



# Pacific Horticultural and Agricultural Market Access Program (PHAMA)

## Report to the Samoa Market Access Working Group (SMAWG)

Development of a Report to the SMAWG Outlining Export Issues for Taro to Australia and New Zealand

26 MAY 2011

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Date: **26 May 2011**  
Reference: 42444103  
Status: Draft

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## Abbreviations

<b>Abbreviation</b>	<b>Description</b>
ACIAR	Australian Centre for International Agricultural Research
ALOP	Appropriate Level of Protection
CEO	Chief Executive Officer
HTFA	High Temperature Forced Air
IHS	Import Health Standard
ISPM	International Standards for Phytosanitary Measures
NZMAF	New Zealand Ministry of Agriculture and Forestry
PCN	Potato Cyst Nematode
PHAMA	Pacific Horticulture and Agriculture Market Access Program
SMAWG	Samoa Market Access Working Group
The Ministry	Ministry of Agriculture and Fisheries (Samoa)
TLB	Taro leaf blight
URS	URS Australia Pty Ltd

## Executive Summary

Samoa has made significant and commendable achievements in re-establishing the security of their domestic taro industry following its devastation by Taro leaf blight in 1993. Domestic production is now at the point where export markets could be pursued in an attempt to regain a considerable share of these markets. There are, however, significant impediments that would need to be overcome before Samoa could enter and be competitive in these markets.

Under Australia's recently proposed conditions for global taro corm imports Samoa would be excluded from this market because of the presence of Taro leaf blight. Once (and if) these proposed conditions become policy, and should Samoa intend to pursue this market, measures to manage Taro leaf blight on exported taro would need to be developed by Samoa and accepted by Australia before trade could commence.

A major potential impediment to establishing trade in both markets is a consumer reluctance to purchase the newly developed export varieties of taro. This barrier has been considered by both the Ministry of Agriculture and Fisheries and exporters in Samoa, and plans have been developed to promote these varieties in the New Zealand market.

Competition in both the New Zealand and Australian markets would be strong from other suppliers with established taro trade in these markets. It may take a considerable amount of time and investment before Samoa is able to regain a reasonable share of these markets. There is a potential that low returns experienced during the establishment of these markets may disappoint some growers and see them leave the export supply chain.

Underpinning Samoa's efforts to re-establish export trade will be a need to reform the current supply system, both in terms of developing and introducing quality and phytosanitary standards for all processes in the supply chain and through improving its internal supply chain infrastructure. Any improvement to supply chain standards and infrastructure could reasonably be expected to have positive flow-on effects for other produce supply chains.

## Recommendations

Based on the issues and opportunities identified during the course of this study it is recommended to the Samoa Market Access Working Group (SMAWG) that:

- The infrastructural needs for the taro supply chain be further investigated in terms of the quality and phytosanitary objectives that will need to be achieved to re-establish export markets.
- Further deliberations be made on the viability of the Australian market in terms of limited freight options, market acceptance of the new taro varieties, competition and potential returns on exports to determine if it is realistic to pursue this market.
- If it is determined that the Australian market is viable through the deliberations outlined above, and if Australia's currently proposed conditions for imported taro corms become policy, that preparations be made to determine how the Taro leaf blight management issue will be addressed to gain access to this market.
- The SMAWG should maintain a watching brief on the outputs of the Australian Centre for International Agricultural Research (ACIAR) projects detailed in this report that will assist in developing standards for processes in the taro supply chain.

## Background

### 1.1 The Samoan Taro Industry

Following the devastation of the Samoan taro industry in 1993 by Taro Leaf Blight (TLB) the Samoan Ministry of Agriculture and Fisheries (The Ministry) and University of the South Pacific have been jointly engaged in developing TLB resistant taro lines that can be successfully cultivated in Samoa. A number of exotic taro cultivars were screened and imported from the Asia-Pacific region during the 1990s, and crossed with locally adapted varieties to produce many potential new varieties.

Twenty five of these varieties were subsequently selected for further evaluation for their suitability for the export market, with five varieties demonstrating exceptional characteristics for export; excellent corm appearance and size, long shelf life, high nutritional value and very good eating qualities. These five varieties also demonstrate good tolerance to TLB and high suckering rates, which allows them to be readily bulked up by farmers. The approved export varieties are provided in Table 1-1.

**Table 1-1 Five varieties of taro selected and approved by the Samoa Ministry of Agriculture and Fisheries for export**

Taro identification	Variety name	Flesh colour
Tama Samoa	Talo Uliuli	Pink
Lalelei o Samoa	Talo Mumu	White
Manaia Samoa	Talo Meamata Niue	Pink
Taupou Samoa	Talo Suga (N15)	Pink
Tamaitei Samoa	Talo Seu (N20)	Pink

Source: Extracted from the Samoa Ministry of Agriculture and Fisheries brochure “Talo Samoa”, 2010

Seed material of these five varieties has been distributed to farmers on both Upolu and Savaii Islands, who have since been producing and bulking up these varieties. Samoa is now at a stage where it has the taro resource to enter the export market and attempt to reclaim a portion of its former markets.

### 1.2 Australia's Phytosanitary Requirements for Imported Taro Corms

Australia's import requirements for taro corms (*Colocasia esculenta*) for consumption are based on global imports. That is, the requirements provide for any taro-producing country that desires to export taro corms to Australia.

#### 1.2.1 Generic Import Conditions

The following, generic, import conditions are applicable to imports of all fruits and vegetables into Australia:

- An import permit is required.
- Phytosanitary certification must accompany each consignment.
- Consignments must be free of live insects, disease symptoms, soil, trash and other debris, and seed contaminants.
- Consignments must be insect-proofed and packed in clean, new packaging material.

### 1.2.2 Specific Import Conditions

The following, specific, import conditions are applicable to imports of taro corms from all countries:

- All varieties of taro (*Colocasia esculenta*), except *Colocasia esculenta* var. *antiquorum* (small corm taro) are permitted entry into Australia. In order to ensure that var. *antiquorum* does not enter Australia fresh taro corms must conform with the morphological criteria particular to *Colocasia esculenta* var. *esculenta*, being:
  - Corms must be at least 15cm in length or at least 7cm in diameter at the widest point,
  - Corms must be at least 300g in weight,
  - Corms must be free of lateral buds or shoots,
  - Corms must lack shaggy hairs.
- Each consignment must be accompanied by a phytosanitary certificate endorsed with the following additional declarations:
  - “The taro in this consignment is *Colocasia esculenta* var. *esculenta* and not *Colocasia esculenta* var. *antiquorum*.”,
  - “The tubers have been inspected and are topped and free from all foliage including petiole bases, and free from sprouting suckers and attached daughter corms, and are free from soil.”,
  - “The product is free from Potato Cyst Nematode (PCN) (*Globodera rostochiensis* and *Globodera pallida*) and potato black wart fungus (*Synchytrium endobioticum*)”, OR “PCN (*Globodera rostochiensis* and *Globodera pallida*) and potato black wart fungus (*Synchytrium endobioticum*) are not known to occur in the country of origin.”

### 1.3 New Zealand's Phytosanitary Requirements for Imported Taro Corms

New Zealand's import requirements for taro corms are provided on a Country:Commodity basis; not all countries have access into New Zealand for this commodity. New Zealand's Import Health Standard (HIS) for taro from Samoa is a 'roll over', meaning that it has been in existence for some time and predates the new IHS schedule arrangement used by New Zealand.

The following import conditions apply to taro from Samoa and are generic for imports of all fruits and vegetables into New Zealand:

- Phytosanitary certification must accompany all consignments,
- Consignments must be free of live insects, disease symptoms, soil, trash and other debris, and seed contaminants.
- Consignments must be packed in clean packaging material.

## The Taro Export Pathway in Samoa

The Ministry has invested considerable resources over the past few years in preparing industry for a return to the taro export market. However, given the lack of industry experience in exporting taro to major markets with strong quarantine regimes it is realised that more work needs to be done. Taro exports, until recently, have been restricted to small consignments being sent to American Samoa. This trade is opportunistic and consists of numerous small consignments of taro purchased from markets to supply demands in American Samoa. Given that producers are typically unaware their product is being exported, commercial exporters are not involved in this opportunistic trade, and there are no (known) quarantine requirements used to manage this pathway, no lessons can be learnt from this trade in relation to exporting taro to larger commercial markets with strong quarantine regimes.

During the second half of 2010 a number of trial consignments of approved variety taro were exported to New Zealand. Feedback on the level of quarantine interventions applied to these consignments at the New Zealand border was mixed, however, issues relating to consumer acceptance of these varieties clearly present a challenge and will need to be worked through by the Samoan taro export industry. The Ministry, through its Quarantine Service, actively participated in these trials, attending all cleaning, grading and packing processes and inspecting every corm prior to export. This level of participation and supervision will be reduced once commercial trade with New Zealand has again been established.

The Crop Division of The Ministry has prepared an overview of the export pathway titled “Procedures for Preparing Taro for Export to New Zealand”, which provides industry participants with a ready reference to the various components of the pathway. However, all parties concurred that more work needs to be done in developing standards and procedures for all processes in the taro supply chain.

### 2.1 Production

Taro is grown throughout Samoa, however, it is likely that the bulk of the export crop will be produced on the Island of Savai'i. Production is not typically limited by land availability in Samoa; crop rotation (including fallow periods) is traditionally practiced and is now an integral component of TLB management.

Apart from the obvious issues with managing TLB no other pests or diseases were identified as generally posing a significant challenge to production. It is likely that crop rotation practiced in Samoa contributes to managing pest and disease cycles. One of the major challenges, at least in the production areas around Apia, is access to water. Rain can be unreliable during certain parts of the year, and irrigation is too expensive for the typical grower. Drought periods may result in reduced size of the harvested corms.

The Ministry maintains a system of grower registration to enforce varietal controls on exported taro. This system is aimed at ensuring only approved varieties of taro are exported in order to protect export markets, and enables trace-back of exported product.

### 2.2 Harvest

Corms are harvested after 8 months of age which is approaching the end of their lifecycle. At this stage the root mass has reduced, making harvest easier, and water content is down leading to less spoilage in the corms.

Soil and extraneous plant material (fibre and roots) are removed from corms in-field. Corms not of healthy, uniform appearance, or with physical damage or disease symptoms, are rejected in the field. Headsets are trimmed to a length of 6 inches and the outer petiole is removed before corms are packed into polythene sacks and moved from the field. Sacks typically hold between 35 to 45kg of corms.

Post-harvest rots caused by *Pythium* spp have been identified as presenting significant issues in reducing the shelf life of corms, and efforts to reject corms displaying symptoms in the field are encouraged.

The method of packing into polythene sacks, and level of care taken in handling the sacks during removal from the field varies and requires guidelines to ensure minimal damage is inflicted on the corms.

## 2.3 Transport

Exporters typically collect taro from the grower and transport the product to arranged sorting/packing facilities. It is apparent that the handling and packing of sacks of taro onto transport vehicles is variable, and the Crops Division of the Ministry is trying to educate exporters about the best handling methods. Some parties recognise the need to minimise rough handling of sacks and stack taro in a manner that minimises crushing/physical damage. However, it is reported that other parties do not demonstrate this level of attention.

It is estimated that corms produced and harvested on the Island of Upolu can usually be transported to sorting/packing facilities within an hour of collection at the farm. For corms produced and harvested on the Island of Savai'i, which is expected to produce most export corms, transport can take up to five hours. This includes a one hour transit by ferry between the Islands (a distance of approximately 22km). Public roads in Samoa are typically in good condition.

These relatively short transport times are a significant advantage in maintaining the quality of taro corms in comparison to the situation in Fiji. The majority of taro corms exported from Fiji are produced on the Island of Taveuni, where transport times between the middle buyer's premise and exporter can be up to 20 hours. Roads are reportedly in poor conditions and corms are transported in exposed, unrefrigerated conditions.

On some occasions it is necessary to use more than one vehicle to transport a load of export taro from production areas in Savai'i to the sorting/packing facilities in Apia. It has been found that this double handling can be particularly damaging to corms when they are unloaded and reloaded onto another vehicle.

## 2.4 Cleaning, Grading and Packing

It was evident through discussions with parties that no facilities are currently available that are suitable for cleaning, sorting, grading and packing taro for export. This situation is not limited to taro, however, and is equally applicable to other domestic and export crops.

The High Temperature Forced Air (HTFA) treatment facility was used in 2010 to process taro corms for trial exports to New Zealand. This facility is not specifically designed for these purposes, however, and may not be available for this purpose in future.

Upon arrival at the packing site taro are spread out on tarpaulins for preliminary washing with mains pressure water. After this, each taro corm is individually washed by hand in tubs, using a soft brush to reach into crevices. This secondary wash effectively removes any soil, pests or other material not removed by the preliminary wash. Taro corms displaying physical damage or rot symptoms are rejected at this point. Headsets on the corms are further trimmed to a length of 2 inches for export.

Cleaned taro are spread on racks under fans for superficial drying. During the preparation of trial shipments in 2010 the Quarantine Service inspected every taro corm at this stage for suitability for export. This level of attention was provided by the Quarantine Service to help the taro export pathway become established. The responsibility for this quality check will be deferred back to industry once the pathway is established. Phytosanitary activities will then focus on export inspection (representative sampling) and certification only, which will still take place at the packing facility prior to, or during, the loading of product into the shipping container.

Once taro are semi-dried they are packed into 20kg polythene sacks for export. The Ministry recommends packing be undertaken in a pest free environment, however, this is generally not possible. Sacks are tied or sewn closed. Exporter, grower and varietal details are recorded on each sack. Sacks are stacked in a shipping container and held at 10-14°C prior to export. The stack is typically arranged to allow adequate airflow around bags to assist in the cooling process. A standard 20' shipping container can hold up to 14000kg of packed taro corms.

## **2.5      Export**

A third party company collects the shipping container of export taro and transports it to the port for loading onto the vessel. The product is maintained at approximately 10-14°C during shipping to New Zealand. Voyage time from Apia to Auckland is typically 7 days as vessels call into Suva enroute to Auckland. The shelf life of these approved export taro varieties, when maintained under optimal conditions, is approximately 21 days. An approximate one third of the shelf life of export taro corms is used during shipping to New Zealand.

Considering it can take up to five days from the time of harvest until product is loaded onto a vessel for export approximately 50% of the taro's shelf life has been expended by the time it reaches New Zealand. However, using airfreight to move export product is not, at this time, seen to be commercially viable.

## Issues and Opportunities

The potential and real issues the Samoan taro export industry faces, in terms of the Australian and New Zealand markets, are substantial and may collectively impede the rapid re-establishment of trade in these markets for Samoan product. There are also significant issues in relation to production and infrastructure in Samoa that need to be considered further and addressed to facilitate achieving the quality and phytosanitary objectives of these markets.

Issues and opportunities are outlined in the discussion below. Where there are opportunities for the Pacific Horticulture and Agriculture Market Access Program (PHAMA) or other programs or projects to assist in resolving these issues these are identified in the boxed sections.

### 3.1 The New Zealand Market

#### 3.1.1 Phytosanitary Issues

Feedback from trial taro shipments to New Zealand during the second half of 2010 has been mixed. The Quarantine Service in Samoa has received no formal feedback from the New Zealand Ministry of Agriculture and Forestry (NZMAF) or exporters and assumes that the absence of feedback is an indication that no quarantine interventions were experienced. The Crop Division, on the other hand, had feedback that mealy bugs and thrips had been intercepted on at least one consignment, which was subsequently fumigated with methyl bromide prior to release.

Other countries with longstanding taro trade with New Zealand have experienced significant issues with quarantine interventions at the New Zealand border and this experience should be considered by Samoa in preparation for entering this market.

#### Nematodes

In Fiji's experience over the past few years nematodes have been intercepted on a large proportion of consignments. While it is probable that many of these nematodes would be saprophytic and not of quarantine concern a significant proportion of consignments have been held and subjected to fumigation, with a resultant reduction in the profit margin and shelf life of these consignments.

It is apparent that the major factor in these unwanted, and perhaps unnecessary, fumigation treatments is the inability of NZMAF to make an identification of these nematode species at the time of interception. Nematode identification is a specialist activity which requires substantial training and cannot reasonably be expected of inspection staff at the border, and in many instances, from generalist pathologists that undertake identifications of interceptions.

Given that identifications can be expensive, and often inconclusive, it is likely that importers are opting to have consignments fumigated without identifications being undertaken to facilitate their timely release and meet market demands.

Both PHAMA and the Australian Centre for International Agricultural Research (ACIAR) Research Project PC2007/118 *Developing cleaner export pathways for Pacific Island commodities* are assisting to improve and resolve this issue. PHAMA may assist in clarifying the taxonomy of nematode species present in Samoa and facilitate negotiations with NZMAF to review their quarantine status, with the aim of reducing the level of quarantine interventions experienced at the New Zealand border. ACIAR Research Project PC2007/118 will complement this approach through providing research into potential treatments for planting material and harvested taro to reduce the nematode load on exported corms.

An additional ACIAR Research Project, PC/2009/003 *Improving soil health in support of sustainable development in the Pacific*, will link into both PHAMA and PC2007/118 through its research into soil health with the intention of producing better crops at harvest with lower pest loads.

### **Hitchhikers**

Interceptions of contaminating organisms generally result in the need for fumigation. Organisms such as snails, ants, millipedes/centipedes, beetles, worms, spiders and weed seeds, while not necessarily a pest of taro, may result in quarantine action at the New Zealand border when detected in association with imported commodities. While some hitchhiker organisms may be regarded as non-regulated and subject to no quarantine action it is often the case with contaminated consignments that more than one species of contaminating organism is present. It is likely that at least one species will be considered actionable (either because of its regulated status or because it cannot be identified to a suitable taxonomic level) and quarantine treatment will be necessary.

In the case of taro corms that are thoroughly washed and graded before packing the point of contamination by hitchhiking organisms will generally be following washing operations. It is important to minimise contamination levels following washing through maintaining good hygiene during packing and loading operations. Equally important is the use of clean packing materials and maintaining the hygiene within shipping containers during loading.

ACIAR Research Project PC2007/118 *Developing cleaner export pathways for Pacific Island commodities* will assist the taro export chain to reach and maintain the requisite levels of hygiene needed for the taro export market. Specifically, the project will be looking to determine minimum packhouse sanitary standards to ensure taro is processed and packaged to meet export market requirements.

### **Aligning export phytosanitary inspections with New Zealand import inspections**

Achieving a high phytosanitary status of export product is important to achieving long term viability of the taro export pathway. While an understanding of New Zealand's phytosanitary conditions for imported taro is critical to achieving this status, an understanding of New Zealand's import inspection regime is equally important. These import inspections are, in effect, an audit to determine whether an exporting country has met New Zealand's requirements.

In order to confirm, with a reasonable level of confidence, that export product meets New Zealand's phytosanitary requirements it is desirable to align the export inspection with that expected to be undertaken by NZMAF. Issues that should be considered include:

- What sample size does NZMAF use?
- How are samples drawn from a consignment?
- What inspection conditions and techniques does NZMAF use, for example:
  - Lighting levels
  - Magnification assistance
  - Inspection bench design
  - Amount of time spent inspecting each corm
  - Specific sites on the corm where inspection is targeted towards
- How does NZMAF inspect packaging material?
- What level of hygiene is acceptable to NZMAF for the interior of shipping containers?

A significant issue in relation to phytosanitary export inspections is the limited availability of remedial actions that can be performed where a consignment is rejected for quarantine or hitchhiker pests. Unpacking and sorting/re-washing corms is inefficient and will result in a significant reduction in returns. While tarpaulin methyl bromide fumigations are used for some bulk goods in Samoa these treatments are a health and safety concern and not appropriate for treating produce. The only real option for rejected export consignments at this time is diversion to the domestic market.

There may be an opportunity for PHAMA to assist the Quarantine Service to better understand NZMAF import inspections through helping to facilitate a visit of key Quarantine export personnel to New Zealand to observe NZMAF import inspections. It would also be desirable for key, respected, farmers to attend this observational visit so they can report back to the farming community in Samoa.

### 3.1.2 Quality Issues

Quality issues may either be linked to phytosanitary issues or may be independent of these. Quality considerations begin at the time of production and occur throughout the supply chain. A key issue during the production phase is the lack of commercial focus of many growers; many preferring to grow the product using traditional subsistence farming techniques. Limited field control measures, application of fertilisers and access to water can all have a negative effect on the consistency of yield and corm shape/size.

A significant post-harvest issue is *Pythium* corm rot which can at times lead to significant rejection levels of harvested corms. While the detection of small amounts of post harvest rots during New Zealand import inspections has not, in the past, resulted in consignment rejections the shelf life of these consignments may be much reduced. Particularly where regulated pests are found in association with these consignments and they are subject to methyl bromide fumigation to enable their release.

A major issue for the taro export pathway is that of handling, from the time of harvest through to the time of export. Poor handling techniques result in damage to corms which are subsequently rejected for export during grading/sorting operations. There is an urgent identified need for quality standards to

be developed for each process in the supply chain, and for these standards to be promoted to all parties involved and their ongoing implementation be measured.

ACIAR Research Project PC/2009/003 *Improving soil health in support of sustainable development in the Pacific* will develop methods to produce better quality corms with lower pest loads. ACIAR Research Project PC2007/118 *Developing cleaner export pathways for Pacific Island commodities* will research methods to assist the taro supply chain export better quality taro. Standards for all aspects of the supply chain will be developed. The broader PHAMA program may facilitate ongoing audits of the implementation of standards by the respective quarantine agencies.

### 3.1.3 Consumer Acceptance

During taro export trials in the second half of 2010 consumer acceptance of the approved export varieties was not as good as was hoped for. This was somewhat of a surprise for the Ministry and exporters as Samoans returning from New Zealand to visit family and friends readily eat these varieties during their stay in Samoa. It appears that the Samoan community in New Zealand prefers the traditionally eaten pink variety of taro (*Tausala ni Samoa*), which is not produced in Samoa any more due to its susceptibility to TLB. This variety is produced in Fiji, comprises approximately 70% of Fiji's exported taro, and is readily available in New Zealand.

Both the Ministry and commercial exporters realised that poor consumer acceptance of the new taro varieties in New Zealand is a significant impediment to re-establishing trade, and further trial shipments were suspended until consumer awareness programs can be delivered in New Zealand and the level of acceptance of these new varieties is increased. The Ministry and commercial exporters anticipate an official launch of these new taro varieties in New Zealand, complemented by air time on Samoan Radio there that will promote the taste, nutritional value and shelf life of these new varieties. A date for the launch is yet to be established.

### 3.1.4 Competition

Competition in the New Zealand market by established suppliers (eg. Fiji) may be strong and a significant impediment to establishing trade in this market. It is reasonable to expect that competitors will not be prepared to give up any market share in New Zealand easily, and already have the advantage of established trading systems and potentially cheaper, and more regular, freight options.

The significant challenge for Samoa will be to initially gain consumer acceptance of the new taro varieties and then to be able to maintain and expand their market by delivering a high quality product, while still achieving a profit margin that makes this export pathway viable.

## 3.2 The Australian Market

### 3.2.1 Review of the Import Conditions for Fresh Taro Corms from All Countries

Australian quarantine conditions for imports of two varieties of taro corms have been in place for many years. In 2006, Australia implemented emergency phytosanitary measures to prohibit the importation of corms of the variety *Colocasia esculenta* var. *antiquorum* due to concerns that these corms could be used as planting material. In accordance with International Standards for Phytosanitary Measures

(ISPM) 13 *Guidelines for the notification of non-compliance and emergency action*, Australia was obliged to evaluate their emergency action to determine whether it remained technically justifiable, and a review of the import conditions for fresh taro corms was subsequently initiated.

On 16 March 2011 Biosecurity Australia notified interested parties of the release of the document *Draft review of the import conditions for fresh taro corms*, and invited comments on this draft review document. The comment period closed on 20 May 2011.

The draft review identified thirty one quarantine pests associated with fresh taro corms, five of which were determined to have an unrestricted risk exceeding Australia's Appropriate Level of Protection (ALOP) and therefore require additional risk management measures to be adopted. Two of these pests are identified as being present in Samoa; the taro planthopper (*Tarophagus proserpina*) and Taro leaf blight (*Phytophthora colocasiae*).

Proposed measures for the taro planthopper include inspection and remedial action along with topping of taro corms (similar to what is currently required). The measures proposed for TLB are area freedom for this pest in countries where it is present.

While the presence of taro planthopper in Samoa will not preclude entry of taro in Australia under the proposed conditions, the requirement to top taro corms will adversely impact on trade. Topping taro corms greatly reduces the marketable amount of each corm and can significantly reduce their shelf life. It is probable that this requirement would necessitate the use of airfreight to market Samoan taro in Australia as seafreight would be too lengthy.

The presence of TLB will effectively preclude Samoa from exporting taro to Australia under the proposed conditions. Area freedom for TLB cannot be demonstrated in any production area in Samoa at the present time, and is not part of the TLB management regime. If the proposed conditions are finalised, and in lieu of TLB pest free areas, Samoa will need to develop and propose alternative measures to manage TLB, and Australia will need to agree to these measures.

The PHAMA program has analysed the Draft Review document and provided comments on the assessments of likelihoods, probabilities and unrestricted risk assessment for *Tarophagus proserpina*. This analysis considered the unrestricted risk of this pest to be Very Low, which meets Australia's ALOP. If this revision is accepted by Australia the requirement to top taro corms would be removed for Samoan taro.

Similarly, an analysis of the likelihoods, probabilities and unrestricted risk estimate for TLB concluded that the unrestricted risk should be reduced to Very Low. This would meet Australia's ALOP and enable Samoan taro to be exported to Australia if it is accepted.

### **Alternative measures to TLB pest free areas**

During meetings with various parties in Samoa some of the following ideas were noted for future discussion on potential management measures for TLB:

- Carry out *Phytophthora colocasiae* transmissibility studies on commercially produced and cleaned taro corms of TLB tolerant varieties,
- Determine the effects of chlorine (tap water) and NaCl (saline water) washes on sporangia and zoospores of *Phytophthora colocasiae*,
  - a Chloroxyl dip may be another possibility.

- Given that it is a tropical species, how long do sporangia and zoospores of *Phytophthora colocasiæ* remain viable during storage of corms at 10°C.

### 3.2.2 Phytosanitary Issues

Although Australia's proposed phytosanitary conditions relate only to two organisms of significance in Samoa the detection of other organisms on taro consignments at the Australian border will still present issues. Identifications can be time-consuming and inconclusive, and even though a pest may not be considered to be quarantinable significant delays in having consignments released or additional costs incurred for treatments may still be necessary. To avoid these quarantine interventions it will be necessary to maintain a high phytosanitary status of the export product.

The phytosanitary issues outline above for the New Zealand market, particularly in terms of hitchhikers and aligning export phytosanitary inspections with that used by the importing country, are equally applicable to the Australian market.

### 3.2.3 Quality Issues

Those quality issues, and programs/projects that can assist in addressing these issues, outlined previously in relation to the New Zealand market are equally applicable to the Australian market. In addition to these issues, if access is gained into Australia in future under the currently proposed conditions the requirement to top taro corms may cause further quality issues in relation to reduced shelf life and increased potential for post-harvest rots to establish in the corms.

ACIAR Research Project PC2007/118 *Developing cleaner export pathways for Pacific Island commodities* will research methods to assist the taro supply chain export better quality taro. Part of this research will focus on post-harvest handling techniques that may help to minimise the establishment of post-harvest rots in taro corms.

### 3.2.4 Freight

Current shipping time between Samoa and Australia, on average, is about 14 days. This is approximately equivalent to two-thirds of the shelf life of good quality taro maintained under appropriate conditions. Given that up to an additional five days may elapse between the time of harvest and time of shipping from Apia sea freight is not considered to be a viable option at the present time.

Air freight is the obvious choice, however, it is significantly more expensive than sea freight and any additional costs resulting from quarantine interventions at the Australian border would significantly reduce an already small profit margin. There are currently three flights between Samoa and Australia each week and it is thought there would be reasonable cargo space available on these flights.

### 3.2.5 Consumer Acceptance

The issues relating to consumer acceptance of the five permitted export taro varieties has already been identified in the New Zealand market. It is likely that the same reaction to these new varieties could be expected in the Australian market, and a coordinated consumer education program may be necessary.

### **3.2.6 Competition**

Competition in the Australian market from established suppliers (eg. Fiji) may be strong and a significant impediment to establishing trade in this market (if Samoan taro is permitted to be exported in future). The same issues discussed above in relation to the New Zealand market are equally applicable to Australia, however, given that freight may be more expensive a higher price may need to be achieved on the Australian market.

Over the past few years some Fijian exporters have been pulling out of the Australian market because of increased costs relating to quarantine interventions. If Samoa is able to maintain a high quality and phytosanitary status of export taro there may be potential opportunities in this market.

## Conclusions

Significant issues in relation to potential markets in Australia and New Zealand, as well as the taro supply chain in Samoa, have been identified in preceding discussions. The following broad conclusions can be made:

### 4.1.1 The New Zealand Market

The New Zealand market for taro presents an opportunity for Samoa, however, there are significant barriers that would need to be overcome before ongoing commercial trade could be achieved. In order to pursue this market it is critical that consumers are receptive to the new permitted export varieties, necessitating an initial investment in promoting these varieties to consumers in New Zealand.

Even though consumers may be receptive to the new permitted varieties following a promotion campaign it would be necessary to compete with established suppliers that will potentially resist any loss in their current market share. This may mean reduced returns for a considerable length of time, potentially resulting in disillusionment among growers and subsequent loss of desire to compete in the export market.

To counter (at least partially) these negative affects it will be necessary for Samoa to provide a consistent and high quality product that is cleared with minimal border interventions, thus achieving maximum returns on its export taro.

### 4.1.2 The Australian Market

While there is an identified interest in re-establishing taro exports to the Australian market due consideration needs to be given to potential market penetration in the context of freight options and the need to promote the new export taro varieties to consumers in Australia. Deliberations also need to be made in view of the implications that Australia's proposed taro import conditions will have on future Samoan taro exports.

At present, sea freight alone is prohibitive in terms of voyage time between Samoa and Australia. However, the need to top taro corms will totally preclude this freight option as product will be at the end of its shelf life by the time it reaches retail outlets in Australia. Air freight is an option, however, further research would be needed to establish whether returns on the product would be acceptable using this relatively expensive freight method.

Before any trade could commence access for Samoan taro would need to be negotiated with Australia by way of demonstrating an alternative, and equivalent, management measure for TLB to area freedom. This will involve a considerable research investment and should be commenced as soon as possible if it is confirmed that this market is viable.

### 4.1.3 Infrastructure

The infrastructure needed to transport, process, and treat taro (or other commodities) is poor or non-existent in Samoa, hampering industry's aspirations to compete in commercial trade.

### **Packing facilities**

No central, and purpose built, infrastructure is currently available for processing taro or other commodities. For trial consignments in 2010 taro were washed, graded and packed at the HTFA facility. This facility was not intended for this purpose and is not adequately designed, or equipped, to facilitate commercial scale processing activities.

This issue was raised by many of the parties met with in Samoa and is one of the key concerns in relation to competing in commercial export trade. The issue is not specific to taro, being a concern across the fruit and vegetable spectrum.

In developing the idea parties considered that a moderately-sized, central facility that could accommodate multiple (perhaps three or four) operations simultaneously was necessary. Key considerations for pursuing this idea include:

- The facility would need to be constructed on secure land that would ensure parties had continued access into the future. That is, it would not be appropriate to construct the facility on private land where there is a potential that the owner could deny access at a future time.
- The facility would need to be well equipped to handle multiple operations simultaneously.
- An adequate water supply and waste water removal system would need to be incorporated into the structure.
- Suitable work benches, that are easily cleaned/sterilised, are necessary to assist in producing quality product.

### **Transport**

It is often the case that taro produced in Savai'i are unloaded and reloaded onto another vehicle at the time of catching the ferry to Upolu. This double handling is inefficient and damaging to the product. Ideally, there is a need to develop transport infrastructure that would allow one vehicle to transport product from the point of harvest through to the packing house.

### **Treatment facilities**

Where an exported consignment is rejected at the point of phytosanitary inspection remedial actions, depending on the nature of the rejection, are limited. It is inefficient to unpack and resort or rewash the entire consignment, however, no other option is currently available.

Tarpaulin methyl bromide fumigation treatments are used in Samoa for treating bulk goods, however, the health and safety aspects of these treatments are of significant concern. This method is also not appropriate for treating consignments of fruit or vegetables.

Installation of a fixed chamber methyl bromide treatment unit, utilising gas recapture technology, would provide scope for performing remedial actions on rejected consignments and help to achieve importing country quarantine objectives.

#### **4.1.4 Standards**

The need for standards to be developed and implemented for each process in the supply chain, from the time of planting through to export of the product, cannot be over-emphasised. Standards need to provide guidance on both phytosanitary and quality issues, and an enforcement regime will be necessary to ensure their correct and continued application.

A directed education effort, particularly focussing on taro production, will be necessary to complement any standards that are developed. A key issue during the production phase is the lack of commercial focus of many growers, preferring to grow the product using traditional subsistence farming techniques. Significant guidance and education will be needed to help move growers' focus towards commercial production techniques to meet export market demands.

## **Limitations**

URS Corporation Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of AusAID and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 20 January 2011.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between April and May 2011 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

## **Appendix A**

### **Appendix A Acknowledgements**

This review involved the participation of people from industry and government sectors in Samoa. Appreciation goes to the following for their time and contributions to this short term personnel project:

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Maposua John Maposua	Farmer
Peni Reueli	Farmer and exporter and Vice Chair of SMAWG
Misa Konelio	Assistant CEO, Ministry of Agriculture and Fisheries
Tolo Losefa	Taro Breeder, University of the South Pacific
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