Ministry of Agriculture and Fisheries Samoa

Quarantine
Protecting Samoa's Natural Heritage
Puipui Samoa

Pacific Horticultural & Agricultural Market Access Plus Program
Supported by Australia & New Zealand

MAF's Operational Manual:

Export of Fresh Taro From Samoa to Australia

Ministry of Agriculture and Fisheries
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Version 2 for the export of fresh taro from Samoa to Australia was adapted by MAF, the partner entity engaged with the Pacific Horticultural and Agricultural Market Access (PHAMA) Plus program in Samoa, in June 2021, under the guidance of Bronwyn Wiseman and Kirifi Pouono (PHAMA Plus Program).

This Version 3 of June 2022 has the requirements of the HWT treatment incorporated (Section 11; Appendix 4, Section 4, Para 7; Appendix 7).

The final formatting was done by Walter Wasile.

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Rev	**Revision Date**	**Details**	**Authorised**	
			Name/ Position	**Signature**
1	21.06.2021	Ver2. Version 1 for NZ being adapted for Australia		
2	15.06.2022	Ver3. Final for Australia with HWT requirements incorporated.	Tilafono David Hunter, CEO-MAF	

Contents

Purpose

This Operations Manual outlines the practices and procedures to be implemented by taro growers, exporters and staff of Samoa Ministry of Agriculture and Fisheries ('Samoa MAF') for the successful export of approved varieties of fresh taro from Samoa to Australia.

Scope

The Operations Manual includes the processes of grower/exporter registration, registration of pack-house, exporter licensing, harvesting, post-harvest practices, quality standards, packaging, control of pests and diseases, phytosanitary pre-export inspection and certification.

Summary of important points

- Growers must submit a Registration Form to Samoa MAF – Crops Division (CD) at Nu'u, in order to produce taro for export to Australia, clearly outlining the export variety grown and location of farm. Their "registered grower identification code" must be recorded on all consignments of taro.
- Exporters who intend to export taro to Australia are to be registered at the Samoa MAF – Quarantine Services (SQS) office, based on existing policies.
- Taro suitable for export must be of a nominated export variety, TLB – resistant, mature, between 1 and 3kg weight (+ 0.2kg), fresh and healthy with minimal cuts, and free from severe corm rot damage or other injury.
- Taro varieties must be retained in single variety batches throughout production, harvest and post-harvest procedures.
- Corms are to be inspected for rots and any corm showing symptoms is to be rejected from the export process.
- Taro should be harvested under dry, cool, weather conditions and according to the export schedule. Corms are to be pre-cleaned by hand in the field to remove excess roots, soil, fibre and avoid removing the corm base. High pressure water washing is recommended as soon as possible and upon arrival at the Pack house. Taro corms for export to Australia must be topped prior to export to remove all petiole material and growing points. The corms are to be free of lateral shoots, suckers and daughter corms, as demonstrated in the diagram flowchart.
- To meet Australian biosecurity requirements, taro must be free of quarantine pests, soil and extraneous plant material.
- The taro must undergo high pressure wash first-then-hot water treatment as mandatory requirement at the specified treatment schedule and timeframe (as per Appendices 4 & 7) prior to export.
- Taro is packed in new standard polywoven bags after air drying to required weight before labelling and sewn or tied fully closed. Bags must have good aeration to allow for moisture and temperature retention. Once the taro is clean, inspected, packed etc., the security of the consignment must be maintained prior to shipment.
- Shipment of taro to Australia is to be transported in refrigerated containers that are held at a temperature of +8 to +10°C.
- Consignments of taro must be inspected by Samoa MAF on quality standards and Quarantine requirements which would include a Phytosanitary Certificate issued prior to export.

Background

Taro (*Colocasia esculenta var. esculenta*) is an herbaceous perennial plant that grows up to 2 metres in height. It produces an underground starchy corm that is round, oval or cylindrical in shape and up to 35 cm long and 15 cm in diameter. Its' time to maturity is generally 7-9 months, slightly longer at higher altitudes.

Taro is one of the most important crops grown in Samoa due to its dietary, cultural and economic significance. It has long been the basis of food security, as an important energy source, and generates income for subsistence farmers contributing significantly to poverty alleviation for several vulnerable groups.

Taro is considered a healthy part of the Samoan diet, consisting of starch granules that are smaller and thus more readily absorbed than some other starch products. It is of low Glycaemic Index and has a high satiety level, being high in fibre and containing protein and other micro-nutrients.

Taro features prominently in Polynesian folk-lore particularly during traditional feasting and as a valuable gift. It is this cultural attachment that is largely responsible for the existence of export markets of taro in New Zealand as well as in Australia and the western coast of USA, where many Pacific islanders live. Demand for taro in these markets continues to be strong.

The Samoan Taro Breeding and Evaluation Program has released a number of high yielding taro varieties with tolerance to Taro Leaf Blight, excellent eating quality, high quality nutritional profile and good shelf-life. These varieties are well positioned to meet the market demand from the Polynesian community in Australia who are seeking high quality taro from Samoa.

To meet customer requirements, taro must be of an approved export variety, greater than 0.8 kg in weight and be free of quality defects including fungal rots, pest damage, deterioration of headset, and softening of corm.

The Australia Department of Agriculture, Water and Environment (DAWE) has previously reviewed the import conditions for fresh taro corms to Australia from Samoa to be permitted, subject to meeting specific biosecurity requirements. To support the biosecurity requirements for the import of fresh taro corms into Australia from Samoa, Samoa MAF has developed the required operational procedures as outlined in this Operations Manual.

The following chart represents the harvesting and post-harvest processes for how the taro corms should be treated prior to export. Each step is described in detail in this manual.

Overview of the Pathway for Biosecurity Operational Procedures for the Export of Fresh Taro Corms to Australia from Samoa

Standard Practice

- Preliminary cleaning and trimming in – field (section 3)
- High pressure washing (tap water) (section 3)
- Air drying before packing (section 6.1.1)

In–field Crop Management (Section 2)

- Routine cut and drop leaves with numbers of spots exceeding 10% level of infection based on farm observations.
- It is farmer's responsibility to remove infected leaves to maintain the low level of infection due to varietal resilience to TLB below (e.g. <10% infestation)
- Crop inspection will be conducted by Samoa MAF or authorized officer on a quarterly basis.

Mandatory Practice for Systems Approach

- High Pressure Wash – Hot Water Treatment (section 11; Appendix 4, Section 4, Para 7; Appendix 7).

Protocol Requirement – General

- Topping of corms (Corms 'topped' to remove all petiole material and growing points. The corms to be free of lateral shoots, suckers and daughter corms) (sections 5.2.1 and 5.2.2)

- Operational system for the maintenance and verification of phytosanitary status (based on revised MAF Operations Manual and MAF's certification of HWT)

    - Phytosanitary inspection by NPPO (section 7.1)
    - Remedial action as required
    - Phytosanitary certification by NPPO (section 7.2)
    - Packing in suitable new packaging and security of consignment prior to export (sections 6.1 and 6.2).

1. Farmer, Pack house and Exporter Registration

1.1. Farmer – Grower Registration

1.1.1 All farmers who intend to supply taro for export must complete the 'Grower Registration' (GR) form and provide their contact information to the Ministry and Exporters for coordination of supply.

1.1.2 All approved growers will be provided with a registration number. The grower number consists of 7 digits and a letter (s) signifying the crop registered for supply. The first 3 digits identify the next sequential number of the grower; the next 2 number is the month when registration took place and the 2 number is the year the farmer is registered. T is for Taro and AU for importing country (e.g. Australia).

1.1.3 Therefore, for example, if a farmer has a registration number of 2330820TAU, this means that Taro farmer's number is 233 which was registered in August 2020. This unique number is to be carried through the records kept by farmer, exporter, Samoa MAF – Crops Division and Quarantine Division, on bags for export.

1.1.4 If a farmer has more than 1 field during a growing season, the farmer must fill out a new GR form for that field.

1.1.5 The grower registration will be valid for 1 calendar year for each registered field. The Samoa MAF is responsible to approving grower registration.

1.1.6 Any registered grower found to be in non-compliance during audits may result in suspension or correction actions to be undertaken within a period of time.

1.1.7 Exporters are only allowed to source taro from registered growers.

1.2. Pack house Licensing

1.2.1 Pack houses that seek to pack taro for export must be approved and licensed by the Samoa MAF and issued with a Pack House License Number. Samoa MAF conducts regular audits of pack houses and those found not to comply with procedure requirements will cease packing until Samoa MAF is satisfied that requirements can be met.

1.3. Exporter Licensing

1.3.1 Exporters of taro must be approved and licensed by the Samoa MAF – Quarantine Division and issued with an Exporter License Number based on MAF's regulatory policies, importing country requirements, with focus on mandatory biosecurity measures. To ensure that taro farmers will receive payment upon supply, the Ministry may require valid financial documents from the exporter.

1.3.2 Samoa MAF may conduct audits of exporters and those found not to comply with procedure requirements may have their licenses suspended or cancelled. Records of approval, license numbers and audit results will be held by Samoa MAF and made available for inspection by Australia DAWE.

1.3.3 The exporter must record the code of each registered grower on packing form for taro in each shipment for trace-back purposes.

1.3.4 Exporter must source/buy taro from registered growers only. Exporters found to be in non-compliance to this standard will be suspended.

2. In – field Crop Management

2.1 During crop growth, routinely cut and drop leaves with numbers of spots exceeding 10% level of infection based on farm observations. This will reduce sources of inoculum and infections of leaves in crop.

2.2 Removal of infected leaves is the farmer's responsibility to maintain the low level of infection due to varietal resilience to TLB below (e.g. <10% infestation).

2.3 Crop inspection will be conducted by Samoa MAF or authorised officer on a quarterly basis.

3. Harvesting and Cleaning Practices

3.1. Harvesting

3.1.1 Farmers and Exporters need to undertake careful harvesting and handling procedures at all times, cleaning and transporting to the packing facility so as to minimise damages and making close inspection to ensure that each corm meets the quality and requirements of the importing country.

3.1.2 Taro varieties must be retained as single variety batches throughout production, harvest and post-harvest procedures. Varieties are to be collected and packed separately.

3.1.3 Healthy plants should be selected for harvest and must only be harvested when they are fully matured (7-9 months after planting).

3.1.4 Cutting and removal of all leaves with TLB lesions 24 hours before harvest.

3.1.5 TLB – resistant varieties should be harvested based on the export schedule, preferably in the mid - morning or late in the afternoon when the temperature is cooler. During harvest, plants are carefully lifted from the ground by hand (Figure 1).

3.1.6 Removal by hand of excess roots, soil and fibre so that extra plant material and soil stay on farm and corms are clean for transport (Figure 2).

3.1.7 Always handle with care, never throwing or dropping the corms as this causes bruising that become visible during shipment and reduces shelf-life.

Figure 1. Taro harvesting.

Figure 2. Removal of petioles, roots and soil

4. Taro Quality Standards

4.1. Approved export varieties

Taro selected for export should only be of approved export variety by the Samoa MAF, correct size and shape, and free from any injuries (cuts and breaks). Corms with rots are not acceptable for export. The taro quality standards must be in line with the Australia DAWE import requirements.

Character	Requirement
Export Variety	Approved Varieties i. ('large corm' type only) ii. Samoa 01 iii. Samoa 02 iv. Talo Fusi v. Talo Salani, and vi. Any TLB resistant variety approved by MAF
Maturity	Recommend 7 to 9 months
Shape	i. Uniform oval shape ii. Free from major deformities
Size	Minimum = 1.0 kg Maximum = 3.0kg Tolerance ± 0.2kg
Headset	Topping of corms to remove all petiole material and growing points. The corms to be free of lateral shoots, suckers and daughter corms.
Soil and Pests	To be free of soil, pests, dead plant tissues and contamination
Roots and Foreign matter	Accessory roots and fibre removed
Rot and Decay	i. Free from injury and corm rot damage ii. Free from internal/external rot and any other pest, disease occurrence and symptoms


Talo Samoa 01


Talo Samoa 02


Talo Fusi


Talo Salani

4.2. Transfer to Packing House

4.2.1 It is preferred that the exporter collects the taro from the farm gate after weighing and purchasing. The exporter must provide a purchasing docket to the farmer indicating the quantity of taro received at farm gate, and reporting to packhouse authorities for data collection/ records.

4.2.2 Harvested corms should be transferred to the packing house within 24 hours after harvest. The exporters must be well informed of this requirement.

4.2.3 Corms of each variety of taro should be graded and packed separately in clean field harvest sacks. Each sack should be labelled as follows:

- 4.2.3.1 Harvest date;
- 4.2.3.2 Name of Variety;
- 4.2.3.3 Net weight and number of corms; and
- 4.2.3.4 Grower registration number.

4.2.4 Pre – grading of taro corms as per taro quality standards (variety, size and shape) must be undertaken prior to transfer to ensure Australia DAWE requirements are met.

4.2.5 Keep taro cool by covering the truck loads with hessian or vehicle canopy. It is necessary to cover the loads to minimise contamination by debris and insects. Sacks used to pack taro from the field should be re-used after it is received at the pack house facility. Do not place people or things on top of the corms that will increase the risk of damage to the corms. The tray of the transport vehicle should be fitted with rubber to minimise damage to the corms from vibrations and jarring of the vehicle.

Hawaii/United States of America

No top (tiapula) shall be attached.

5. Handling Practices at the Packing Facility

5.1. Receival of Taro

5.1.1 Taro from individual farmers must be recorded, identified and segregated during the entire process to allow trace-back where necessary.

5.1.2 The exporter inspects the taro corms (with MAF staff's final inspection at Packhouse) to make sure they adhere to quality and quarantine export measures. The Exporter is responsible for the weighing and grading and packing of taro corms.

5.2. Topping of the Headset

5.2.1 Corms must be 'topped' to remove all petiole material and growing points. The corms must be free of lateral shoots, suckers and daughter corms.

5.2.2 Taro with headset present will not be acceptable for export to Australia.

Various importing countries have different requirements for headsets

New Zealand

Taro shall have no more than 5cm in length of top (tiapula) attached.

Australia

'Topped' and must be free of lateral shoots, suckers and daughter corms.

5.3. Washing of Taro

5.3.1 Australia DAWE has specific risk management measures put in place for restrictions on the introduction of insects, diseases, soil and roots of the taro and these must be removed to meet Australia quarantine requirements.

5.3.2 Corms intended for export for all markets should initially be cleaned using clean water. The use of high pressure washing is a standard practice (per the Biosecurity Protocol) and must be done for corms exported to Australia.

5.3.3 Corms must be washed using fresh water to remove insects, soil, roots, fibre and foreign matter. The corms must be free of lateral shoots, suckers and daughter corms.

5.3.4 Corms must be washed as separate varieties to ensure single variety batches are maintained.

5.3.5 The Exporter is responsible for undertaking the washing of the approved taro variety.

5.4. Postharvest Treatment

5.4.1 Application of a hot water dip treatment is recommended for exports to all markets to kill incipient Phytophthora colocasiae infections and to eliminate potential quarantine pests such as mites and nematodes from export taro.

5.4.2 To reduce incidence of pathogen infection, it is recommended that the taros are air dried well after postharvest treatment before further processing.

5.4.3 Hot water treatment is a mandatory endpoint treatment for taro exports to Australia, and the details are in Appendix 7.

5.4.4 The Samoa MAF – Quarantine Inspector will certify for HWT treatment and conduct random inspections to ensure the treatment procedure is maintained.

5.4.5 Exporter will assist the Samoa MAF – Quarantine Inspector where necessary to ensure compliance with HWT requirements and no interceptions of live mites and nematodes after treatment.

5.5. Quality Inspection

5.5.1 The quality inspection is conducted by the exporter to ensure that all corms meet export quality requirements, and is subject to MAF's final inspection (see Section 7.1).

5.5.2 Corms must be of the approved TLB-resistant variety, correct maturity, and uniform oval shape and are free of soil, rots, damage or other injury including cuts or bruising.

5.5.3 Taro corms not meeting the taro quality standards as per section 7.1.5 are to be rejected.

6. Packing and Labelling

6.1. Packaging

6.1.1 Once dried, corms are to be packed in woven polypropylene sacks for shipment to Australia. Packaging in a laminated sack reduces moisture loss and provides a fresher taro with better appearance and taste upon arrival at its destination.

6.1.2 Old sacks must not be re – used. Each consignment of taro must be packaged in new sacks.

6.1.3 Each sack should be weighed immediately and the net weight at packing and variety should be recorded by the Exporter. Each sack shall weigh approximately 20kg.

6.1.4 Each sack shall contain only a single variety of taro. Once filled, each sack should be sewn or tied closed to prevent re – contamination from quarantine pests and extraneous material.

6.2. Labelling

6.2.1 Each sack shall be labelled by printing on outside of sack or attached label into top seam.

6.2.2 Sacks shall be labelled with the following wording and information:

- 6.2.2.1 "Product of Samoa" and "Taro"
- 6.2.2.2 Name of Variety
- 6.2.2.3 Net weight and No. of taro
- 6.2.2.4 Date of Packing
- 6.2.2.5 Exporter license number, Grower reference and Pack house name for trace – back purposes.

6.3. Loading in containers and shipment

6.3.1 The approved taro varieties should be stored between 8 - 10°C for less than a week.

6.3.2 Produce should be packed directly into the refrigerated sea container located on site at the pack house. The holding area of the container shall meet quarantine requirements.

6.3.3 Alternatively, store the packed produce in an insect – proof area. Transfer sacks to refrigerated storage if longer than 24 hours until despatch to Port.

7. Phytosanitary pre–export inspection and certification

7.1. Pre-Export Quarantine Inspection

7.1.1 Quarantine inspection is the responsibility of the Samoa MAF – Quarantine Division/ Services (SQS).

7.1.2 The quarantine inspection will be conducted by MAF Samoa at the packing facility.

7.1.3 The Exporter must produce records for each consignment for Samoa MAF – SQS to verify related documents pertaining to the consignment.

7.1.4 The Samoa MAF – Quarantine Inspector will conduct a 600-unit sample regime per grower line. Therefore, for each registered grower in the consignment, the MAF – Quarantine Inspector will conduct inspections depending on the total number of corms per grower applied in the 600-unit sample. Hence:

- 7.1.4.1 Number of corms > 1000 = 600-unit sample to be inspected
- 7.1.4.2 Number of corms < 1000 = 450-unit sample to inspected.
- 7.1.4.3 Number of corms < 450 = 100% inspection

7.1.5 Corms are to be inspected for rots, and any corms showing symptoms are to be rejected.

7.1.6 If pests or rots are detected during the Quarantine inspection, the grower line lot where the detection was made must be reconditioned and re – inspected. If there is no further detection made during the re – inspection, the grower line may be accepted. If a second detection is made during re – inspection, the grower line must be rejected. A trace – back audit must then be initiated.

7.1.7 Taro corms not meeting requirements for regulated pests and soil as stated by the Quarantine inspector will be re-cleaned to export standard or rejected and not exported to Australia. The Quarantine Inspector will record inspection date, Exporter's license number, sample size, pests found and action take (rejected or accepted for treatment and

export). These records will be held by Samoa MAF (SQS and CD) and will be available for inspection by Australia DAWE.

7.1.8 If the Samoa MAF Quarantine Inspector is satisfied that quality standards and Australia DAWE requirements have been met, a Phytosanitary Certificate may be issued.

7.1.9 Samoa MAF – SQS shall place a Quarantine seal on the container once cleared for export. Once the seal is in place, the container must not be opened unless authorised by the Samoa MAF ACEO – SQS.

7.1.10 If the Exporter is found to be in non-compliance with the appropriate requirements of this procedure, operation will be suspended for export packing to Australia until such time as the Samoa MAF – CEO or ACEO – SQS is satisfied that the requirements of the procedure can again be met. The Exporter must demonstrate full compliance to the requirements of the taro pathway.

7.2. Phytosanitary Certification

7.2.1 A completed International Phytosanitary Certificate (IPC) will be issued by the Samoa MAF Samoa Quarantine Services covering each shipment of taro cleared for export. The IPC may be issued covering a number of individual products supplied by the Samoa MAF. Each product and the license number of official Exporter supplying that product will be included in the IPC.

8. Audit

8.1 Samoa MAF will audit critical control points of the export process, from field to final packaging and storage prior to export to Australia regularly at specified interval. Regular audits will be conducted by the Samoa MAF and will hold reviews on a quarterly basis through a consultative process. Samoa MAF will react to DAWE's decision if a major non-conformance, which will affect the integrity of the produce, is detected. Australia DAWE also has the right to conduct random audits of the export process.

8.2 Audit(s) may check for the following:

- 8.2.1 Grower registration;
- 8.2.2 Field management practices and spray records to ensure that export taro is grown in a clean area;
- 8.2.3 Transportation;
- 8.2.4 Packing facility operations including cleaning, treatment, packing and documentation;
- 8.2.5 Quarantine inspections and certification;
- 8.2.6 Storage areas and transport vehicles.

9. Inspection upon arrival and feedback

9.1 Australia DAWE will undertake document compliance at the port of entry prior to biosecurity clearance. Consignments may be inspected using the standard inspection protocol. The inspection rate is 450 units from a packing line of 1000 units or less, or 600 units from a line > 1000 unit. In both cases, the sample must meet the following requirements:

- 9.1.1 0 units infected with regulated pests;
- 9.1.2 less than 25g soil

9.2 The detection of live quarantine pests, soil and other extraneous matter may result in:

- 9.2.1 The consignment being washed and released;
- 9.2.2 The consignment being fumigated and released;
- 9.2.3 The consignment being re-exported at the exporter's expense or;
- 9.2.4 The consignment being destroyed at the exporter's expense.

9.3 Trade may be suspended with the detection of high impact pests for which specific phytosanitary measures are required.

9.4 Australia DAWE will inform Samoa MAF of the interception (and treatment) of any regulated pests, unlisted pests or non-compliance with other phytosanitary requirements. If regulated pests are not detected, or are successfully treated following interception/ detection, biosecurity clearance will be achieved.

10. Records

10.1 Records should be kept by the exporter and Samoa MAF.

10.2 The following records should be kept by the Samoa MAF – Crops Division:

- 10.2.1 Farmer declaration form (s);
- 10.2.2 Exporter's inspection/check sheets;
- 10.2.3 Quality inspection check forms;
- 10.2.4 Written advice or instructions to farmers on export of taro to Australia

10.3 The following records should be kept by the Samoa MAF – Quarantine Division:

- 10.3.1 Exporter's registration form;
- 10.3.2 Non-compliance records (from inspections upon arrival in Australia);
- 10.3.3 Quarantine checklist (s) and audit record (s) by Samoa MAF;
- 10.3.4 Written advice or instructions from Samoa MAF to farmers on export of taro to Australia;
- 10.3.5 Quarantine instructions/advice from importing countries of directions to MAF and Exporter;
- 10.3.6 Filed copies (hard copy and electronic) of Phytosanitary Certificates.

10.4 All inspection records such as the exporter's inspection/check sheets, inspector's report, quality inspection report shall be held for a period of not less than three years and shall be made available to Samoa MAF and Australia DAWE Auditors.

11. Specific measures for export of fresh taro from Samoa to Australia to mitigate *Phytophthora colocasiae, Tarophagus proserpina and Taro vein chlorosis virus*

Pest	Common Name	Measures
Phytophthora colocasiae	Taro leaf blight	Systems approach including: ↗ Only growing approved TLB-resistant varieties ↗ In-field measures to reduce disease incidence ↗ Pre-export hot water treatment ↗ Topping of corms of large-corm taro ↗ Prohibition of corms of small-corm taro
Tarophagus prosperpina	Taro planthopper	Pre-export visual inspection and if found, remedial action and Topping of corms of large-corm taro
Taro vein chlorosis virus (TaVCV)	taro vein chlorosis virus	Topping of corms of large-corm taro Prohibition of corms of small-corm taro

Appendix 1: Grower Registration Form (Example only)

Numera Faifaatoaga:

TA: _____/_____

HP: ___: _____

MATAGALUEGA O FAATOAGA & FAIGAFAIVA

RESITALA MO LE AUINA ATU O TALO MO MAKETI I AUSETALIA

'Ai'aiga i le va o le Faifa'atoaga Talo ma le Matagaluega o Fa'atoaga & Faigafaiva

Vaega 1 – Resitalaina o le Faifa'atoaga:

Suafa o le Faifaatoaga: _____

Numera Telefoni: _____

Afioaga: _____

Nuu o loo i ai le Faatoaga Talo: _____

Itumalo: _____

Vaega 2 – 'Ai'aiga ma Tu'utu'uga mo le Faifa'atoaga (Farmer/Grower)

1. Ia usitaia ta'iala ma auala ua uma ona fa'ata'atitia e le Matagaluega mo le auina atu o talo mo maketi i fafo (Ausetalia)
2. Ia resitala uma le aufaifa'atoaga e auai i lenei polokalame i le Matagaluega o Fa'atoaga & Faigafaiva i le Vaega o Laau Toto i Nuu.
3. E nā o le lima (5) ituaiga talo (Samoa1, Samoa2, Samoa3, Samoa4 & Samoa5) ua fautuaina e le Matagaluega mo le maketi, e mafai ona totoina mo le auina atu i fafo (Ausetalia)
4. E tatau ona totoina talo i poloka i o latou ituaiga, ina ia faigofie ai ona faavasegaina i le taimi e fafai ai ma auina atu mo le maketi (Ausetalia).
5. Ia fafai i le matua talafeagai (ia le i lalo ifo ole 8 masina), e pei ona fautuaina e le Matagaluega mo le auina atu i (Ausetalia).
6. Ia faamama, ave'ese a'a ma palapala o loo pipi'i i le tino o le talo, a'o le'i tu'uina atu i le fale o loo faamamaina ai ma tu'u taga ai.
7. Ia lē i lalo ifo ma le 15cm le umi o le tiapula e pipii i le i'o o le talo
8. E le faatagaina ni talo ua manu'a pe faaleagaina foi le tino.
9. E tatau ona siaki ma aveesea iniseti poo manu ninii faalafua pe afai e vaaia i luga o le tino o le talo.

Vaega 3 - Matāfaioi ale vaega e maketiina le Talo (Exporter):

1. Taliaina ma fuaina le mamafa o talo auina mai i Faifa'atoaga
2. Filiina ma faavasega talo i ituaiga eseese
3. Toe fa'amamaina vaega le manaomia mai le tino o talo
4. Faatinoina le siakiina mulimuli o talo mo le faatauina atu i maketi i fafo
5. Iloiloga ma suesuega faaopoopo ao lei faatinoina le isi laasaga mo le auina atu o talo i maketi i fafo.
6. Tuuina i pusa poo taga ua iai igoa ma numera o feta'atauaiga mo Faifa'atoaga.
7. Tu'uina atu i le Matagaluega o Fa'atoaga ma Faigafaiva mo le toe siakiina mulimuli.

Vaega 4 - Matāfaioi a le Matagaluega o Fa'atoaga ma Faigafaiva:

1. Faatino asiasiga o fa'atoaga mo le mulimulitaia o le tausiga o fa'atoaga mo maketi,
2. Faatino a'oa'oga o talafeagai mo le tausia o fa'atoaga ma faailoa aiaiga manaomia mo maketi.
3. Faia galuega su'esu'e i auala talafeagai mo le maketiina o fua o faaeleelega mo maketi.
4. Faatino su'esue'ga I metotia talafeagai mo le puipuia o mfaama'i ma iniseti fa'alāfua e a'afia ai fua o fa'aeleeleaga mo maketi.
5. Faatino su'esu'ega mulimuli a'o lei tu'uina i pusa po'o taga mo le auina atu i maketi (Quarantine Inspection).
6. Saunia le tusipasi fa'atagaina mo talo e auina atu i atunuu i fafo.
7. Tuuina atu faatagana mo fefa'atauaiga i atunuu i fafo.

Vaega 5 – Maliega Aufa'atasi a le Faifa'atoaga ma le Matagaluega o Fa'atoaga ma Faigafaiva

O lenei maliliega ua faia i le va o _____ mai le Afioaga o _____, ma le Matagaluega o Fa'atoaga ma Faigafaiva, e faapea:

- O le ā mulumulita'ia uma ma aiaiga e pei on tuuina maim o le polokalame.
- O le ā fa'aleāogaina ma aveesea lo'u igoa mai le polokalame pe āfai o le ā le usitaia nei tu'utu'uga.

Sainia,

Faifa'atoaga _____ Aso: _____

_____

Tanu Toomata
Pule Sili Lagolago – Vaega o Laau Toto
Matagaluega o Fa'atoaga ma Faigafaiva

Appendix 2: Export License Application Form

Government of Samoa
MINISTRY OF AGRICULTURE

QUARANTINE

APPLICATION FOR A LICENSE TO EXPORT QUARANTINE MATERIALS

FULL NAME OF EXPORTER IN SAMOA	FULL NAME OF IMPORTER OVERSEAS
ADDRESS OF EXPORTER (VILLAGE) Phone/Fax Number: _____	ADDRESS OF IMPORTER Phone/Fax Number: _____

QUARANTINABLE MATERIAL PROPOSED FOR EXPORT
Tick box or fill in blanks where relevant

☐ **Commodity** (Scientific name if possible) **QUANTITY**

ADDITIONAL INFORMATION:

END USE: ☐ Commercial Consignment (Valid to December every year)

PORT OF EXPORT

☐ Faleolo Airport ☐ Fagali Airport ☐ Matautu Wharf/Satitoa Wharf ☐ Post Office

_____ **Signature of applicant**

_____ **Date of application**

Appendix 3: Pack house Facility Licensing Registration Form

QUARANTINE

Approval / Monitoring Audit - Generic

Company:

Audited By:
Date:

Checklist	Y / N	Comments / Objective Evidence
The operator accepts costs incurred with the approval of the facility and on going audit costs.		
A site plan of the facility		
The container devanning area is secure, sealed, in good repair and sweep able.		
Holding areas free of weeds, rubbish or debris for 3 metres around the containers.		
The operator will ensure the facility is kept clean, free from dust, debris and vegetation in areas where risk goods are unpacked or held.		
Who looks after the day to day running of the site?		
Staff working at the facility are aware of the operational requirements. Staff have access to current/ relevant standards.		
Accredited Persons are available to conduct checks What checks so they carry out? • Internal • External • Wood Packaging		
Operator understands carriage to the facility is to be secure (e.g. leak-proof method or vehicle). Carriage must be by the most direct practical route.		
Risk goods can be held under adequate security within the facility until they are ready to leave the facility. How/ Where?		
Operator understands Risk goods awaiting clearance will be kept within an enclosed building and approved area. They must not be placed in contact with cleared goods otherwise the cleared goods take on the status of being un-cleared goods.		
The operator agrees to advise MAF Quarantine Service when risk goods are received at the facility.		

Operator understands risk goods are not to be removed, sampled, opened or tampered with unless authorised by an inspector.		
The facility has the required cleaning equipment being: ⇒ A broom (labelled) ⇒ A dustpan and brush (labelled), or ⇒ A bin		
A dual-action aerosol insecticide is available having both knock-down and residual action properties (such as tetramethrin 4g/l for knock down and permethrin 1g/l for residual).		
A potable light source is present and working.		
Fumigation: Where are items fumigated? Who arranges fumigation?		
A documented operational procedure is in place describing at least: • Holding and devanning of containers • Holding and removal of quarantine refuse and recording		
An easily retrievable recording system is in place showing: ⇒ Date of arrival at site ⇒ Container # ⇒ Ship / Flight ⇒ Quantity and product ⇒ Importer ⇒ Date of devanning ⇒ Date and details of holding and processing ⇒ Date of release ⇒ Reports on any event that might jeopardise Biosecurity and the notification to an inspector of each event. Remedial action taken to rectify any non-compliance to these requirements.		
OSH check for Approval ⇒ Is a health & safety induction course required for this facility? ⇒ Is a First Aid kit available for MAF staff use if required? ⇒ Is there a hazard register and are there any hazards MAF staff need to be aware of?		
Signature of officer:		Date: Approve: Yes / No

Appendix 4: Control of Pests and Diseases of Importance for Export of Fresh Taro

Information in this Appendix has been summarised from the book "Taro Pest: A guide to pests and diseases of taro in the South Pacific". Pests covered in this appendix include:

1. Mealybugs
2. Army Worm
3. Taro beetle
4. Taro Leaf Blight
5. Soft corm rot
6. Nematode

1. Mealybug

Mealybugs belong to the insect group known as scale insects: they have soft segmented oval bodies, but without an outer shell. They are covered with a white waxy powder and long, short or no filaments projecting from the margin.

Mealybugs have a long feeding tube that is used to pierce plant parts and suck the sap. On taro, mealybugs can be found on all parts of the plant, but generally not in numbers sufficient to cause physical damage. However, some can transmit the virus TaBV.

If control is warranted, it is best to target control of ants as they prevent the activities of natural enemies. If this is not sufficient, then a spray of a horticultural oil (eg. Conqueror) or soap should be considered.

Mealybugs may remain in holes on corm if not washed sufficiently prior to export which may lead to quarantine issues.

2. Army Worm *(Spodoptera litura)*

Army worm are widespread throughout the pacific. They are usually well controlled biologically, but outbreaks can occur after cyclones or in newly cleared isolated areas.

Egg masses are cream to golden brown in colour and 4-7mm diameter. Young caterpillars are pale green, older larvae are dark green to brown.

Although colouration is variable, the bright yellow stripe along the dorsal surface is characteristic.

Young larvae remain together at first, later radiating out from egg mass, stripping the interveinal leaf surface and skeletonising the leaves as they advance.

Older larvae are solitary night feeders. They chew large areas of the leaf and when numerous, they can defoliate a crop. In such cases, the larvae migrate in large groups from one field to another in search of food.

Chemical control may be needed when biological control is insufficient. However, they should be used with caution so as not to disrupt the balance between natural enemies and pest, as has been witnessed in Samoa where more damage has been noted in a field where insecticide had been applied than in those unsprayed. Products to be considered are those that are non-toxic to beneficial insects, such as biologically derived pesticides, Spinosad and Bt. Neem extracts have been considered in India.

Physical control will help reduce populations through the removal and destruction of leaves infested with egg masses or young larvae.

3. Taro beetle *(Papuana spp.)*

The taro beetle is not currently found in Samoa. Strict quarantine measures must be observed to prevent its entry into this country.

The adult beetles are brown to shiny black and measure @ 25 mm long and 12mm wide. The males have horns on their head and a tubercle behind the head. The females sometimes have a small horn and tubercle.

The adult beetles feed on the corms, tunnelling inside. The impact is considerable as the export markets do not tolerate any damage and more than 15% damage makes them unacceptable for the local market.

Above-ground, the young plants may be attacked and killed as the beetle invades the shoot; older plants grow slowly and a few or all of the leaves wilt.

An integrated crop management approach is recommended for control through a combination of cultural (crop rotation, clean planting material - free from soil, destruction of breeding sites near farms), chemical control (imidachloprid, bifenthrin), biological control (Metarhizium anisopliae) and phytosanitary measures.

It is effective and economical for large commercial plantations that produce taro for the export market to consider the option of chemical control if taro beetle is detected in Samoa. Planting material must not be moved from infested areas to non-infested areas.

4. Taro leaf blight *(Phytophthora colocasiae)*

Taro leaf blight (TLB) is a major disease of taro, and where present may prevent farmers from successfully growing taro if tolerant varieties are unavailable. In Samoa, a number of varieties with tolerance to TLB have been bred and released for commercial and food security production.
A small brown speck, on the upper leaf surface and water-soaked below is the first sign of the disease. Infections often begin on the

lobes and sides of the leaf where water collects. The spots enlarge, become circular in shape, and are dark brown with yellow margins. The initial spots give rise to secondary infections and soon the leaf blade collapses and dies.

The fungus can also cause a post-harvest corm rot that is difficult to detect unless corms are cut open. The rots are light brown and hard.

Control is largely through the selection of resistant varieties of taro and cultural and sanitary control.

Select a site away from already infected crops, regular remove diseased leaves and plant material on wide spacing between plants.

Both protectant and systemic fungicides have been reported to give control of TLB and studies done after the outbreak of TLB in Samoa recommended phosphoric acid alternated with mancozeb.

Control for the export of fresh taro can be managed based on the hot water treatment preliminary study and verification findings by the Samoa Research Organisation of Samoa (SROS) as follows:

- The preliminary study demonstrated that the hot water treatment at 48.5°C for 25 mins is effective in managing *Phytophthora colocasiae* following inoculation of the surface of taro corms.
- The pilot study demonstrated that the high pressure washing at 50 psi for 15 seconds, in combination with a hot water treatment at 48.0°C for 25 mins is successful in managing the biosecurity risk of *Phytophthora colocasiae* should it be present on the surface of taro corms.

Corm rots are best controlled by dipping corms in 1% sodium hypochlorite solution and storing them in polyethylene bags.

5. Corm Soft Rot *(Pythium spp.)*

Diseased corms show a rot of varying colour from whitish-yellow, through shades of grey and blue, to dark purple usually starting at the base of the corm and progressing upward until the whole corm may be affected. Occasionally the fungus attacks the small side roots and then the side of the corm. When the corm is cut open, a sharp line of can be seen between healthy and rot tissue.

Above ground, the whole plant becomes stunted, leaf stalks are shortened and leaf blades become curled and wrinkled.

To manage this rot, start with healthy planting material free from rot. If required, clean suckers of old leaves, soil and roots. Don't plant taro where draining is poor. Remove any diseased material from the field at harvest and rotate with non-host crops to reduce the disease level. Avoid planting too close to Fau (Hibiscus) trees.

Chemical control of post-harvest rots caused by Pythium splendens using 1% solution NaOCl (bleach) as a corm dip helps reduce damage.

6. Nematodes

Root Knot Nematodes (*Meloidogyne spp.*)
Lesion Nematodes (*Pratylenchus coffeae*)

Both nematodes are found in association with roots of a range of crops and their incidence needs to be monitored in taro grown in Samoa due to quarantine concerns. High numbers of lesion nematodes have been found on taro in American Samoa and Fiji.

Damage from root knot nematode has shown to be relatively mild in Pacific Islands.

Typically, roots are slightly swollen without knots and only very rarely have swollen, deformed roots with galls been reported.

Symptom of lesion nematode is localised necrosis of feed roots but generally detection is by extraction from root and corm tissues.

To help manage nematodes, select planting material from fields without a history of infection. A cover crop of marigolds which produce chemicals that are toxic to nematodes may help in some areas.

Nematacides such as dazomet, oxamyl (Vydate™), fenamiphos (Nemacur™) and carbofuran (Furadan™) would reduce nematode numbers but their use is uneconomical and limited in pacific Islands and must only be used with extreme caution and by a licensed operator.

Appendix 5: Maximum Residue Levels (pesticides) for Fresh Taro to Australia (extracted from New Zealand Operations Manual for Fresh Taro exports from Samoa)

Reported by Codex Alimentarius as MRL for root and tuber vegetables.

Pesticide	MRL (mg/kg)
Aldrin and Dieldrin	0.1
Azoxystrobin	1
Bifenthrin	Level of detection
Chlorantraniliprole	0.02
Cyhalothrin (includes lambdacyhalothrin)	0.01
Cypermethrins (including alpha and zeta cypermeth)	0.01
Fenvalerate	0.05
Imidacloprid	0.5
Paraquat	0.05
Piperonyl butoxide	0.5
Pirimicarb	0.05
Pyrethrins	0.05

Additional MRL reported from other countries

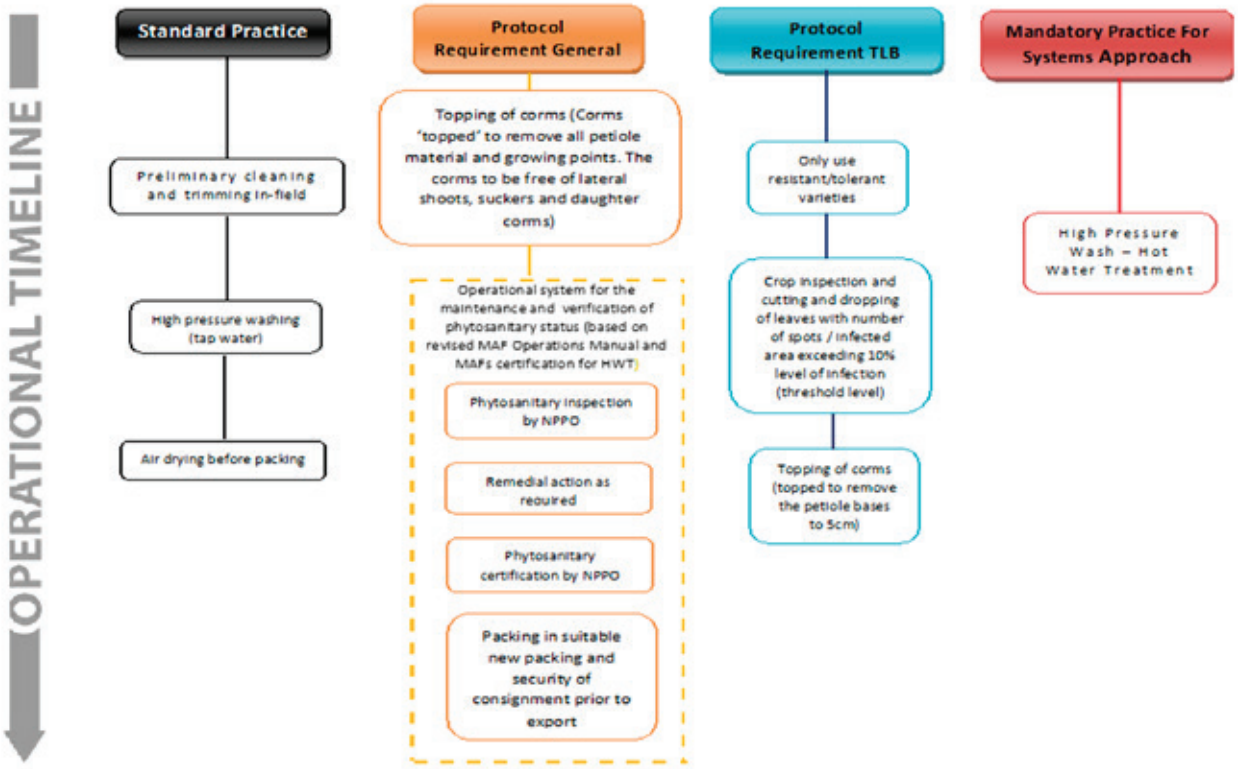
Pesticide	Crop	MRL (mg/kg)	Country
Acephate	Root, bulb & tuber vegetable	1.0	Taiwan
Bifenthrin	Taro	0.05	Australia
Carbaryl	Vegetables	5	Australia
Carbofuran	Root, bulb & tuber vegetable	0.5	Taiwan
Chlorpyrifos	Taro	0.05	Australia
Cyfluthrin	Root, bulb & tuber vegetable	0.5	Taiwan
Deltamethrin	Root, bulb & tuber vegetable	0.01	Taiwan
Dithiocarbamates (incl. Mancozeb)	Vegetables	7.0	NZ
Dithiocarbates	Root, bulb & tuber vegetable	0.5	Taiwan
Fenamiphos	Root vegetables	0.2	NZ
Fenvalerate	Root, bulb & tuber vegetable	0.1	Taiwan
Imidacloprid	Taro	0.05	Australia
Indoxacarb	Taro	0.1	Japan
Iprodione	Taro	0.05	Australia
Methomyl / Thiodicarb	Taro	1.0	Australia
Permethrin	Root, bulb & tuber vegetable	0.5	Taiwan
Pirimiphos methyl	Root, bulb & tuber vegetable	0.2	Taiwan
Pyrethrins	Vegetables	1.0	NZ

Exemptions from MRL for Plant Compounds (New Zealand)

- *Bacillus thuringiensis* (Bt)
- Copper and its salts
- Extract of Neem (*Azadirachta indica*)
- Sulphur
- Phosphoric acid
- Microbial Pesticide Organisms.

Appendix 6: Biosecurity Protocol for Fresh Taro from Samoa to Australia

From Outline of Biosecurity Protocol December 2020



Appendix 7: Hot Water Treatment

High pressure washing followed by hot water treatment is a mandatory part of the systems approach for the export of fresh taro to Australia. The treatment schedule is: 50psi for 15 seconds + 48°C for 25 minutes. The key steps for packhouse operations are:

1 Receiving of taro and topping
2 High pressure washing, 50psi, 15 seconds
3 Sorting and grading: MAF inspection
4 Hot water treatment, 48°C for 25 minutes
5 Cooling taro in ambient water for 25 minutes
6 Air drying taro until they are fully dry: MAF inspection
7 Packing corms into sacks
8 Keeping taro sacks at 10°C

Commercial operators are responsible for treating the taro and ensuring the treatment schedule is met. The operator will maintain records (hard copy and/or digital) for each treatment run including water temperature and date / time of treatment. MAF will verify that the treatment schedule is being met based on random checks of treatment runs and checking the operators records for each treatment run.

The details for the operations including monitoring of water temperature and treatment time, and record keeping will be developed by each commercial scale treatment facility. These details will be endorsed by MAF prior to commence of treatment for export consignments.