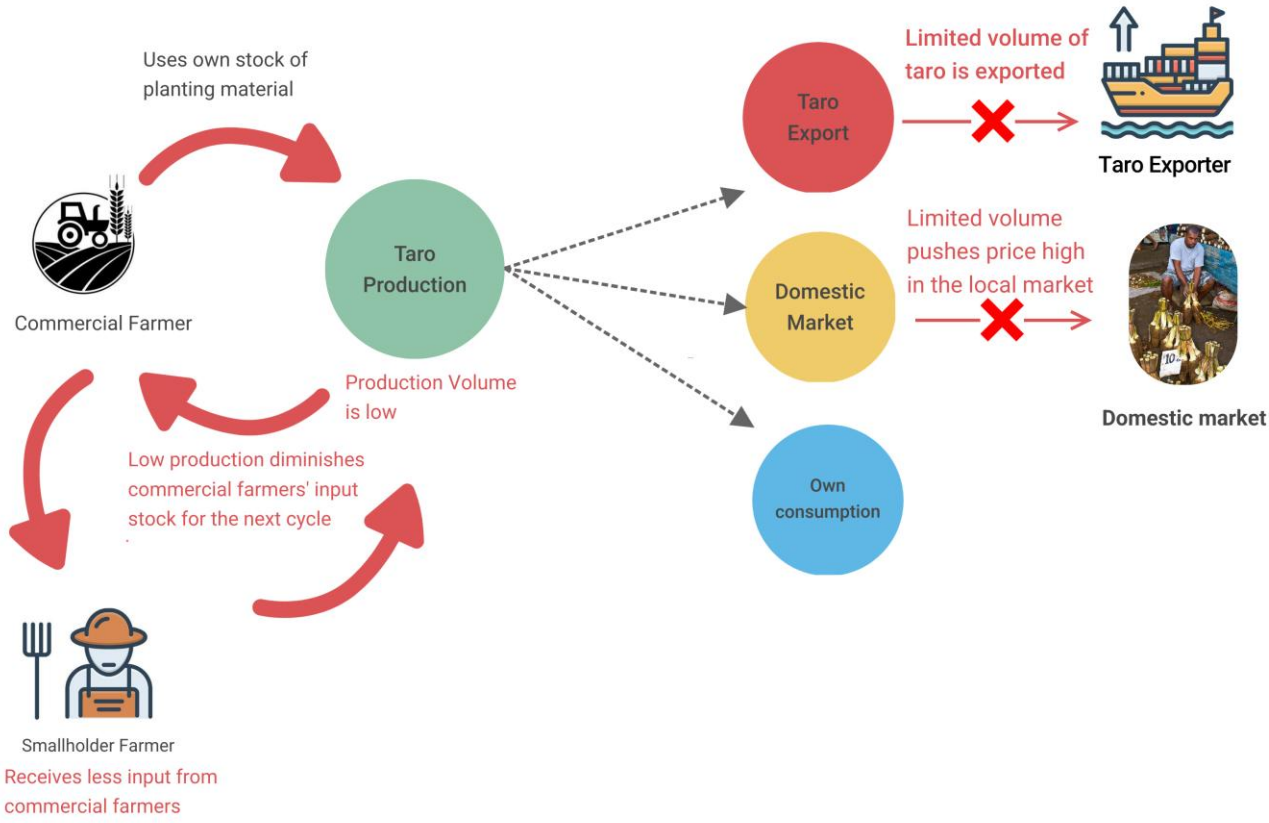
## 4.2 Moving from social protection to commercial nurseries

Before PHAMA Plus, the nursery system for taro in Samoa was dominated by MAF and largely framed as a form of social protection rather than a commercial input market. MAF, as the leading provider of tiapula, typically prioritises distribution for subsistence purposes to smaller and poorer farms, complementing the social protection system, and is not necessarily oriented toward commercial farmers. The large MAF nursery facility just outside Apia would grow tiapula and, when supplies were sufficient, districts would receive an allocation which was then redistributed generally as around 200–300 tiapula per farmer or household (MAF 2015; MAF 2024). Supplies were inconsistent, and while there was some scope for farmers to purchase planting material from MAF, this was limited and often linked to village grants or other forms of assistance.

In this model, the largest commercial farmers tended to grow their own tiapula to secure supply, but most subsistence households and semi-commercial farmers did not have the scale or resources to do so and remained dependent on MAF or commercial farmers in the community. This constrained both the speed at which TLB-tolerant varieties could spread and the ability of farmers to expand areas in response to high prices. As one nursery farmer observed, "many people still use traditional ways of

growing, which means they are using the older varieties, not the new ones" (Mano, nursery farmer, interview 2025). The absence of a functioning commercial nursery system was therefore a critical bottleneck – the missing link between genetic improvement and production at scale.

*Figure 7. Constraints in sourcing planting material without commercial nurseries (PHAMA Plus, 2024b).*




A key early catalyst (2020) was the joint response with MAF to emerging taro shortages, which included support to planting programs that reached hundreds of farmers and aimed to stabilise domestic supply while laying the groundwork for a future export rebound. Through a collaboration with Farmer Joe, the program enabled distribution of 200,000 planting material to 327 farmers to urgently increase production of taro for immediate food security. While successful in its short-term objectives, it did not address the fundamental systemic constraint of reliable long-term tiapula supply.

PHAMA Plus's diagnostic work with MAF concluded that a new approach was needed: one that would maintain MAF's social protection role but also crowd in a network of commercially oriented nurseries supplying high-quality tiapula to semi-commercial and commercial farmers. This required not only more planting material, but also a shift in perceptions – away from viewing tiapula as a free welfare input and towards treating them as a valuable, paid agricultural input that underpins farm income growth.

## 4.3 Designing an effective nursery network

Tiapula grown in nurseries are critical to maintaining and expanding taro production. Unlike taro grown for roots, nursery crops are planted at much higher density – around 25 cm spacing compared with 1 metre in conventional planting, equivalent to roughly 4,000 plants per acre for tiapula production (MAF 2024; PHAMA Plus 2024a). This allows farmers to generate large volumes of planting material from relatively small areas, provided they have access to basic infrastructure.

PHAMA Plus supported MAF to increase the supply of pest-resistant, TLB-tolerant tiapula and to establish nursery infrastructure such as irrigation systems and fencing in both public and private nurseries. Recognising that tiapula are often grown and sold locally, with limited economies of scale, the program's design was to support a large number of small nurseries across taro-growing districts rather than a few extensive sites. These small-scale nurseries were typically provided with an initial allocation of planting material – roughly enough for a ¼ acre plot – and complementary low-tech materials such as fencing, irrigation and mulching to manage weeds and protect the crop.

The nursery model supported by PHAMA Plus has also driven technical changes in how tiapula are produced. All beneficiaries received training on land preparation, spacing, weeding, crop management and harvesting, with a basic expectation of generating around 5 tiapula per plant through the growing cycle, though some farmers were able to achieve up to 15–20 through their own improvements (MAF 2024; PHAMA Plus 2024b). The main shifts include higher planting density, experimentation with alternative weeding approaches (some nurseries use herbicides, others rely on manual labour or sheep), and piloting ways to increase production from around 5 suckers per taro plant to up to 15 in some instances (PHAMA Plus 2024b). These innovations have improved the productivity and financial viability of nurseries, while also diversifying the range of cultivars used, which in turn strengthens the resilience of the industry and the quality of taro available for export.

Prior to the intervention, there were no commercial nurseries for taro in Samoa that enabled tiapula to be widely distributed outside of MAF. By 2024, this had changed markedly. The nursery network included 2 MAF nurseries, 4 private nurseries and more than 100 commercial farmers who had established small nurseries within their taro fields (MAF 2024; PHAMA Plus 2024a). To assist in expediting the taro production rebuild, over March–November 2024, these nurseries produced more than 700,000 planting materials, which were channelled through exporters and other intermediaries to more than 200 supplier farmers (MAF 2024; PHAMA Plus 2024b). This surge in available planting material was critical to re-establishing an industry that had been heavily impacted by drought, pests and other shocks in preceding years.

## 4.4 Creating a market for tiapula

To create a sustainable market for tiapula, it was essential to shift farmer perceptions away from seeing planting material as an entitlement. PHAMA Plus, in collaboration with MAF, therefore designed a subsidy program to distribute tiapula from nurseries and individual suppliers to commercial farmers between March and November 2024. Under this model, farmers paid a subsidised price for tiapula while nurseries received a top-up payment to reflect full production costs, enabling them to cover their inputs and earn a profit. This approach aimed simultaneously to support commercial growers with access to high-quality, pest-resistant planting material and to enhance nursery sustainability by stimulating demand.

Experiences from nursery farmers show how this has changed business models at the farm level. Mano's nursery, for example, is around 2 acres and has about 5,000 tiapula now, but their family plans to expand it to the full 13 acres (Mano, nursery farmer, interview 2025). The family reports that "the nursery is more profitable for them, so they want to expand using the nursery instead of growing taro" and that the tiapula are sold for around WST1 each. "Each planting material has much greater returns than the taro root itself, making the tiapula very valuable" (Mano, nursery farmer, interview 2025). In practice, this means earning over WST5 per plant rather than waiting for a harvested root sale several months later at up to WST9 (MAF 2024). The nursery manages 4 different varieties, with the main darker variety being used for exports. Mano sells to 5–6 customers locally, with plenty of demand but limited capacity: "the issue is capacity however – we can sell a lot more, there is significant demand from farmers and nurseries, but we do not have the capacity to meet all the market demand" (Mano, nursery farmer, interview 2025).

At a larger scale, Aialii Anapu's experience illustrates how nursery development can transform a family farm business. Aialii was part of the PHAMA Plus program to establish a taro nursery, receiving 30,000 tiapula in 2 tranches at WST0.50 each through the MAF partnership. Aialii has expanded his tiapula

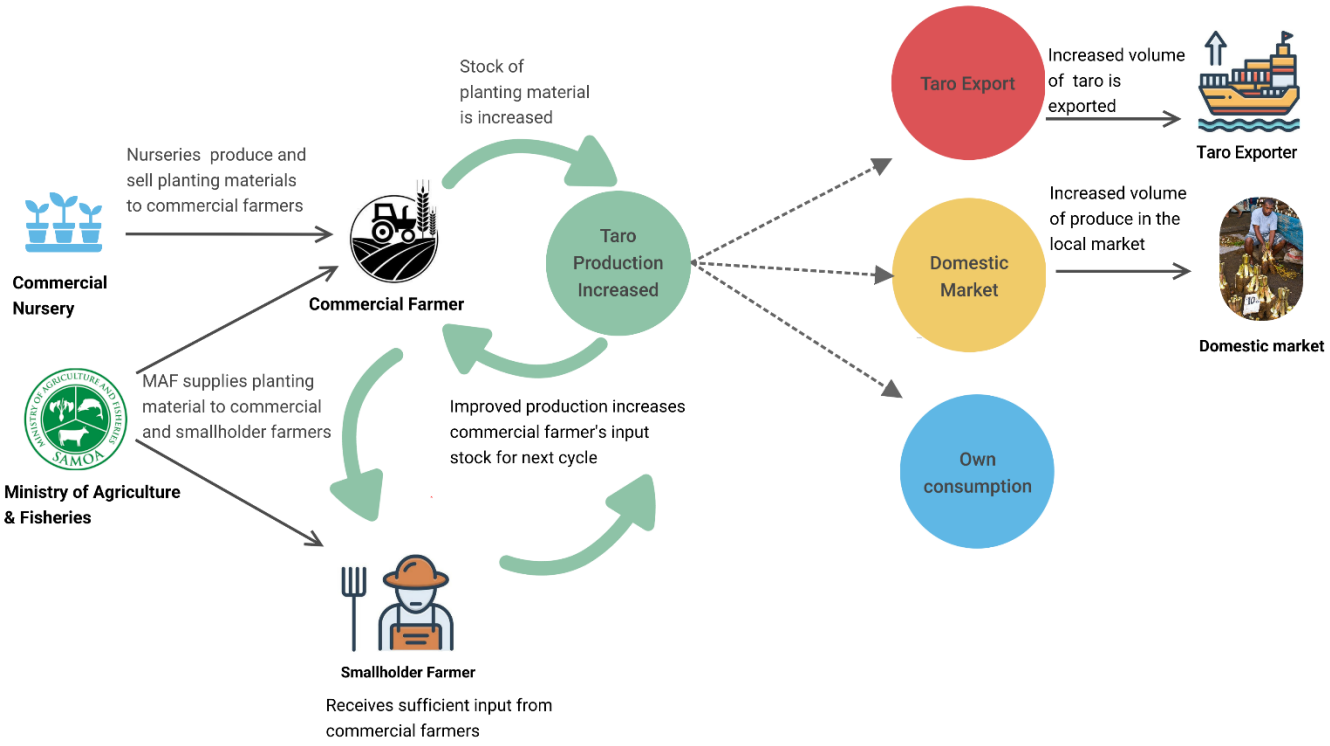
production substantially and has the capacity to produce 5,000 tiapula per month, with an aim of increasing up to 10,000 (Aialii Anapu, interview 2025). He now has 20 acres dedicated to taro, most of which is tiapula, but he also sells the taro root and reflects that "We get money from the tiapula and the taro. Before PHAMA Plus, we were only selling taro, but now we can support the family and the community and are able to expand production and sell 1,000 tiapula per month" (Aialii Anapu, interview 2025). Yet even here, expansion at national scale remains a challenge: stakeholders estimate that "they would need to expand 30 times the number of small nurseries like this to get to where they want to be in terms of the overall stock of taro. At the moment, nursery production is still small and niche" (PHAMA Plus Advisor, interview 2025).

## 4.5 Early signs of economic sustainability

Importantly, the emergence of private nurseries has not undermined MAF's role; instead, the 2 systems appear to be complementary. MAF nurseries largely service subsistence and smaller farmers, typically providing 200–300 tiapula at a time, while private nurseries tend to focus on semi-commercial and larger operations that may purchase up to 1,500 tiapula in a single transaction (MAF 2024; PHAMA Plus 2024a). At the same time, MAF's own procurement of planting material from nurseries helps set a benchmark price for the market, giving nursery operators more confidence and reducing risk. This parallel operation has increased the diversity of taro cultivars in circulation, improved access to TLB-tolerant and export-suitable varieties, and begun to normalise the idea of paying for high-quality planting material.

There is strong evidence that the nursery model and the emerging tiapula industry are on a sustainable trajectory, despite being at an early stage. First, most of the nurseries supported under PHAMA Plus – both MAF-run and private – are still operational. Second, many nurseries have reinvested in expanding their operations, upgrading fencing, irrigation and labour, or have used surplus income to invest in other income-generating activities. Third, demand for tiapula from semi-commercial farmers is increasing, as they seek to expand area and adopt TLB-tolerant varieties. And fourth, a growing number of commercial farmers have identified planting material sales as an additional source of income alongside taro roots, establishing small nurseries within their taro fields to supply their own future planting needs while selling surplus planting material to neighbours.

*Figure 8. A blended public–private supply response to the current shortage of inputs.*



These developments suggest that PHAMA Plus has helped shift Samoa's taro planting material system from a largely state-dominated, welfare-oriented model towards a more mixed system that blends public support with private initiative and commercial incentives. However, this shift still has further to go: the nursery network remains relatively small, many farmers continue to rely on MAF distributions or the generosity of neighbouring farmers. If current trends continue, nurseries are likely to become a cornerstone of taro production growth and a key channel through which improved, TLB-tolerant varieties reach farmers at scale – with implications not only for domestic food security but also for the potential to rebuild and sustain export volumes over the coming decade.

# Case study: Choosing the land for a prosperous future

At 35, Toa Iakopo of Vaoala, Upolu, is proving that a good life can still be built from the soil. He grew up on a farm and has been planting since he was a boy, but for years, he used his small plot only for subsistence, taro for the home, a few vegetables, nothing serious. That changed in late 2024 when he received 300 tiapula through PHAMA Plus.

The timing felt right. Toa decided to clear part of his 4-acre property, almost 2 acres, to give farming a proper chance. What he thought would simply boost his taro supply turned into something much bigger. The tiapula took off. They grew fast, healthy, and strong, and before long, he found himself with more than 3,000 tiapula, all grown from the 300 he started with. He harvested some and sold them locally, and the income came quicker than he expected.

Now, Toa is planning to expand across the full 4 acres, shifting from subsistence to semi-commercial farming. With taro in high demand, he never struggles to find buyers. “People from the village come straight to my farm every Saturday,” he says. A bundle of 3 taro corms sells for 20 tala, and when he has extra, he loads up and heads to the Apia market.

For Toa, farming is more than work. It gives him independence and keeps him grounded. “I know boys my age who went to New Zealand or Australia for seasonal work,” he says. “But I believe I can make a steady income here. Farming keeps me healthy, and I like being my own boss.”

He also grows bananas, cocoa, vegetables, and papaya, and even donates tiapula planting materials to his local Pentecostal Church plantation.

With PHAMA Plus’s support and his own determination, Toa has turned a small start into a real future, one rooted in family land and community.

# Case study: Growing tiapula hope on Savaiʻi

On the island of Savaiʻi, where taro is more than food, it is livelihood, identity, and nutrition, Temukisa Tofilau has become the quiet force making sure farmers never run short of planting material. At 41, she has spent years lifting her community, especially women, through farming. It began with a simple idea: if Savaiʻi had enough healthy tiapula, the entire taro industry could stand stronger.

Five years ago, Temukisa brought together a small circle of women and formed the Local Farmers Association. Most were mothers and growers working tiny plots behind their homes, but they shared one dream: to strengthen farming and create income in a way that fit village life. Two years ago, PHAMA Plus stepped in with technical support, fencing, planting materials, and a mulching shredder that grinds coconut husk into rich mulch, perfect for healthy tiapula.

The association's nursery, once a quarter-acre, now stretches across 1.5 acres. Of the 70,000 planting material the association received, 15,000 were used in her expanded plot. The rest were shared with growers across the district. Today, 13 of the association's 22 members run their own nurseries, small but thriving pockets of productivity that feed into the broader taro economy.


Yet Temukisa remains a hands-on farmer. "All manual, no spray," she says, smiling as she points to 2 women pulling weeds by hand. Weeding is her preferred method to protect her young suckers. Each tiapula gives her about 5 new suckers, sold for WST0.50 each. The income is modest, but the discipline is not. The association has saved WST10,000. Their savings are proof of the quiet strength of women farmers, steady hands making steady progress.

For Temukisa, this work is personal. "I have five brothers, but they all left Savaiʻi. I am the one who must look after our family land," she says. "I learned everything from my father. A good field brings opportunities, and so I work the land to provide for my family."

Her goal has never changed: "I just wanted to make sure we have enough planting materials for everyone."

Through her leadership and PHAMA Plus's support, Savaiʻi now has a stronger, more reliable supply of tiapula, fuelling local income, strengthening the taro export chain, and giving women farmers a place to rise with dignity and purpose.

# Case study: Tiapula offers a new strength for family farms

For Tauilili Polito Vili, farming is not a career he chose—it is the life he was born into. Raised on his family's 200-acre estate in Lotofaga, Aleipata, Tauilili spent his childhood clearing land, planting taro, and caring for cattle. The land shaped him, and he never walked away from it. "Farming is the best," he says, with the certainty of someone who knows no other rhythm.

Today, he runs Calcy Farm, a large operation with 120 acres of grazing cattle and 50 acres of taro, supported by 8 part-time workers. But in recent years, something unexpected has taken root: a thriving tiapula nursery that has become one of the most productive in his district.

Tauilili was one of the farmers to receive training, fencing, a mulcher, and 1,500 tiapula across 10 varieties. What began as a small, fenced quarter-acre plot quickly surprised him. The tiapula grew fast, strong, and plentiful—and the demand from other farmers was immediate.

In just 2 years, that small starter plot has expanded to 3 acres, with more land already earmarked for further growth. When the PHAMA Plus team met him, he was preparing to sell 4,500 tiapula at WST0.30–WST0.50 each. "Most weeks, I do this twice," he says. The nursery now brings in a steady side-income without needing heavy labour—he can harvest the suckers himself.

Weeds, especially in Aleipata's heavy rainfall region, were once a significant challenge. Tauilili solved this in a true farmer's way: sheep. They keep the weeds low, fertilise the ground naturally, and have lifted the nursery's productivity. From each plant, he now gets 10–15 suckers, far more than he expected.

The extra income has opened new opportunities. He plans to shift some cattle and expand taro by another 20 acres next year, strengthening both his farm and the district's supply to Apia markets, restaurants, and exporter Saint Agriculture.

For Tauilili, tiapula has become more than planting material. It is another way to keep the land productive, support neighbouring farmers, and build a future rooted firmly in the soil he grew up on.

# 5 Infrastructure for market access

## 5.1 Central Packhouses

MAF has adopted an explicitly infrastructure-led approach to lifting export capacities. Ministry leadership has articulated an informal target of returning to 30–40 shipping containers of taro per month, echoing the export peaks of the 1970s, 1980s and early 2000s (MAF 2024; MAF CEO, interview 2025). To support this ambition, MAF is investing in centralised packhouse facilities with fresh and frozen handling capacity, financed through a mix of government resources and development partner support. As the MAF CEO noted, "90% of our thinking as MAF is taro." (MAF CEO, interview 2025). These investments aim to remove a major barrier to entry for exporters by providing access to compliant facilities without the need for each firm to build its own expensive set-up.

The central packhouse in Apia is a cornerstone of this infrastructure strategy. The World Bank/IFAD-funded Samoa Agriculture and Fisheries Productivity and Marketing (SAFPROM) program, recently launched a new facility for processing with improved separation of fresh and frozen lines and support for HACCP certification. PHAMA Plus support has focused on complementary investments such as a refrigerated reefer container to maintain cold-chain integrity.

The packhouse is run on a commercial but subsidised basis: "The facility serves the private sector – so for those who do not have the scale to have their own facilities for exporting, they can use this packhouse, prepare the taro, and then put it in the freezer awaiting shipping. The service is not free, but it is heavily subsidised. The facility is not used for government entities, so it is not competing with the private sector. There should be crowding in of private investment if anything" (MAF official, interview 2025). At present, utilisation remains low – often only around one shipping container most months – but the facility is designed to accommodate much higher volumes as production and export demand grow.

## 5.2 The value-add of frozen product

Frozen product offers a range of benefits for accessing export markets. Frozen produce is subject to lower biosecurity thresholds than fresh produce, so it offers a lower risk market pathway which is particularly important when margins are tight. Frozen produce is also less time sensitive than fresh product, allowing exporters the flexibility to fill orders over a longer period to better manage supply flows and labour constraints, key to maintaining an export presence even when faced with low supply. Anecdotal market feedback from NZ PTI and NZ importers indicates strong demand and a growing preference for frozen product over fresh product, and frozen product is the only form of taro currently able to enter the Australian market.

PHAMA Plus has partnered with 3 exporters and MAF to improve their processing capabilities for fresh and frozen agricultural products. The reefer containers, freezers and packaging equipment have improved exporters' storage and processing capacities and contributed to lowering costs of production. One exporter deals only with frozen products to New Zealand and Australia, another just with fresh produce to American Samoa, and the third exports both fresh and frozen crops to Australia and New Zealand. The markets exporters serve align with their established networks and connections with consignment frequencies depending on both supply and price.

Exporters are improving their facilities: new warehouses, freezers and packing equipment have been installed in anticipation of expansion, but in some cases remain underused while exporters struggle to secure enough taro at viable prices. This reinforces the finding that export capacity has grown faster than export volumes, and that the current binding constraint sits on the production and price side rather than in processing or compliance systems. The infrastructure is now in place, the markets are there, continuous supply is now needed to ensure sustainable production and the survival of this essential industry.

## Case study: Saolotoga's life is rooted in the land

For more than 30 years, Saolotoga Pupi has run Foundations for Farming, a family-owned business and PHAMA Plus partner in Samoa. Spanning 500 acres, the company exports fresh and frozen root crops, cocoa and fruit, and also supplies the local market.

Over time, life has become harder for Saolotoga. Labour costs have increased from WST30 to WST100 a day and where her father employed more than 100 workers, Saolotoga now manages with fewer than 10. Many villagers have migrated, and machinery is expensive to maintain. "Taro is hard work," Saolotoga says simply.

"I grew up in the business," she says, recalling her childhood. "We used to clean the taro, and they'd say, 'The boat is tomorrow!' Everyone would rush to harvest and peel taro under the trees. Those are the memories."

At 60, Saolotoga starts her days early, calling in the boys to help collect taro and coconuts, or buying other high-value root crops like yams, whatever the land will give that day. It is work she has known all her life.

Her father exported Samoan tausala taro from Sa'anapu Village before roads were sealed or electricity reached the area. The family worked more than 200 acres of taro alongside coconuts and cattle, exporting to New Zealand and American Samoa. "Those days, we had to travel to the one house with a phone to call the markets in New Zealand," she remembers. "Fresh Direct. Produce Market. We talked directly to them."

Market conditions have shifted over time. Local markets are flooded, exporters are buying less, and demand from New Zealand has softened. Saolotoga continues to adapt, diversifying into cattle, coconuts and cocoa and expanding into frozen produce.

Frozen produce offers a range of benefits for accessing export markets. It is subject to lower biosecurity thresholds than fresh, offering a lower risk market pathway, especially important when margins are tight. Frozen produce is also less time sensitive than fresh, allowing exporters flexibility to fill orders over a longer period to better manage supply flows and labour constraints, key to maintaining an export presence even when faced with low supply. Anecdotal market feedback from PTI and importers in New Zealand indicates strong demand and a growing preference for frozen product, over fresh, while frozen taro is the only form of the crop currently able to enter the Australian market.

Partnering with PHAMA Plus, Foundations for Foundation received support for expansion of processing capacity for frozen and fresh products. With improved processing, cold storage facilities and compliance, Saolotoga hopes to strengthen exports again. Her plan is simple: move back to the farm, manage it better, and keep the business going. After all these years, her belief remains firm, Samoa's future, like her own, is rooted in the land.

# 6 Ongoing barriers to production

While there is strong evidence that PHAMA Plus has helped improve taro productivity, particularly in terms of improving access to better cultivars of taro for subsistence and semi-commercial farmers, the prospects for a sustained rebound in taro exports from Samoa depend heavily on what happens on-farm. While nurseries and biosecurity systems have begun to address key constraints upstream and downstream in the value chain, the core of the system remains thousands of smallholder and semi-commercial farmers whose decisions about area planted, labour use and investment ultimately determine production volumes.

Over the last decade and a half, on-farm production has declined, but Samoa Bureau of Statistics data indicate that the area under taro has fallen more sharply than total output, implying an overall increase in average productivity per hectare, particularly among better-resourced producers (Samoa Bureau of Statistics 2023; MAF 2024; PHAMA Plus 2021). Anecdotal evidence suggests that subsistence farmers have broadly maintained production for household consumption, while some commercial farmers have held or even expanded area in response to high domestic prices. This leaves a “missing middle” of semi-commercial producers who could, in principle, respond to price signals and new market opportunities but face a combination of labour, pest and capital constraints that limit their ability to do so.

## 6.1 Labour constraints and limited scope for mechanisation

Taro remains a highly labour-intensive crop in Samoa. Land preparation, planting, weeding and harvesting are still overwhelmingly done by hand or with minimal mechanisation, and many farms are located on rocky or sloping land where machinery is difficult to use. Stakeholders frequently point to declining labour availability as a major brake on production, with rising wage rates partly attributed to out-migration and participation in labour mobility schemes such as the Pacific Australia Labour Mobility (PALM) scheme and New Zealand’s RSE program. Higher wages increase production costs, leading to domestic prices that are viable in local markets but make Samoan taro less competitive in export markets once processing and freight are added.

The potential for labour substitution through mechanisation is limited. While some farmers are experimenting with excavators or tractors for initial land clearing and contouring, the prevalence of rocks in many taro growing areas means that significant land conditioning would be needed before mechanisation such as mini tillers could be scaled. As one exporter explained, “Traditional growing methods for taro use a lot of manual work – it's hard to meet the demand due to the labour requirements. And they can’t mechanise taro production because of all the rocks in the volcanic island. So if you want to use mechanical ploughs for larger-scale production, you first need to remove all the rocks from the soil” (Jim Liu, Sunfield Agriculture, interview 2025). -growing areas means that significant land conditioning would be needed before mechanisation such as mini tillers could be scaled.

For most smallholders and semicommercial farmers, the capital required for such investments is out of reach. A farm input supplier summarised the dilemma: “Most taro farmers are not buying equipment – just the knapsack sprayers… The areas where rocks can be easily cleared and mechanised are very limited in Samoa. With RSE and PALM, access to labour is getting harder, but it is difficult to do mechanised farming” (Tomata, Managing Director of Samoa Agriculture Store Company Ltd, interview 2025). As a result, productivity gains on farm are more likely to come from incremental improvements – such as better weed management and the use of higher-yielding varieties – rather than a wholesale shift to mechanised production in the short to medium term. This contrasts with Fiji and Tonga where there is increasing focus and progress on mechanising production systems.

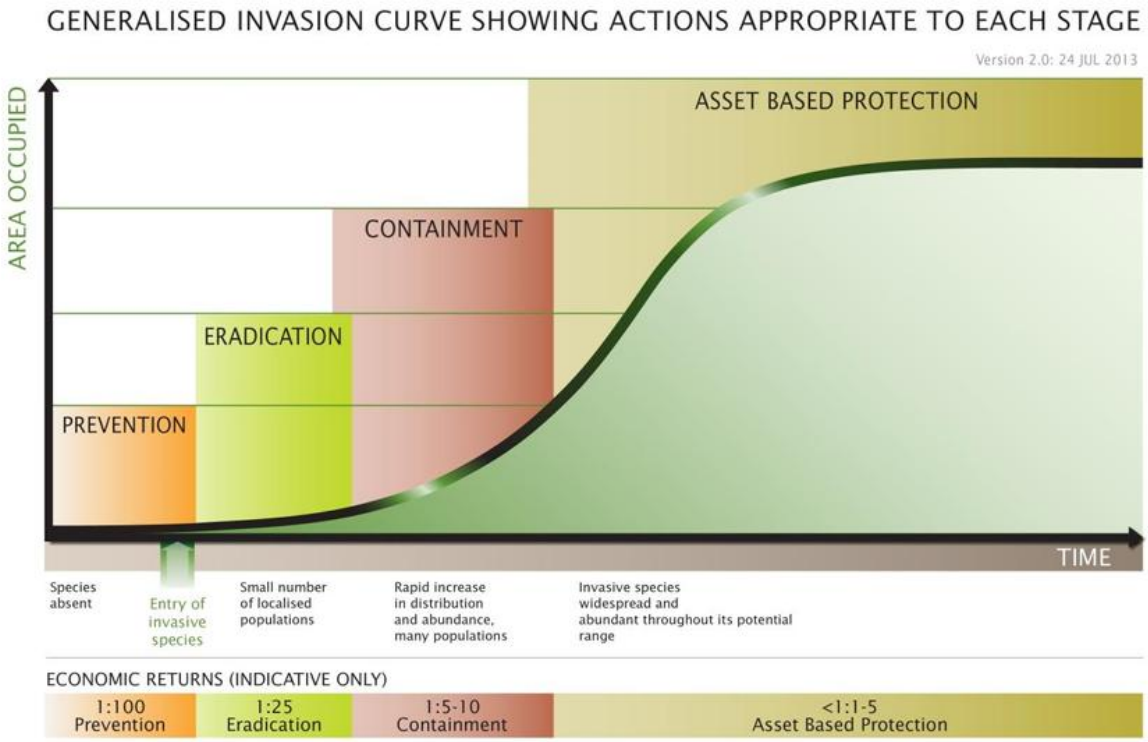
## 6.2 The growing impact of feral pigs

One of the most commonly cited threats to taro production is the rapid increase in feral pig damage. Farmers and officials report more frequent and more severe incursions, with pigs targeting both juvenile plants and taro that are almost ready for harvest, sometimes in groups of up to 100 animals at a time (MAF 2024; PHAMA Plus 2024a). The problem has been exacerbated by a decline in the number of people living and working full-time on farms, reduced hunting pressure, and changes to pig management regulations which led some owners to release animals that did not meet new standards.

*Figure 9. Samoa's feral pig population is on the rise, leading to food security concerns. ABC Pacific, 16 October 2024.*


Recent media reporting from Samoa's livestock division suggests that crop loss and damage from feral pigs have been rising sharply, with officials estimating that the root crop production has dropped by around 50–60% in the last 3 years in some areas, contributing to reduced supplies to local markets, higher prices and a marked fall in exports between 2020 and 2023 (Cooper 2024; MAF 2024). Stakeholders are clear that it is now too late to rely on prevention alone; eradication at national scale is not realistic and attempts at containment have not been effective. The combined effect is that what was once a nuisance that could be contained has become a significant production and food security risk that requires more expensive asset-based management to prevent large sections of a field from being destroyed overnight and undermining farmer confidence to continue planting taro.

*Figure 10. Generalised invasion curve, National Biosecurity Committee (2016).*




The Samoan government has encouraged farmers and communities to trial alternative management approaches alongside traditional controls such as fencing and trapping. A delegation of researchers, MAF staff, farmers and exporters also recently visited Far North Queensland as part of a collaboration with the Market Development Facility to learn from Australian farmers, scientists and Traditional Owners about feral pig control. Officials are using these lessons to prepare recommendations and to develop a national feral pig management plan informed by Australian government measures.

Current responses on farm continue to focus on management and damage limitation. These include trapping (which has had limited enduring success according to monitoring of the MDF-supported pilots), baiting (which carries environmental and food safety risks and has produced mixed results), and, most commonly, investment in fencing around high-value plots (MDF 2024; PHAMA Plus 2024a; MAF CEO, interview).

Fencing has emerged as the most reliable way to protect taro from feral pigs, especially for semi-commercial and commercial farms located outside villages where wild pigs are more common. The cost of fencing materials and installation is high relative to farm incomes, so many farmers have fenced only small areas, prioritising nursery plots or the most productive taro blocks. In some cases, nurseries and small farms have been relocated closer to villages where pigs are less prevalent, reducing the need for fencing but potentially increasing transport costs to fields or markets.

For farmers supplying exporters or aiming to scale up semi-commercial production, fencing is increasingly seen as a de facto requirement if they are to protect investments in planting material, labour and land preparation. For some, this has meant focusing on smaller, more intensively managed plots rather than expanding area; for others, it has meant shifting to crops with lower pest pressure or more favourable labour-to-income ratios.

# 7 Lessons and recommendations

There is strong evidence that Samoa's technical capacity to export taro has improved, even as actual export volumes remain constrained by production levels, price signals and global competition. PHAMA and PHAMA Plus have worked with MAF and key exporters to address supply constraints, strengthen biosecurity systems for export pathways, and enable market access and value-adding through strategic co-investments in infrastructure. Together, these efforts have laid the groundwork for future growth, once sufficient surplus production emerges. Key learnings and recommendations from PHAMA Plus's work include:

- **Taro is central to Samoan livelihoods and remains relevant to the Samoa-Australia-New Zealand partnership.** The performance story shows that taro underpins food security, cultural identity and *fa'alavelave*, while also providing one of the few scalable cash income opportunities. As Kuini observed, "Taro is a staple. So first and foremost, it is essential for food security. Samoans everywhere will always buy their taro first, then the rest of their needs." Future sector strategies and support should explicitly position taro as a priority crop for domestic and export development, sequencing export growth with genuine production and efficiency gains so that local availability and affordability are maintained.
- **The nursery model is a foundational improvement that now needs further scale up.** This report demonstrates the effectiveness of the pilot nursery interventions, showing how public and private nurseries are closing the gap between improved genetics and farmers' fields and contributing to higher on-farm productivity. Future support should deepen the nursery network (including Savai'i), maintain MAF's nursery focus on social protection and subsistence households, and enable private nurseries to continue to strengthen and grow.
- **On-farm constraints are now the binding limits to production and export growth, so support must shift further downstream.** Labour shortages, limited scope for mechanisation on rocky land, high fencing costs and feral pig damage all constrain area expansion even when planting material and processing capacity are available. Programs should prioritise practical on-farm solutions to expand production and find cost efficiencies for domestic and export purposes.
- **Feral pigs have become a systemic production and food security risk, requiring a coordinated national response.** Evidence shows severe yield losses, rising costs and farmers being pushed into expensive defensive investments. Building on Australian experience, government and partners should develop and implement a national feral pig management strategy that combines targeted fencing support, community-based control and culling, lessons from trapping and baiting pilots, and clear institutional roles.
- **Export and biosecurity capacity are ahead of supply, so new infrastructure should be carefully targeted.** Internationally compliant packhouse and processing facilities are now sufficiently established to position Samoa for export growth. Future investments should focus on maintaining and fine-tuning these systems, supporting efficient use by exporters, and avoiding over-building until production and price conditions make higher export volumes realistic.
- **Domestic markets and American Samoa will continue to shape incentives**, so export strategies must work with, not against, these pulls. High local prices and near-shore US dollar returns often out-compete distant markets, so future strategies should focus on premium niches and seasonal windows in markets where Samoan taro can compete on quality, identity or provenance (especially for diaspora), reliability and relationships. This moves beyond competing on price in light of added pressures from Fiji, Tonga, China and Vietnam. Better data and market intelligence on fresh versus frozen opportunities, developed with SEA, PTI and industry, would help refine this strategy.
- **Biosecurity and market-access gains are valuable assets that need long term systemic support as PHAMA Plus exits.** Samoa now has stronger surveillance, diagnostics and treatment capacity, but stakeholders have raised concerns about maintaining these functions after program closure, particularly in response to continuously evolving market access requirements or in the event of a biosecurity incursion.

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# Annex 1: Evidence Matrix

This annex summarises the key evaluation questions, main findings and supporting evidence for the Samoa taro performance story. It draws on program documents, national statistics, market studies, case studies and interviews, and is designed to provide transparency on the strength and sources of evidence underpinning each finding.

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| **1. Context – relevance of sector-wide and systemic-change strategies** | | |
| 1.1 What is the relevance of the sector-wide and systemic-change strategies, considering wider economic, social and environmental contexts? | • Taro remains economically modest in GDP terms but highly important for livelihoods, food security and *fa'alavelave* obligations; it is one of the few crops with potential to generate broad-based cash income for smallholders.<br>• Sector-wide strategies that combine food security, resilience and export-led growth (e.g. Food Systems Pathway, root crop strategy) are highly relevant in a context where agriculture involves over 70% of households but contributes less than 10% of GDP.<br>• There is strong evidence that PHAMA and PHAMA Plus have significantly helped to protect and sustain Samoa's taro sector for domestic and export markets through investments and partnerships with government and industry, even as export volumes have fluctuated.<br>• The emphasis on TLB-tolerant cultivars, nurseries, biosecurity pathways and export infrastructure directly responds to long-standing disease risks, climate shocks and tighter import standards in New Zealand and Australia. | • Samoa agricultural GDP and household livelihood data (Samoa Bureau of Statistics 2023; FAO 2024).<br>• Taro production and value estimates, including recent value of ~WST3.8m per year (Samoa Bureau of Statistics 2023; MAF 2024).<br>• Discussion of taro's role in food security, *fa'alavelave* and cash income (McGregor 2012; Ugalde 2022; PHAMA 2015; FAO 2024).<br>• National policy documents emphasising food security, nutrition and resilient agriculture (Government of Samoa 2021 – National Food and Nutrition Policy; Government of Samoa 2023 – Food Systems Pathway 2030).<br>• PHAMA and PHAMA Plus design and strategy documents highlighting systemic-change approach (PHAMA 2015; PHAMA Plus 2020; PHAMA Plus 2021; PHAMA Plus 2024a).<br>• Regional horticulture experience showing vulnerability of export pathways to biosecurity incidents and compliance failures (McGregor 2012; PHAMA Plus 2025b – Tonga watermelon performance story). |
| 1.2 Alignment with national strategies and institutional settings | • PHAMA and PHAMA Plus support is well aligned with Samoa's food security, agriculture and trade strategies, which position root crops, including taro, as central to both food and income security.<br>• PHAMA Plus interventions are aligned with, harmonised with, and captured in the Samoa National Food and Nutrition Policy, the Food Systems Pathway, and the SEA strategy.<br>• Program engagement with MAF, SROS, MAWG and the newly established SEA reinforces existing coordination mechanisms rather than creating parallel structures.<br>• The systemic focus on biosecurity, nurseries, processing and market access aligns with emerging root crop and horticulture strategies and with SEA's mandate to support policy settings, production and market access. | • Samoa National Food and Nutrition Policy 2021–2026 and Food Systems Pathway 2030 (Government of Samoa 2021; Government of Samoa 2023).<br>• Draft/root crop and horticulture strategies highlighting taro and other root crops as priority export and food-security crops (MAF 2024; Samoa Root Crop Sector Strategy 2025).<br>• MAF Phase II completion materials outlining partnerships with PHAMA Plus and others (MAF 2024).<br>• Establishment documents and communications for SEA and its Board (Government of Samoa 2024; SEA 2024; Samoa MAWG 2025).<br>• PHAMA Plus planning and reporting on support to MAWG and sector strategy processes (PHAMA Plus 2024a; PHAMA Plus 2025a). |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| **2. Inputs – Nursery development and sustainability** | | |
| 2.1 To what extent has PHAMA Plus contributed to the establishment of taro nurseries in Samoa? | • There is strong evidence that PHAMA Plus has been the main catalyst for moving from a single, socially oriented MAF nursery system to a mixed public–private nursery network and on-farm nurseries.<br>• Prior to PHAMA Plus, MAF was effectively the only significant nursery provider, with irregular supply largely framed as social protection rather than commercial input provision.<br>• By 2024, the network comprised 2 MAF nurseries, 4 private nurseries and over 100 commercial farmers operating small on-farm nurseries.<br>• Between March and November 2024 alone, this network produced more than 700,000 planting materials, distributed via exporters and intermediaries to more than 200 supplier farmers. | • Description of pre-existing nursery system and social protection focus (MAF 2015; MAF 2019; PHAMA Plus 2020).<br>• PHAMA Plus design, activity reports and nursery intervention summaries (PHAMA Plus 2021; PHAMA Plus 2024a; PHAMA Plus 2024b).<br>• MAF Phase II completion report and presentations summarising nursery numbers and geographic coverage (MAF 2024).<br>• Field notes and interview transcripts describing the number and type of nurseries (Field notes, 2025 – MAF officials, PHAMA Plus advisors). |
| 2.2 To what extent are nurseries viable and sustainable? | • PHAMA Plus combined input support (e.g. fencing, irrigation, mulch) with a subsidy scheme that encouraged farmers to pay for tiapula while nurseries received a top-up, shifting expectations away from free planting material.<br>• There is strong evidence that the nursery model and emerging tiapula industry is broadly sustainable: many nurseries remain operational, have expanded beyond initial supported plots, and have reinvested profits into fencing, additional land or other income-generating activities.<br>• Case studies show farmers turning nurseries into core or complementary businesses (e.g. Polito's 4,500 tiapula twice a week; Savai'i women's association producing 70,000 planting materials; Satu selling ~5,000 tiapula per month).<br>• Risks remain around ongoing dependence on MAF for subsistence-level distribution and the persistence of a culture of entitlement to free or subsidised planting material among some farmers. | • PHAMA Plus nursery intervention design and subsidy scheme documentation (PHAMA Plus 2021; PHAMA Plus 2024b).<br>• MAF reports on nursery performance and sustainability (MAF 2024).<br>• Case study: Tauilili Polito Vili turned tiapula into a new strength for his family farm – expansion from quarter-acre to several acres and regular, profitable sales of planting material (PHAMA Plus 2025c).<br>• Case study: Growing Tiapula Hope on Savai'i – Savai'i Local Farmers Association, Temukisa and women's leadership, 70,000 planting materials, 13 members operating their own nurseries and saving WST10,000 for a cacao packhouse (PHAMA Plus 2025d).<br>• Case study: Toa Iakopo – transition from subsistence to semi-commercial production and nursery development (PHAMA Plus 2025e).<br>• Field observations on Satu's nursery and aggregator role in Savai'i, supplying up to 5,000 tiapula per month and multiple containers of taro. |
| 2.3 How effective were program inputs, partnerships and delivery mechanisms? | • PHAMA Plus inputs included fencing, irrigation kits, mulchers, tools and starter planting material, delivered through a co-investment model with MAF and private partners.<br>• Strong, long-term relationships between PHAMA/PHAMA Plus staff and MAF/SROS (e.g. Kuinimeri and Pu'eata's shared history) facilitated rapid response to planting material shortages and collaborative design of the nursery and subsidy model. | • PHAMA Plus intervention designs and procurement records for nursery inputs (PHAMA Plus 2021; PHAMA Plus 2024b).<br>• MAF documentation on co-investment arrangements and technical support (MAF 2024).<br>• Case study: Kuinimeri, Pu'eata and MAF's Shared Path in Strengthening Samoa's Taro Sector – long-standing relationships, co-design of the response to taro shortages and nursery rollout (PHAMA Plus 2025f) |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| | • The harmonisation and multi-purpose approach of MAFs nurseries and the development of private sector nurseries targeting a different niche in the market has been complementary.<br>• Private suppliers of inputs have benefited from equipment purchases (e.g. shredders, irrigation) but there is limited evidence yet of widespread, fully private replication of these investments without program support. | • Interview with farm input supplier on equipment purchases and limited replication (Tomata, Samoa Agriculture Store Company Ltd, interview 2025; Field notes, 2025). |
| **3. Production – Access to improved planting material and commercialisation** | | |
| 3.1 To what extent has PHAMA Plus contributed to increased farmer access to pest-resistant, high-quality tiapula? | • There is strong evidence that farmer access to TLB-tolerant, export-suitable planting material has improved markedly as a result of PHAMA Plus support to nurseries and distribution programs.<br>• More than 700,000 planting materials were produced and distributed in 2024, with additional significant volumes distributed earlier in the program (e.g. 200,000 planting materials to 327 farmers via Farmer Joe during COVID-related interventions).<br>• Case studies show how relatively small initial allocations (e.g. 300–1,500 tiapula) have been multiplied into thousands of plants and used to expand farms and supply neighbours and local farmers with planting material.<br>• Access has improved on both Upolu and Savai'i, although Savai'i still relies heavily on a small number of champions and cooperatives. | • PHAMA and PHAMA Plus reports on TLB-tolerant cultivar development and distribution (PHAMA 2015; PHAMA Plus 2020; PHAMA Plus 2021; PHAMA Plus 2024a; PHAMA Plus 2024b).<br>• MAF nursery and planting material distribution records, including figures for 2024 and COVID-related programs (MAF 2022; MAF 2024).<br>• ACIAR and Ugalde (2022) documentation on TLB-tolerant varieties and their performance (ACIAR 2021; Ugalde 2022).<br>• Case studies: Toa Iakopo (300 starter tiapula growing into > 3,000 plants and planned expansion); Tauilili Polito Vili (1,500 starter tiapula across 10 varieties); Growing Tiapula Hope on Savai'i (PHAMA Plus 2025c; PHAMA Plus 2025d; PHAMA Plus 2025e). |
| 3.2 To what extent has higher quality and more reliable supply of tiapula led to increased commercialisation and production? | • National data show that taro production peaked around 28,457 tonnes in 2015, then declined and partially recovered to about 21,389 tonnes in 2023, while the area under taro has fallen more sharply – implying higher average yields per hectare, particularly among better-resourced and nursery-linked farmers.<br>• There is strong evidence that access to quality tiapula has enabled farmers such as Polito, Toa, Satu and Temukisa to expand or intensify production, diversify income (root sales plus planting material), and transition from subsistence to semi-commercial operations.<br>• However, overall scale remains modest relative to national production; many farmers still rely on recycled planting material and traditional varieties, and production gains are dampened by feral pigs, labour constraints and capital costs for fencing.<br>• Productivity gains are most visible where improved planting material is combined with fencing and basic advisory support on spacing, weed management and nursery operations. | • Taro production and area data (Samoa Bureau of Statistics 2023; Samoa Bureau of Statistics 2024; MAF 2024).<br>• Ugalde (2022) and ACIAR (2021) analyses on yield performance of improved cultivars (ACIAR 2021; Ugalde 2022).<br>• Case study: Tauilili Polito Vili – higher sucker production (10–15 per plant), expansion of taro area and increased supply to domestic and export buyers (PHAMA Plus 2025c).<br>• Case study: Growing Tiapula Hope on Savai'i – women's association using improved planting material to increase production and supply (PHAMA Plus 2025d).<br>• Case study: Toa Iakopo and other farmer profiles in MAF Phase II slides (MAF 2024; PHAMA Plus 2025e).<br>• Field observations on Satu's expansion and use of fencing combined with improved planting material.<br>Findings from MAF Nursery Impact Assessment 2025<br>100% of the interviewed commercial farmers consider Taro as key source of income. |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| | | Commercial farmers have become self-sufficient in planting material stock, reducing their dependency on neighbouring farmers and increasing their own stock.<br>81% commercial farmers prefer taro varieties (Samoa 2, Talo Salani, Talo Fusi) which have demand in the export market.<br>88% commercial farmers observed faster growth from the taro varieties distributed from PHAMA Plus intervention.<br>81% commercial farmers mentioned improved taro corm size and quality from the taro varieties distributed from PHAMA Plus intervention.<br>100% of the interviewed smallholder farmers consider Taro as key source of income.<br>Smallholder farmers have also become self-sufficient in planting material stock, reducing their dependency on neighbouring farmers and increasing their own stock. In 2025, only 18% smallholder farmers rely on neighbouring farmers for inputs, which used to be 53% in 2024.<br>Smallholder farmers do not purchase any input from commercial nurseries.<br>88% smallholder farmers observed faster growth from the taro varieties distributed from PHAMA Plus intervention.<br>59% commercial farmers mentioned improved taro corm size and quality from the taro varieties distributed from PHAMA Plus intervention. |
| **4. Processing – farmer linkages and processing capacity** | | |
| 4.1 To what extent are farmers more able to sell to processors, including higher prices and higher quantities, through increased processing capacity? | • There is strong evidence that PHAMA and PHAMA Plus have helped maintain export processing capacity and farmer–exporter linkages through investment in packhouses, cold-chain and compliance systems, even as volumes have contracted due to production and price constraints.<br>• Farmers now interact with exporters in multiple roles: as suppliers of taro, as buyers and sellers of planting material, and in some cases as aggregators (e.g. Satu sourcing for Ah Liki; Polito supplying Saints Agriculture).<br>• However, high domestic prices and attractive near-shore markets (especially American Samoa) mean exporters often struggle to secure sufficient volumes at prices that cover processing and freight costs; some exporters have reduced or paused exports as a result. | • PHAMA and PHAMA Plus program reports on processing and exporter support (PHAMA 2015; PHAMA Plus 2021; PHAMA Plus 2024a; PHAMA Plus 2024b).<br>• MAF data and reports on packhouse utilisation and exporter numbers (MAF 2024).<br>• Samoa Root Crop Sector Strategy analysis of farmer–exporter linkages and price dynamics (Samoa Root Crop Sector Strategy 2025).<br>• Case studies and interview transcripts with exporters (Foundation for Farming, Saints Agriculture, Ah Liki) – including statements about driving to farms to secure product and scaling back exports (Exporter interviews 2025; Field notes, 2025). |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| 4.2 To what extent has processing equipment resulted in improved volumes and/or prices for exporters? | • PHAMA and PHAMA Plus co-investments in processing equipment (freezers, reefer container, cutting and packing equipment) and MAF's investment in the central packhouse have increased installed export capacity beyond current utilisation.<br>• There is strong evidence that Samoa now has sufficient technical capacity (packhouse, fumigation, HWT/HWHP pilot) to support a larger taro export industry; current under-utilisation reflects shortages of supply at viable prices rather than inadequate processing capacity.<br>• Exporters report that improved cold-chain and storage allow gradual filling of containers and reduce product loss, but do not fully offset high farm-gate prices, wage costs and shipping uncertainties.<br>• Price improvements for exporters have been limited by high domestic prices and competition from other Pacific suppliers in New Zealand and Australian markets. | • MAF packhouse and export infrastructure documentation, including World Bank-financed upgrades and HACCP plans (MAF 2024; World Bank 2024).<br>• PHAMA Plus reports on processing and cold-chain interventions, including reefer container support (PHAMA Plus 2024a; PHAMA Plus 2024b).<br>• Exporter interviews describing facility use and remaining constraints (Foundation for Farming, Saints Agriculture, Farmer Joe – interviews 2025).<br>• Fiji and Samoa taro export trend data to New Zealand and Australia (PHAMA Plus and Pacific Trade Invest 2021; NZ Customs 2024; Austrade 2023; PTI Australia 2023; PTI Australia 2025). |
| **5. Sector – Exports and triple bottom line** | | |
| 5.1 To what extent has market access and exports been maintained or improved as a result of PHAMA and PHAMA Plus interventions? | • There is strong evidence that PHAMA and PHAMA Plus have contributed to maintaining market access pathways for taro and other plant products (e.g. NZ and Australia), and to preventing biosecurity-related closures, even as export volumes have fallen due to production and price constraints.<br>• Samoa's taro exports to New Zealand fell from around 2,043 tonnes in 2020 to approximately 796 tonnes in 2024, but access pathways remain technically robust.<br>• New Zealand's total imports of taro from all origins decreased from 6,181 tonnes in 2020 to 4,395 tonnes in 2024, while Fiji retained a dominant share; US imports of taro remained broadly stable (72,850 tonnes in 2020 vs 68,176 tonnes in 2024).<br>• American Samoa continues to act as a near-shore extension of the domestic market and a key outlet for Samoan taro. | • Market access and pathway documents for fresh and frozen taro to New Zealand and Australia (PHAMA 2015; PHAMA Plus 2021; NZ MPI 2023; DAFF 2024).<br>• MAF export statistics and Samoa Bureau of Statistics trade data for taro and other commodities 2016–2024 (MAF 2024; Samoa Bureau of Statistics 2024).<br>• Australia, New Zealand and US trade data (NZ Customs 2024; US ITC 2024; FAO 2024, ITC 2026).<br>• PHAMA Plus and PTI analysis of NZ taro imports and Fiji's market share (PHAMA Plus and PTI 2021; PHAMA Plus 2024b).<br>• Samoa Root Crop Sector Strategy and MAF reports describing American Samoa trade and shipping patterns (Samoa Root Crop Sector Strategy 2025; MAF 2024). |
| 5.2 Economic outcomes – productivity, quality, revenues, import substitution and export potential | • At enterprise level, there is strong evidence of increased productivity and income for farmers engaged in nurseries and semi-commercial taro production: higher yields, new income from tiapula sales, and expanded taro area are evident in multiple case studies.<br>• Taro has remained one of Samoa's top agricultural exports by value, alongside products such as virgin coconut oil, despite overall export revenue declining since 2019. | • Case studies: Tauilili Polito Vili; Growing Tiapula Hope on Savai'i; Toa Iakopo – evidence of increased incomes, reinvestment and business expansion (PHAMA Plus 2025c; PHAMA Plus 2025d; PHAMA Plus 2025e).<br>Impact from MAF Nursery Impact Assessment 2025:<br>Total net attributable positive income change for all household AUD334,885 AUD |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| | • Import substitution benefits are significant but not fully quantified; increased production of taro and other root crops contributes to domestic food security and reduces reliance on imported staples.<br>• The sector's export potential remains high but is currently constrained by production, cost structures and competition in key markets. | Total Beneficiaries (Direct : Commercial Farmer + Smallholder Farmer)<br>Benefit Households: 178<br>Usage Households: 211<br>Access Households: 217<br>• MAF and Samoa Bureau of Statistics data on export values for taro and other key commodities 2016–2024 (MAF 2024; Samoa Bureau of Statistics 2024).<br>• FAO and Antille et al. (2023) analyses on productivity, costs and import substitution (FAO 2024; Antille et al. 2023).<br>• PHAMA Plus market reports and economic analyses for taro and root crops (PHAMA Plus 2021; PHAMA Plus and Pacific Trade Invest 2021; PTI Australia 2023; PTI Australia 2025). |
| 5.3 Social outcomes – food security, livelihoods, employment, access to inputs, gender inclusion | • There is strong evidence that PHAMA Plus support has contributed to food security and livelihood resilience by increasing the availability of planting material, supporting church and community plots, and helping some farmers remain in Samoa rather than relying solely on overseas seasonal work.<br>• Women's leadership is prominent in some nursery development and community-based production (e.g. Savai'i Local Farmers Association, Temukisa), with nurseries providing income opportunities compatible with care responsibilities and village life.<br>• Case studies highlight social benefits such as improved ability to meet *fa'alavelave* obligations, invest in children's education and housing, and support church and community functions through taro production.<br>• However, rising labour costs, feral pigs and climate risks continue to threaten livelihood gains, underscoring the need for complementary social protection and disaster risk management. | • Case study: Growing Tiapula Hope on Savai'i – women's association leadership, income generation and savings for community assets (PHAMA Plus 2025d).<br>• Case study: Toa Iakopo – young farmer choosing to stay and farm in Samoa, improved household income and aspirations (PHAMA Plus 2025e).<br>• MAF Phase II farmer and church group stories (e.g. Talaoalii Rex, church farmers) using taro to support family and community welfare (MAF 2024).<br>• PHAMA gender analysis and related documents on women's participation in horticultural value chains (PHAMA 2016b; PHAMA Plus 2021).<br>• FAO and Samoa Bureau of Statistics data on household livelihoods, food security and poverty (FAO 2024; Samoa Bureau of Statistics 2023). |
| 5.4 Environmental outcomes – pest and disease resistance, sustainable nursery practices, environmental impacts of inputs | • Adoption of TLB-tolerant varieties has reduced disease risk and is central to long-term resilience, though TLB remains a "long-term management issue" requiring ongoing monitoring and management.<br>• Nursery and farm practices include some environmentally positive methods (e.g. use of mulch, sheep for weed control and fertilisation, manual weeding), though limited in the adoption or demonstration of environmental improvement. | • ACIAR and Ugalde (2022) documentation on TLB-tolerant cultivars and disease management (ACIAR 2021; Ugalde 2022).<br>• Biosecurity and pest management policies (MAF 2024; DAFF 2024; NZ MPI 2023).<br>• Case study: Tauilili Polito Vili – use of sheep for weed control and soil improvement (PHAMA Plus 2025c).<br>• MDF reports and Australian media coverage on feral pigs in Samoa and associated crop damage and responses (MDF 2024; Cooper 2024). |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
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| | • Feral pigs have become a major environmental and agricultural threat, driving increased use of fencing and, in some pilots, baiting – with trade-offs for biodiversity, water quality and cost.<br>• Collaboration with Australian partners on feral pig management (study visits, MDF-supported pilots) is generating knowledge for a national feral pig management plan, but implementation is at an early stage. | • Samoa Root Crop Sector Strategy and MAF documents describing feral pig impacts and planned national management approaches (Samoa Root Crop Sector Strategy 2025; MAF 2024).<br>Findings from MAF Nursery Impact Assessment 2025-<br>To improve soil fertility, MAF and commercial nurseries encouraged to use their organic fertilizer (shredded coconut husks) and provided with a shredder to supply their own mulch. MAF also ensured water distribution to all areas of the nursery by supporting extension of the drip irrigation system<br>83% commercial farmers and 75% smallholder farmers mentioned wild pigs destroying their taro crops as key challenge in growing the taro industry.<br>Second biggest problem mentioned in the impact assessment is drought or water shortage. 50% commercial farmers and 63% smallholder farmers mentioned drought or water shortage as second biggest constraint in growing taro. |
| **6. Lessons learned – for future designs, programs and interventions** | | |
| 6.1 What are the lessons for future design and strategy? | • Sector-wide strategies should explicitly recognise that domestic and American Samoa markets are core parts of the taro system; export strategies need to work with these strong demand pulls.<br>• The lower barriers to trade and the lower risk of supplying the domestic market and American Samoa need to be fulfilled prior to other global export opportunities will be met.<br>• There is strong evidence that combining export-system investments (packhouse, fumigation, pathways) with production-side interventions (nurseries, feral pig management) is essential; focusing on only one side of the system is insufficient.<br>• Relationship-based, locally led delivery – exemplified by Samoan technical leads and long-term partnerships between MAF, SROS and PHAMA/PHAMA Plus – is critical in small island contexts and should be a deliberate design feature of future facilities. | • Price comparisons and market analysis showing domestic and American Samoa prices higher than export-equivalent prices (MAF 2024; Samoa Bureau of Statistics 2023; PHAMA Plus 2021; Samoa Root Crop Sector Strategy 2025).<br>• Evidence of under-utilised export infrastructure alongside production constraints (MAF 2024; World Bank 2024; PHAMA Plus 2024a; PHAMA Plus 2024b).<br>• Case study: Kuinimeri, Pu'eata and MAF's Shared Path in Strengthening Samoa's Taro Sector – importance of local relationships and leadership in designing and implementing sector responses (PHAMA Plus 2025f).<br>• DFAT and MFAT policy guidance on locally led development and facility models (DFAT 2023; MFAT 2023). |
| 6.2 What are the operational and delivery lessons (nursery model, feral pigs, mechanisation)? | • The nursery model is a foundational improvement that now needs further scale-up and careful tapering of subsidies, especially in Savai'i and among semi-commercial farmers; protecting MAF's social-protection nursery role while enabling commercial nurseries to thrive will be important. | • Evidence on nursery sustainability and scale-up needs (MAF 2024; PHAMA Plus 2024b; case studies on Polito, Savai'i women's association and Toa – PHAMA Plus 2025c; 2025d; 2025e).<br>• Feral pig impact and management analysis (MAF 2024; Cooper 2024; MDF 2024; Samoa Root Crop Sector Strategy 2025). |

| KEQ / Sub-question | Key findings | Evidence and data sources (examples) |
|---|---|---|
| | • Feral pigs have become a systemic constraint; future designs should treat feral pig management (fencing support, coordinated control, learning from Australian practice) as a core enabling investment, not a peripheral issue.<br>• Labour shortages and rocky soils limit potential for large-scale mechanisation; incremental labour-saving technologies and improved practices (e.g. better weeding tools, field layout, cultivar choice) are likely to deliver more realistic gains than a wholesale shift to machinery in the short term. | • Interview evidence on mechanisation constraints, labour and land conditions (Jim Liu, Sunfield Agriculture; Tomata, Samoa Agriculture Store Company Ltd – interviews 2025).<br>• PHAMA Plus design notes on practical delivery challenges and adaptations (PHAMA Plus 2024a; PHAMA Plus 2024b). |
| 6.3 What are the broader learning implications for DFAT/MFAT facility models? | • Facility-style support such as PHAMA and PHAMA Plus can play a pivotal role in keeping critical export pathways open while also supporting pivots between export and food-security objectives as conditions change.<br>• A focus on food security (domestic consumption), intra-pacific trade, and international trade should form part of the goal and end of program outcomes for future interventions, not solely international exports.<br>• Export and biosecurity capacity are ahead of supply, so new infrastructure should be carefully targeted. Reducing the cost of processing through centrally MAF-owned and managed facilities is a positive step, but it is not a panacea for increasing exports. Future investments should focus on maintaining and fine-tuning these systems, supporting efficient use by exporters, and avoiding over-building until production and price conditions make higher export volumes realistic.<br>• Future facilities should continue to integrate GEDSI and locally led approaches (e.g. women's associations, youth farmers, church groups) as core delivery channels, given their demonstrated role in sustaining change.<br>• There is a growing risk of a gap in Samoa's coordinated biosecurity response capacity as PHAMA Plus winds down, particularly for emerging threats such as Fall Armyworm; successor investments or transition arrangements will be important to avoid losing hard-won surveillance, diagnostic and response capabilities.<br>• Biosecurity and market-access gains are valuable assets that need bridging support as PHAMA Plus exits. Samoa now has stronger surveillance, diagnostics and treatment capacity, but stakeholders are concerned about resourcing these functions after program closure in the event of an incursion such as Fall Armyworm or other regionally significant threats. | • PHAMA and PHAMA Plus facility designs, MEL frameworks and performance story documentation (PHAMA 2015; PHAMA Plus 2020; PHAMA Plus 2024a; PHAMA Plus 2025a–f), DFAT and MFAT guidance on facilities, MEL and GEDSI (DFAT 2023; MFAT 2023).<br>• MAF and DAFF collaboration documents on surveillance and response to emerging pests such as Fall Armyworm and other regionally significant pests (MAF 2024; DAFF 2024; NZ MPI 2023).<br>• Interview evidence from biosecurity officials on concerns about a "gap with PHAMA Plus ending" in relation to technical backstopping and rapid biosecurity response (Biosecurity officials, interviews, 2025).<br>• Case studies on Temukisa and Savai'i women's association, Toa Iakopo, church farmers and Talaoalii Rex demonstrating locally led, GEDSI-inclusive change pathways that future facilities can build on (PHAMA Plus 2025d; 2025e; MAF 2024). |