

Attachment 1

TERMS OF REFERENCE FOR REVIEW TEAM

Mid-Term Project Review

HORT/2019/165 – Enhanced fruit systems for Tonga and Samoa (Phase 2):
Community based citrus production

1. Background to the Review

2. Reviewers

The review will be undertaken by Dr Wayne Hancock, Australia and Mikayla Hyland-Wood, Australia.

3. Process for the Review

The review was conducted in Tonga from 11-15 March 2024

4. Template for the Review Report

As follows.

MID-TERM PROJECT REVIEW REPORT

Project ID: HORT/2019/165
Project title: Enhanced fruit systems for Tonga and Samoa
 (Phase 2): Community based citrus production
Project Leaders: Prof Steven Underhill
Commissioned organisation: University of Sunshine Coast
Countries: Tonga and Samoa

Reviewer:

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Dates of review: 10-15 March 2024

1. Methodology/approach adopted for review

This Mid Term Review was undertaken in Tonga (Tongatapu and 'Eua Islands) from 11-15 March 2024 with presentations on unseen Samoan activities from the Samoan Project Coordinator (Dr Seesei Molimau-Samasoni). The project team, led by Professor Steven Underhill from the University of the Sunshine Coast, were present ably supported by Mr Soane Patolo from MORDI Tonga Trust and other collaborators. The project documentation was up to date and thorough. The format included formal presentations, field trips, informal discussions and one-on-one meetings with project personnel and counterparts to follow up on key points.

2. Background

This project seeks to translate prior ACIAR investment in Tonga into sustainable and resilient citrus value chains, that support pro-health outcomes and create new business enterprise opportunities for women and rural communities. In Samoa, the project undertakes a series of targeted interventions to unlock local citrus industry profitability and expand domestic fruit availability (with similar pro-health and gender benefits).

The research strategy and proposed interventions outlined in this proposal directly aligns with the current *Tongan Agricultural Sector Plan*, the *Eua Island Development Plan*, *Tongan National Non-Communicable Disease Strategy*, the *Samoa Agricultural Sector Plan*, the *Samoa 2040 Development Strategy*, and the *2018 World Health Organisation's Strategy for the Development of Samoa*.

TONGA

Citrus fruit value chains in Tonga are currently associated with wild-harvesting or sourced from small village and amenity plantings. There is little institutional and farmer knowledge and capacity in fruit production or orchard management (Underhill and Singh-Peterson,

2017), few private-sector run plant nurseries, limited propagation expertise, and postharvest handling practice is poor and inconsistent (Underhill, 2019; Underhill et al., 2020). While HORT/2014/077 has successfully established numerous multi-species citrus orchards on Eua and Tongatapu islands (which commenced commercial bearing in 2021), local capacity building and the new knowledge (i.e. agronomic, postharvest, and consumer connectivity) is required to ensure the emerging Tonga citrus industry become sustainable and resilient.

SAMOA

A rapid analysis of the Samoan citrus industry undertaken by HORT/2014/077 noted that the introduction of early and late season bearing grafted citrus cultivars could help improve industry viability by significantly extending domestic fruit availability, increasing farm productivity (current seeded cultivar types have low yields), and improving fruit quality (current seeded cultivar types have lower eating quality). The Samoan Government is currently collaborating with China Aid - SCATAP¹ to support the local Samoan citrus industry. This represents an opportunity to partner with the Samoan Government, based on complementary citrus technical and capacity building support.

While increasing domestic citrus production in Tonga and Samoa creates potential health benefits (based on providing a more reliable² and affordable supply of domestically grown fruit), there is a need to better understand consumer purchasing behaviour and food choice, if agronomic gains are to be translated into diet change. New knowledge on cultivar preference, priority markets, price point, product quality and safety are required to guide agronomic and postharvest interventions. New knowledge on local food choice and dietary behaviour is also required to early identify and address potential barriers (and/or incentives) to increased fruit consumption (particularly for women).

3. Review Executive Summary and Recommendations

The impacts of the slow start to the project (travel restrictions from COVID-19 and the Hunga Tonga-Hunga Ha'apai eruption and tsunami) was covered in detail for consideration of a project extension. Another project with an emphasis on Samoa, covering postharvest, processing and agronomy and a smaller Tongan component to complete outstanding issues and increase sustainability was also discussed.

Despite the slow start, the project has built on the earlier project (HORT/2014/077) and has demonstrated commercial and non-commercial citrus production well. Producing locally grafted citrus was hampered by slow uptake of grafting skills in an unsuccessful training session, overcome 19 months later by further training with Fijian expertise. The pest management input from University of Queensland did not happen, in part because of the delayed start and then the near completion of the counterpart ACIAR project early in this project's delayed implementation. Another partner is needed to complete pest and disease research, especially to address increasing fruit fly pressure, which was raised as a priority by all commercial growers and MORDI staff. Fruit flies, endemic with endemic perennial hosts is an emerging issue that needs to be addressed urgently to ensure production is not lost and project benefits are sustainable. The threat of HLB is ongoing and needs to be monitored because of the danger to all Pacific countries, and Australia and New Zealand if this disease becomes established. The vector is present in Samoa, not Tonga. Although the Tongan threat is high given recent importations of genetic material by MAF from China. It would be useful from a learning perspective for the project team to reflect in the final report on why the

¹ Samoa-China Agricultural Technical Aid Project

² External shocks to the domestic food system (such as COVID-19) have had a massive impact on fruit and vegetable imports into Tonga (Underhill and Patolo 2020 unpublished data).

first grafting training and engagement with other ACIAR projects was unsuccessful, for the use by future ACIAR projects.

Varietal selections of both scions and rootstock will not have adequate time to fruit for variety assessment by the project end date of June 2025, so developing a sustainability plan for these activities is crucial. The last planting of imported planting material will occur between May-Aug of this year (Daisy and Fremont mandarins). Rootstock selections will be ongoing although Cox's is showing promise. Afourer mandarin is performing very well so far and competes well in terms of fruit production, vigour, taste and consumer acceptability with the local Emperor seedling types. Visits to all four project trial sites also confirmed the importance of windbreaks to reduce the impact of the strong south-east trade winds all year round. Several species have been planted across trial sites, with Kauri showing promise due to fast, vigorous growth at an appropriate height to protect orchards.

The two nutrition surveys are ongoing with the support of a PhD student and Crystal 'Ake (MORDI) and will provide information and understanding for approaches to health benefits from dietary changes into the future. This is supported by the food technology inputs that seek to address waste, excess supply and spreading the availability of citrus and other fruit products for the benefit of women and communities financially as well as nutritionally.

Capacity building and training across the project is going well and MORDI have produced a range of manuals as well as the processing manuals. This is updated and translated for wider distribution. Technical input is very well received and appreciated by target groups. The exception was household-based nurseries that were not well accepted, and this pivoted towards community group-based food processing. It was found that household-based nurseries (i.e. home citrus gardens) were not an appropriate model, with local women preferring a community group-based approach. Having more counterparts in the food processing and citrus technical support teams would help with sustainability of activities. This project has also supported one PhD student (Samoa), two Masters students (Tonga) and two Honours students (Australia).

It is recommended that the project team focus strongly on ensuring sustainability of capacity and activities in the remaining 14 months of the project. A funded project extension of one to two years may be considered to support the completion of the project outcomes, particularly in response to the slow start to variety trials, allow a fruit fly control mechanism to be developed, support increased food processing down to household level for nutrition and income benefits and enhance the outcomes of the nutrition work with a better information base and sound analysis that can be worked into healthy diet messages and utilised in future project activities.

Recommendations for project team

Despite the delay in in-country input and a couple of pivots due to on-ground realities, this is a good project with an enthusiastic team. This is reflected in the collaboration and mutual respect shown in field visits and one-on-one discussions with partners and collaborators. Project documentation is excellent and is supported by field visits and discussions.

A couple of issues will cause on-going pressure, these are the fruit fly problem, the late start of the late season cultivar plantings and the need for commercial counterparts in the food processing area to support sustainability of venues, equipment and funding. There is also the need for the project team to address personnel succession in the remaining project time.

Fruit flies are endemic along with a range of hosts so control measures are needed to address the impact on the crop as the impact will increase as production increases and the flies habituate to the crop. The weather impacts are very significant in control measure because of high temperature and likely high rainfall events as the fruit matures and becomes

more attractive to the flies. This will require a couple of fruiting cycles to test and build a resilient method to deal with fruit fly. This work, however, should consider the extensive existing fruit fly management research in comparable climates, and be used as an opportunity to build pest management capacity of commercial growers and local partners.

The late planting of Daisy and Fremont will result in not enough time for a full harvest of fruit before the project end date. The evaluation of rootstock will also be ongoing. While a short-term extension would allow for the first fruits on the Daisy and Fremont trees, sustainability of trials will be an on-going issue unless otherwise addressed. This is an additional opportunity to develop agronomic capacity in MORDI and industry partners, and assess other local partners that may play a role in carrying this work forward.

The sustainability of food processing activities would be enhanced with further inputs such as the food technology technical expertise for processing, based on nutrition knowledge, alongside sustainable venue and materials support. It would be useful if this could be achieved using local counterparts. The program focus is different in the two partner countries, so understanding and recording the differences in community group direction and capacity would be beneficial. It was acknowledged in the review that group 'champions' or leaders are critical for group success. This support is currently fragile (one person) in each group and should be nurtured for group sustainability.

A funded project extension may be beneficial to focus on the above challenges and make the outcomes more sustainable, however, the project team should focus on ensuring sustainability of the work to date in the event of no extension. The fruit fly work needs a decent commitment from growing partners as it will take at least two fruiting cycles and out of season inputs of monitoring the fruit flies to get a good result with a baiting-type program. Avoiding sprays with a long withholding period and any maximum residue limits would also be advantageous. Consider weatherproof bait stations and rain-fast treatments.

It is recommended to reinforce the food processing activity capacity and enthusiasm, especially down to household and group levels to get the most benefit. The use of higher-level facilities is good but if this is not available to communities of household-level technology, sustainability will be an ongoing issue. Local counterparts, with access to additional skilled personnel, are vital to support the existing food technologist and to support sustainability and continuity of work.

The nutrition and survey work are very important and will provide insights into where to target support and health-based interventions in the future. Analysis of current work (two completed surveys) will raise questions that should be explored around the potential impact of this project and future local initiatives. Particular attention may be given to promoting year-round citrus consumption, and the nutritional impact of value-added products. The PhD student will play an important role in providing access to the in-country partners for longer, allowing her results to be better integrated into the on-ground situation. It should also be considered how this objective can better link with other objectives and existing MORDI activities in the remaining project time.

We recommend that the project team focus strongly on ensuring sustainability of capacity and activities into the future in the remaining 14 months of the project. It may be beneficial to identify what the impact goal in 5 years is in both countries and consider what is needed to reach that. This is particularly important in terms of identifying opportunities for local partners to bring work forward (i.e. MORDI, private partners, community groups), the role of local partners not currently engaged (i.e. Tonga MAF and Samoa MAFFF), and the nutritional impact of this work. A funded extension may be considered to address the above to get a better, more sustainable outcome. The project delays have validly included the COVID 19 travel restrictions, Tsunami in Tonga, in addition to some unfortunately delays around unsuccessful first grafting training and later planting of some varieties. Increasing citrus

production in both countries is of limited value if the fruit is not protected (fruit flies) and utilized effectively for health benefits (processing and nutrition). Increasing agronomic understanding is always beneficial and finding counterparts in both countries that this project's outputs can link to will support sustainability.

Recommendations for ACIAR

This is a well-managed, well-documented project that has had a few issues beyond its control, including travel restrictions from COVID-19 and the volcanic eruption and resulting tsunami that delayed activities and inputs. The delays in travel and start of some activities will mean some activities will not be completed within the project timeframe of June 2025. Others are observations beyond direct project objectives.

These include:

- Delayed assessment of the varieties, especially late mandarins Daisy and Fremont that have only recently been established in the field in Tonga and are still in quarantine in Samoa (due for release this Apr 2024).
- Delayed assessment of rootstocks, although Cox's is doing well from the earlier planting, it will take some years before a good assessment is possible. Fruit fly control is already a large issue, and it will take a few more fruiting cycles to validate an effective control mechanism because fruit flies are endemic with many hosts hence an area free or control strategy is not possible. A combined weatherproof baiting system supported by a rain-fast tree sprays/bait mechanism is worth exploring as sprays with a withholding period and residue issues should be avoided if possible. Even if this work starts for the current season starting soon, it will take more time to be sure of a viable control strategy is in place before the project end date of June 2025, therefore requiring commercial partner engagement to drive long-term impact. Reinforcement and further spread of value-adding processing will be difficult with the remaining short inputs from the food technologist and, there is no counterpart food technologist for this specialist to ensure continuity.
- The Samoan citrus harvest and postharvest needs more additional research to reduce losses and encourage uptake of processing activities. Orchard rejuvenation is needed with existing and new varieties as the existing trees are aging and are very difficult to harvest because of tree height. This will require significant input to achieve starting with the postharvest and processing as well as tree size management and rejuvenation and replanting of existing and better varieties. Apart from some postharvest and processing, most of this is beyond the remit and expertise of the current project.
- HLB presents an ongoing issue after confirmation of the vector in Samoa and untested planting material imports by Tongan MAFF from China (HLB-positive country) so monitoring for this is necessary and is important for all Pacific countries and Australia/New Zealand. This is beyond the scope of this project. It remains unclear why the cooperation with UQ was not successful on pest management.

A costed extension may be considered to ensure key project challenges are addressed and include adequate sustainability planning for impact into the future, compensating for the slow start due to travel restrictions and tsunami. Rootstock and scion research will be on-going, and a short extension may not provide a significant amount of more information within the extension timeframe. It is therefore preferable for the project team to focus on completing planned activities in the remaining 14 months, particularly assessing existing fruit fly

management research, identifying local partners that could take on farmer fruit fly training, markets for new product, and nutritional impact of value-added products.

If another project were to be considered or requested, Samoa should be the focus on citrus production and postharvest/processing with a smaller input into continuing the pest management and variety work in Tonga and Samoa to get the most from increased production in both countries and increase sustainability through capacity building and technical/scientific support.

4. Project outputs

Determine and comment on how well the project has achieved the outputs and milestones against each of the objectives. Reviewers should refer to Sections 3 and 4 of the Project Document for a more complete discussion of objectives, outputs, activities and methodologies.

The overall aim of this project is to increase domestic citrus production in Tonga and Samoa in support of pro-health outcomes and wider community development impacts

Objective 1: Creating viable citrus value chains in Tonga and Samoa

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
1.1	Establish on-farm trials to evaluate and identify citrus cultivars that can extend consumer supply in Samoa.	Citrus cultivars compatible with local conditions that can extend consumer supply in Samoa are identified. Citrus farmers in Savaii have access to early and late season bearing citrus trees. June 2025	Grafted trees sourced from Australia are in quarantine in Samoa and should be released and planted in May or the second half of 2024 at two sites on the Island.	This was delayed by Covid 19 travel restrictions and quarantine requirements. Selection of suitable cultivars will not be as progressed as planned in the timeframe before June 2025. Consider appetite for continuation for rootstock evaluation post-project.
1.2	Support established citrus orchards in Tonga to provide commercial quantities of fruit for the domestic market.	A network of commercially viable citrus orchards in Tonga. June 2025	The established orchards at 5 orchards (including Nishi Trading, and MORDI) and 3 on Eua Island including Bob Buster's farm are doing well with the Afourer mandarin and Tahitian lime outstanding performers to date. Newly established later varieties will not produce before the end of the project	Nishi trading sold all they could produce locally and believe there is a much larger market for the Afourer mandarin within Tonga and for export with successful fruit fly control. Tahitian limes are less subject to fruit fly so are also a good export prospects to regional markets including New Zealand and may be invested for use in fruit fly management. Bob Buster's farm is doing well although has a way to go with fruit fly control. The recent introductions of mandarin varieties to extend the season further including the Daisy and Fremont mandarins have just been planted at all sites and these will not be able to be assessed in the timeframe of the project.

1.3	Undertake on-farm and laboratory trials to assess the suitability of commercially and locally sourced citrus rootstocks, to local production conditions in Tonga.	The best citrus rootstock for deployment in Tonga has been identified and incorporated into future MORDI led scale-out. Start-up grafted trees for local nursery enterprises. Dec 2023	The establishment of grafting skills took longer than anticipated so two nurseries including MORDI now graft citrus successfully. Rootstock assessment is ongoing	Citrus nursery stock and grafting training now established so Tonga partners can now assess citrus varieties and on experiment on different rootstock to increase planted area. Rootstock assessment will take longer than the project timeframe although Cox Mandarin Hybrid rootstock is showing promise. Over 2000 locally grafted trees have been produced, with an aspiration to reach 8000 as part of the one citrus tree per household project. Consider implications on host prevalence for future pest and disease challenges.
1.4	Undertake participatory postharvest handling trials in Samoa and Tonga.	Low-cost interventions that reduce physical loss incorporated in the supply chain. Dec 2024	This will be done on the crop in 2024, the surveys have been done to support this work and how the chain currently works is documented.	Considerable work will be needed in Samoa from the information presented to have an impact as many individual traders/farmers are involved and how to influence will be a challenge with established practice that is low input/low cost although labour intensive with much double handling. Working on ways to reduce handling and make transport more efficient will be necessary. While crates seem like an obvious solution, making that work with the cost of crates and crate return is a concern.
1.5	Enhance local knowledge and capacity in tree fruit production and postharvest handling.	Technical training manuals. Farm field schools. Staff capacity building. Dec 2024	Technical training manuals continue to be updated and training ongoing with MORDI staff for example.	Ongoing with more work needed on both islands, the MORDI visit to an Australian nursery had a large impact on staff. Technical training manuals could be updated to better represent local production systems, priority pests and diseases, and common post-harvest practices, in an effort to better-inform local best practice. Training manuals need to be updated considering local challenges, materials and extension methods.

Objective 2: Enhancing the resilience of fruit production systems

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
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2.1	Establish on-farm trials to evaluate options to enhance orchard resilience to potential future cyclone damage.	Knowledge of appropriate low-cost strategies to reduce wind damage in fruit orchards. Feb 2025	Windbreaks of Pacific Kauri have planted around orchards, with reasonable results. Local plantain variety has also been trialled.	Kauri is growing rapidly as an effective windbreak at the MORDI site. The Kauri will eventually shade and compete with the orchard which must be considered in management. The school orchard (Ha'atu'a) is on a waterlogged site also suffering negative wind effects with no windbreaks in place. The artificial windbreak at Nishi works well, although is not a realistic option for most farmers given high capital cost requirements.
2.2	Pest and disease remediation awareness	Farmer and institutional capacity building. Increased awareness and use of farmer support tools (i.e. PestNet). An increased awareness of citrus pests and diseases by quarantine services. Dec 2023	PestNet has been introduced in the Mordi system and other pest information supplied into the networks and extension material. The awareness of the danger of HLB is increasing and an official from Tongan Plant Quarantine is undertaking a study of the HBL vector in Tonga (ACIAR funded Master's Scholarship).	Due to issues of the non-starting of inputs from a related project, now finished this is an area where more input is needed. Fruit fly has been identified as a serious threat to production and current control methods inadequate. Project team to investigate existing fruit fly management research fit for similar climates. Tonga has local fruit fly species that are well adapted to local high humidity and high rainfall conditions. Better methods of control are needed although how to fund this is an issue at present. HLB risk is ongoing and needs a higher level of support in future years, current awareness raising is good, but may need to increase if recently imported Chinese planting material has the vector or disease.

Objective 3: New household enterprises to enhance industry sustainability

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
3.1	Improved farmer access to locally sourced grafted citrus planting material in Tonga, by creating a network of small-scale plant nurseries.	New household-scale plant nursery enterprises in Tonga. Nursery training manuals. June 2025	Household level nurseries no longer an objective due to limited women's interest and resources, more interested in flowers and value adding so resources moved to that.	Although not successful, the grafting training re-enforcement that resulted from the earlier limited success was beneficial, the MORDI and Dassah nurseries are capable of producing large numbers of grafted trees for local planting (including in community gardens and household fruit tree planting targets) and for upscaling larger planting. Spread across two nursery sites shown to be a successful project approach to combat emerging climate and natural disaster risks – though not necessarily the intended 'network' of small-scale plant nurseries.

3.2	New income-generating opportunities aligned with existing citrus value chains in Samoa.	New household-scale fruit processing enterprises in Samoa. Citrus value-added products that are compatible with a diabetic diet will be identified. June 2023	Ongoing work with more re-enforcement and resources needed such as equipment and venue space.	Community based rather than household level is preferred in Tonga for women's groups. Households currently lack the means for ease of processing such as blenders. The larger scale facility used for initial trainings is great but not representative of the resources available lower down at household level. Several citrus based products including lime chutney and marmalades produced. Most success has been found with women's groups in Samoa (Savaii) particularly those led by women with existing business skills. These still have fragile capacity which should be addressed. Project should strongly consider sustainability of these activities, in terms of workshop leaders, funding for equipment and materials.
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Objective 3: Translating citrus value chains into human nutrition impacts

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
4.1	Food choice, dietary intake and consumer purchasing behaviour with the capacity to support or hinder increased fruit consumption	A report/publication that documents and analyses food choice and dietary intake, and options for increasing fruit consumption in Tonga and Samoa. A report/study that outlines high risk population cohorts and location based on atypical low fresh fruit consumption. June 2023	Two surveys completed. First survey covered 370 individuals on food preferences, dietary distribution and changing community purchases. Second survey covered 12 community members in semi-structured interviews on determinants of food choice). Analysis of surveys ongoing, using a standardised data collect tool.	More work needed on analysis and synthesis of results, should be valuable information for future use. An area where different analysis techniques such as cluster analysis could yield insights, a follow-up survey with a ratings scale for specific questions would be useful.

4.2	Design and establish a network of demonstration healthy eating gardens that support wider diet-based NCDs-aligned healthy eating in Tonga*. <i>* Healthy eating gardens will only be established in Tonga, as co-funding from IFAD to construct is not available for Samoa.</i>	Three demonstration healthy eating gardens will be established in Tonga. A report/ publication documenting a Polynesian-healthy eating garden design. Healthy eating gardens will be integrated into wider healthy eating initiatives and programs in Tonga. June 2025	Mordi (Tonga) has established gardens and student has commences PhD studies on healthy eating gardens in Tonga, first field visit in February 2024.	Ongoing work, the linkages to the surveys will be important to get a good overview of food preferences, can be difficult to change food preferences. Mordi aims to increase citrus (and other fruit in gardens) to 2 trees and can now produce grafted trees for distribution to support healthy eating. Aim is 8000 trees, one for each Tongan household (currently grafted about ~2000).
4.3	Studies to document the nature, scale and impact of project activities.	A document and analysis project impact. June 2025		Reports seen are well prepared and thorough, some delays at the start of the project due to COVID and the Tsunami will impact the project outcomes within the current timeframes. Project team to consider succession planning via bringing on junior researchers/students and including them on publications.

5. Project Evaluation

In completing the following table, the reviewers are requested to synthesise the information listed in the Project Outputs table; quantitative evidence from reviews, reports, etc; as well as qualitative information from interviews, case studies and the like. The first group of questions (Group A) relate to the specific outcomes of the project. The next group (Group B) concern best practice and longer-term impact. The final group (Group C) is directed at ACIAR's learning processes. Include any additional explanation or comments and where appropriate the recommendations that are included in the Executive Summary after the evaluation table for each group of evaluation questions. The scoring for Groups A and B is defined using the following evaluation system:

Satisfactory		Less than satisfactory	
6	Exceptional quality Equal to or greater than 90%. Beyond normal project expectations; an example of a project team delivering significantly more than anticipated at the time of project design.	2	Less than adequate quality Project did not deliver on several areas of core expectations. Reviewers consider that, given the circumstances of the project, outputs and outcomes should have been at a higher level.
5	High quality 80-89% performance. Overall very good work, with virtually all outputs achieved, although possibly some minor gaps that could have been closed. Strong, positive cooperation across the entire project team.	1	Poor quality Unacceptable performance, even after consideration of all mitigating factors.
4	Good quality 65-79%. Performance quite good. Project team has delivered on the majority of the activities, with valid justifications for those not achieved.		
3	Adequate quality 50-64%. Some areas of core expectations probably not achieved, although factors, external or outside of the control of the project team, may have been responsible.		

A – Specific outcomes of the project		
A1 – Achievement of outcomes	Guidance: Evaluate the extent to which the project activities and outputs have resulted in the desired outcomes, including engaging project partners and relevant stakeholders outside of the project. What are the most substantial outcomes that have occurred as a result of the project's activities?	
	Results Statement: The collaboration with partners is excellent and this supports the project outcomes, despite some delays, the increase in availability of grafted citrus for distribution has increased and community gardens as well as other more commercial growing is now possible. Although the community nursery and household nursery approach did not work, the community groups processing move has been successful for the women's groups. Older established orchards are now producing and can be assessed for suitability of varieties. Differences between Tonga and Samoa in women's approaches is useful to know (community groups preference in Samoa, individual in Tonga).	Score: 4
A2 – Availability of new or enhanced technologies	Guidance: Evaluate the extent to which the project has increased the availability of new or enhanced technologies. Is there any evidence that these technologies have been adopted by next or end users?	
	Results Statement: Improved grafting has been demonstrated and adopted and can be built upon by moving into grafting of other species. There is at least one commercial nursery now applying the grafting of citrus with a range of rootstocks. The rootstock evaluation will take longer than the project timeline, the introduced Cox's is showing promise as a rootstock. Interest in processing is very strong and has shown that individuals and community groups can utilise these techniques for advantage.	Score: 5
A3 – Skills and knowledge change	Guidance: Evaluate the extent to which the project has increased knowledge and skills of in-country researchers and stakeholders, through their participation in the project and the training elements. Has the project contributed to Australian skills and knowledge change?	
	Results Statement: The project has positively impacted in-country skills and knowledge and the training in areas of project focus such as grafting and nurseries, post-harvest processing and citrus orchard management will enhance local skills, especially for Mordis and commercial farmers. The impacts	Score: 4

	for Australia are less certain until the project final results are in and will include increased knowledge about nutrition issues in both countries and a better understanding of how to approach support in other initiatives beyond citrus in the food systems. This is ongoing. Impacts in Samoa are less certain because they are further behind Tonga in the citrus variety improvements cycle and have a different citrus growing culture already established so improvement and change will take longer.	
A4 – Institutional and group practice change	Guidance: <i>Have the collaborating communities, R&D institutions, local government agencies and collaborating industry partners changed their approach to user directed research and interacting with researchers to facilitate improved collaboration and adoption?</i>	
	Results Statement: • Collaboration has been very good with public and private institution with MORDI as a standout partner. The ongoing support in both countries is evidence of the collaboration moving forward. The ACIAR team has excellent relations with on ground partners and have established a trust relationship for support including when not in country through regular support and communications. The WhatsApp groups are very active in providing support for individuals involved and demonstrated the dedication of the ACIAR team.	Score: 5
A5 – Engagement of the private sector	Guidance: <i>Evaluate the extent to which the project has engaged the private sector in project activities. What benefits have occurred as a result of this engagement? What could have been done better?</i>	
	Results Statement: • The two private sector citrus farms visited and the private nursery demonstrate positive engagement and mutual respect in Tonga. Mordi also, although it is more difficult in Samoa because of the nature of citrus production and marketing system, based on many individuals. The main concern is where ongoing support could come from once the project finishes as training of local extension people is limited due to lack of such people. As above the WhatsApp group is very helpful although it will still need technical support at times. It may be useful for the project team to consider how private sector engagement can complement smallholder citrus production in both countries, given limited smallholder-representative trial sites.	Score: 4
A6 – Gender equity	Guidance: <i>How did the project respond to the different needs of women and girls during research scoping? How have women been involved in project implementation? What efforts have been made to plan for the differential effects on women and men resulting from adoption of research outputs?</i>	

	Results Statement: Women and or women's groups are the full or partial focus of Objectives 1.4, 3.1 (Tonga), 3.2 (Samoa), 4.1 and 4.2. Vendors in the markets are primarily women and the processing at individual and community level is focused on women. Community gardens also have a women's focus and, Samoan project coordinator is a very capable woman. Although Objective 3.1 to establish women led household nurseries was not successful (the women preferred group activities rather than individual activities), the move to more emphasis on processing has been well received and is still focused on women for income and nutrition benefits.	Score: 5
A7 – Communication / extension / dissemination processes and strategies	Guidance: <i>Were the communication and dissemination activities and strategies appropriate for the content of the project? Were they successful in facilitating practice change and in establishing enduring information sources? What could have been done better?</i>	
	Results Statement: MORDI in Tonga is building a data base of manuals on many projects related activities in English and local language and some such as the processing manuals are transferable to Samoa, and some have been. Manuals should be updated regularly to align with current best-practice and relevant pests/diseases. WhatsApp has been shown to be a good medium, accepted easily by people in both countries and allows for communication with project staff in Australia for offsite support. It is difficult to reach large numbers of farmers with traditional extension services and these services are not available in either country so different approaches are needed. WhatsApp and other media still need to be supported by a sound information base and people within groups who have access to and a good understanding the information base that can be applied to inquiries. It is unclear whether this platform has been fully taken advantage of for information dissemination into communities, opportunities for MORDI or community leaders to lead these activities, and reliability/robustness of information communicated via WhatsApp should be managed appropriately.	Score: 5
A8 – Publications, scientific outputs	Guidance: <i>Assess the scientific outputs in terms of their number, quality, distribution and potential contribution to other scientific projects or activities.</i>	
	Results Statement: The project documentation is very good, both by local partners and USC team, including scientific publications. Additional work could be done focusing particularly on diet, nutrition and	Score: 4

	preferences in food choices as these will be very useful in future projects. Long term impacts of rootstock assessment will not be completed by the end of the project and variety suitability will also not be completed by the end of the project and will not be published on. The delayed start of the project is a contributing factor but rootstock and variety work is classically a long term effort. This score should improve with the completion of the project and student publications as part of their studies.	
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Additional comments, stakeholder feedback and any recommendations:

B – Best practice and longer term impact		
B1 - Governance	Guidance: <i>Comment on the management (practices, policies and procedures) of the project by ACIAR and by the commissioned agency and overseas institutions involved, including the adequacy of reporting and financial administration. Were all the project partners adequately and appropriately engaged in the management of the project? What could have been improved?</i>	
	Results Statement: This is a well-managed project with very good cooperation with partners, the delays at the start were beyond the control of the project management (travel restrictions from COVID and from the volcanic eruption leading to the Tsunami).	Score: 5
B2 - Appropriateness	Guidance: <i>Were the activities and methods appropriate and implemented with scientific rigour? Were the project partners appropriate and did they collaborate effectively? Was the project well targeted to the needs of the intended beneficiaries?</i>	
	Results Statement: The project fits well within the scope of improving nutrition through increased supply of good quality citrus into the market and through processing to reduce waste in existing and increased future production. The countries are different and have a different production and marketing system although there are commonalities between them, so a mixed approach is needed to cover both countries. The partners and approach have been very good, and more work is needed to compensate for the slow start and to reinforce the activities including the processing. More work is also needed in connected the value adding processing to nutrition outcomes, to ensure nutrition benefits are seen across the project outputs.	Score: 5
B3 - Efficiency	Guidance: <i>Were the inputs (money, time, personnel, equipment) appropriate in terms of the outputs and outcomes delivered by the project?</i>	
	Results Statement: To date it appears to be appropriate, a delayed start has compromised some inputs including the delivery of grafted trees from Australia to Samoa so these will not be fruiting by the end of the project for assessment.	Score: 4

B4 - Effectiveness	Guidance: <i>To what extent did the project deliver on its aim and objectives? Were the planned activities effectively implemented and did they deliver the outputs and early outcomes expected? What could have been improved?</i> Results Statement: • The project has delivered most of what was planned within the timeframes with 2 exceptions, one being the intended pest management input form UQ that has not been delivered and needs to be revisited and, the initial individual nursery output that was not preferred by the community members. • The pest management will have a significant impact because of the fruit fly issue that is not easy to resolve within the remaining timeframe for the project. Fruit flies are endemic to Tonga and Samoa and an area wide restriction approach is not possible so a reliance on direct controls is necessary, complicated by high rainfall during fruiting that hampers application and resilience of treatments. It will be difficult to complete this work in the remaining project time as a few fruiting cycles will be needed to validate effective treatments in the field. Weatherproof bait stations and rainfast attractant/kill applications with no withholding periods would be desirable. • The move away from the individual nurseries is not an issue because other sources of trees will be available and the preferences of the women has been respected and, resources moved to a more useful outcome as seen by the women. The popularity of this and need to reinforce this activity is worth a funded extension as this likely to be a significant project sustainable outcome. There is a need to find/train a local food technologist to continue this work. • Variety selections will be indicative only within the project time frame because while Afourer is doing very well, the two delayed later introductions to spread the season (Daisy and Fremont) will not have time to fruit before the end. • Rootstocks are showing differences with Cox's doing well; however, more time is needed for these to be evaluated and a short, funded extension would not cover this as the new varieties will take longer to produce before the evaluation of rootstock performance.	Score: 4
B5 - Impact	Guidance: <i>Indicate how the outputs have been or may be taken up by users, and how these may generate community, capacity building and scientific impacts. To what extent were the proposed impacts achieved? What do you consider the most significant impact(s) achieved?</i> Results Statement: • Improved nursery practices and successful grafting is evident in the MORDI nursery and private nursery so that is a success for capacity building and adoption. The MORDI/Dassah nurseries have successfully grafted seedlings locally, distribution to communities and intended impact is yet to be seen. • The processing is also on the way to success with a range of products (dried, pickled and some juice thus far) tried and tested for citrus, breadfruit, and bananas. Further adoption requires more equipment at the household level for long term impact because current training has been at larger post-harvest/processing facilities.	Score: 5

	• Difficult to judge the community gardens until a longer time has passed as these are just starting and are part of another program as well.	
B6 – Legacy - sustainability	Guidance: <i>Will the partners and stakeholders be able to utilise the outputs after the project ceases? Will there continue to be impacts over time? Why or why not?</i> Results Statement: • Yes, and already are in areas such as the nursery, processing, and the use of a WhatsApp group for extension and support. Grafted trees into community gardens will continue to support fruit for health. Processing will be supported by a few people and or groups in the longer term who will make a small business from it although not all participants will get that far. The preference for community rather than individual processing required a strong community lead to maintain interest as seen in one group spoken to while others will drop out. • Some concern that food value adding processes are not yet able to be sustainable. Consideration around long-term sourcing of equipment and materials is needed. Recipes and experience are recorded already. • The information generated from the nutrition surveys will support ongoing efforts in health, nutrition, and diabetes reduction. • Increasing commercial production will be more difficult because of the time and investment needed. • The pest management will have a significant impact because of the fruit fly issue that is not easy to resolve within the remaining timeframe for the project.	Score: 6

Additional comments, stakeholder feedback and any recommendations:

C – ACIAR Learning	
C1 – Lessons learnt relevant to project design	<i>Guidance: How effective was this project's design? How did the issues raised by external reviewers contribute to this effectiveness? Are there specific lessons related to projects of this nature that could be applied to future projects?</i>
	Results Statement: •
C2 – Lessons learnt relevant to project implementation	<i>Guidance: What do you consider to be the most important factors that have contributed to the success or otherwise of the project's implementation? Are there specific lessons related to projects of this nature that could be applied to future projects?</i>
	Results Statement: •
C3 – Lessons relevant to collaboration	<i>Guidance: Are there specific lessons related to specific partners or collaboration between partners that could be applied to future projects of this nature?</i>
	Results Statement: •
C4 – Follow-up and future research	<i>Guidance: Advise ACIAR on what, if any, follow-up activities and support are desirable to ensure long-term benefits from the project (including spill over to other countries/regions). Where appropriate, provide advice on specific research priorities for future projects</i>
	Results Statement: •