Pacific Horticultural & Agricultural Market Access Plus Program

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Initial Scoping for Avocado Production Opportunities on Niue – Summary Report

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NEW ZEALAND FOREIGN AFFAIRS & TRADE Manatū Aorere

Initial Scoping for Avocado Production Opportunities on Niue – Summary Report

Client: Department of Foreign Affairs and Trade

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Executive Summary

This report summarises the findings of an initial technical scoping study conducted to evaluate the feasibility and potential for developing avocado production in Niue. The study, commissioned by PHAMA Plus in partnership with the Government of Niue, aligns with national priorities focused on improving food security, decreasing reliance on imports, and promoting agrotourism opportunities. A field visit by a consultant from Lynwood Nurseries in New Zealand, with stakeholder consultations and soil testing between February and March 2025, showed potential for establishing commercial-scale avocado production in Niue. Options for a follow-up project to create an orchard have been identified, but project design would need to be informed by some more detailed analysis. Specifically, further information is needed regarding the likely demand for avocados throughout the year, the structure and functioning of the supply chain, projected initial and ongoing costs, and expected net returns. The initial scoping highlighted the need for investments in inputs (e.g., nursery stock, fertiliser), infrastructure (including irrigation, shade houses, and windbreak systems), ongoing access to expertise in avocado cultivation, training and capacity building for government staff and local farmers, soil improvement, and structured varietal trials. If a follow-up project is to proceed, it is recommended that this be a phased project – detailed analysis and design as a first phase, with implementation and orchard establishment as a second phase.

Background and Evaluation

Niue is a remote island nation located approximately 2,400 kilometers (1,500 miles) northeast of New Zealand, with a land area of 261.46 km^2. Often called the "Rock of Polynesia," this raised coral atoll is recognised as one of the world's smallest states, both in terms of landmass and the lowest population density. Niue faces persistent economic challenges due to its geographic isolation, limited natural resource base, and ongoing outward migration trends. Despite these constraints, Niue achieved an estimated GDP per capita of USD 15,698 in 2021, reflecting moderate economic performance. Tourism remains the most significant contributor to national income, bolstered by approximately 9,000–10,000 annual visitors, primarily from New Zealand and Australia. Subsistence agriculture continues to play a vital role in the daily lives of Niueans. Nearly all households maintain taro plantations, underscoring the importance of traditional farming practices in food security and cultural identity.

Niue's agriculture sector remains limited in both production volume and the number of active participants. Current agricultural exports mainly include vanilla, noni juice, and honey. Despite these exports, there are limited commercial-scale farming operations on the island. Recognising agriculture's strategic value, the Government of Niue has prioritised this sector within its National Strategic Plan, identifying it as one of three key industries for maximising sustainable economic benefits from the country's limited resources[1].

In earlier efforts to diversify fruit and vegetable cultivation, the Government of Niue, through its Department of Agriculture, Forestry and Fisheries (DAFF), explored the importation of fruit tree seeds**.** The strategic expansion of fruit tree cultivation has been identified as a key pathway to achieving import substitution, enhanced food security, and economic sustainability in Niue's agricultural sector. These imported trees, which were largely experimental and not based on formal research, included oranges, mandarins, and avocados. Of these, avocados initially demonstrated promising growth performance. However, subsequent progress has been limited, and avocado cultivation has since reverted to a subsistence-level activity.

Niue imports majority of its avocados, with local retail prices ranging from NZD 10 to NZD 15 per fruit, which is a substantial premium compared to New Zealand's market rate of NZD 3.00 to NZD 8.00 per kilogram. This price disparity highlights the potential for a domestic avocado industry aimed at reducing imports and supporting food security. As part of its development agenda, the Government of Niue sought external support to import 2,000 fruit tree seeds, demonstrating its commitment to diversifying local production. However, following technical advice from PHAMA Plus, it was recommended that further research be undertaken to better understand the viability of avocado cultivation on the island. This recommendation led to the initiation of a targeted "Scoping of Avocados" Study, designed to inform evidence-based planning and reinvigorate the sector.

[1] *As mentioned under "Finance and Economic Development", which is one of the 7 National Development Pillars within the Niue Strategic Plan 2016-2026.*

Purpose of this summary report

This report consolidates the consultant's key observations and recommendations, with an emphasis on areas that warrant further evaluation. It is intended to support the Government of Niue in making informed, strategic decisions to revitalise the avocado sector, aligning with national tourism goals and the needs of local consumers.

Scope of the visit

A consultant from Lynwood Nursery (CEO Stuart Pascoe) in New Zealand was engaged to undertake a feasibility assessment on the growth and viability of the avocado industry in Niue. The short visit to Niue from the 21st of February to the 2nd of March, 2025, included consultations with local market actors, soil testing from selected sites, identification of the avocado varieties best suited to the growing conditions across Niue, and a workshop to disseminate the findings. This report captures the results of this initial scoping work, providing recommendations to maximise growing opportunities for avocados in Niue.

Summary of Inputs

The consultant travelled to Niue to consult key stakeholders, conduct site visits, and gather soil samples. A day after his arrival, he toured the island for the first two days before attending a briefing meeting with key stakeholders from both the government and the private sector. This briefing meeting was followed by visits to two farms (Vaipapahi and Vaiea), after which he went on a bush track/plantation tour covering the sites of Alofi, Makefu, and Tuapa (soil samples were collected with Mr. Frank Sioneholo). He then participated in the 2-hour A5 Tour, hosted by Tony Aholima, which covers Niue's ancient rainforest and a Niuean plantation, accompanied by explanations of traditional farming methods. The country mission was concluded with a debrief session that included key stakeholders from the earlier briefing session.

The list of key stakeholders consulted during the mission included:

Director of Trade, Economics Planning, Development & Trade Unit, Ministry of Finance and Planning Frank Sioneholo
Associate Minister for Trade Ricky Makani
Farm Manager, Vaipapahi Brandon Tauati
Acting Director for Niue Department of Agriculture, Forestry & Fisheries (DAFF) / Biosecurity New Aue
Director of Taro Company (private sector: growers and farmers Pualino Tokimua
CEO of Government State-Owned Enterprises – Niue Noni Farm Poi Kapaga
Office Manager for Niue Department of Agriculture, Forestry & Fisheries (DAFF) Priscilla Kapaga
Financial Secretary within the Ministry of Finance Doreen Siataga
Land Information/GIS Expert Richard Siataga
Trade Admin Assistant Auchern Panama

1 Post Mission Reporting and Stakeholder Engagement: Findings of the Initial Scoping Visit

1.1 Status of Avocado Production and Supply on Niue

Niue's commercial avocado rootstock remains undocumented; however, wild-growing trees are found across the island. These established trees, now over 50 years old, originated from early seed-based introductions, primarily from New Zealand and neighbouring Pacific Islands. The more recent avocado plantings utilise Zutano rootstock, supporting grafted cultivars such as Hass and Fuerte.

Observations indicate that younger trees appear stressed, potentially due to climatic factors, soil conditions, or graft-rootstock dynamics. In local avocado varieties, flowering typically occurs in November**,** during a season of heavy rainfall. The rainy season adversely affects flower retention and reduces fruit set. Cultivars that initiate flowering and set fruit before the rainy season could offer enhanced productivity and resilience under Niue's climatic conditions.

1.2 Intended Expansion of Avocado Production

Niue attracts a large number of tourists from New Zealand (82%) and Australia (10%) each year[2]. Recently, Niue has experienced a boost in tourist arrivals by 28% between 2023 to 2024, with projections indicating continued upward momentum[3]. This escalating visitor arrivals create a demand in the tourist market for fresh avocados. Avocado production in Niue is modest but promising, with growing interest in its potential as a high-value crop. Recognising the limitations in local supply, the Government of Niue is initiating plans to introduce between 300 and 500 disease-free, true-to-type avocado seedlings imported from New Zealand to be propagated at the Vaipapahi research station and transferred to the Government farm in Vaiea. These trees will take at least five years to mature and produce fruits to supply the tourism market.

This initiative aims to:

- Enhance the domestic supply mainly for tourism and local consumption
- Reduce import dependency
- Encourage local cultivation and agro-enterprise development

The imported avocado seedlings would undergo initial propagation at the Vaipapahi Research Farm, ensuring acclimatisation and evaluation of rootstock performance. Successful cultivars and propagation techniques could then be scaled up through field trials at the Government farm in Vaiea. This phased approach allows for:

- Selection of climate-resilient and high-yielding varieties, which can be harvested during the peak tourist season
- Testing of soil compatibility and managing high soil pH.
- Development of best-practice agronomic protocols for boosting the production of high-quality avocados
- Pest and disease resistance and management in avocado orchards

[2] *Pacific Tourism Organisation: https://southpacificislands.travel/home/research/pacific-tourism-data-initiative/ptdi-reports-niue/niue-ivs-reports-2024/*

[3] *Director of Niue Tourism – Micah Fuhinui-Viviani, 2025*

2 Investment in Avocado Orchards: Identified Needs

Establishing a government-owned and operated commercial avocado orchard and nursery in Niue offers substantial potential for import substitution, targeted supply to the tourist markets, and strengthened local food supply. Its success, however, depends on a thorough assessment of economic feasibility, technical capacity, and supply chain dynamics. Critical considerations include optimising local growing conditions, enhancing technical training in orchard management, and initiating a gene block program to evaluate diverse rootstock varieties under Niue's agroecological environment. A gene block program refers to having a dedicated section within a nursery where diverse avocado varieties are grown so their performance can be evaluated to inform which ones should be further propagated and/or how production practices might need to be changed to best support the performance of different varieties

2.1 Soil Condition

Niue, as a coral atoll, has shallow topsoil and elevated pH levels that pose challenges for avocado propagation. Field testing across proposed sites revealed pH readings between 7.0 and 7.9, with Vaiea Farm, which was recommended for the initial plantation development, recording a high pH of 7.8. Soil deficiencies in Nitrogen, Potassium, and Zinc were also noted.

Recommendations:

- Controlled applications of sulphur-based fertilisers (e.g., *Ammonium Sulphate*) to lower soil pH towards 6.0.
- Conduct ongoing soil tests and amendments to support orchard nutrition and resilience.

It would be critical to control the application of sulphur-based fertiliser with regular soil testing, as excessive application can have negative impacts such as lowering the soil pH too much (i.e. soil acidity becomes too high) which can then have a negative impact on the soil microbes which are crucial for soil fertility, and the ability of plants to absorb other nutrients; and run off of excess sulfur into waterways which can reduce water quality.

2.2 Climate Resilience

Niue is highly vulnerable to tropical cyclones and weather variations, which have an impact on the flower and fruit set in avocados. Introducing a genetically resilient variety through a gene block and improving the soil conditions may improve the resilience to natural disasters. To safeguard avocado trees from cyclonic winds and extreme weather, farms should adopt protective layout strategies.

Recommendations:

i. Develop a farm management plan incorporating native windbreak species and identifying vulnerable zones.
ii. Adopt pruning techniques to maintain avocado trees at safe, compact heights (3.5 m), minimising wind damage.
iii. Develop a site-specific farm management plan addressing exposure zones and microclimate buffering.
iv. Soil enhancement using inputs that support lower pH and nutritional balance with routine soil diagnostics.
v. Genetic diversity: Use of gene blocks to trial and propagate cultivars with resilience to stress factors like wind, poor soil, and rainfall patterns.

2.3 Use of Plant Growth Regulators (PGRs) for Flowering and Fruiting

To address the erratic flowering and fruit drop observed in avocado trees on Niue, trialling the use of Plant Growth Regulators (PGRs**)** could be considered. These compounds are available as both natural and synthetic and function as phytohormones, influencing key physiological processes such as:

- Flower induction and fruit set
- Growth regulation and ripening
- Stress response to climate extremes, including heavy rainfall and drought

Commonly used PGRs like Gibberellic Acid (GA) and Cytokinins have demonstrated effectiveness in stabilising flowering cycles and improving fruit retention in avocados. Strategic application of GA may enhance productivity and support a more consistent fruit supply aligned with Niue's tourism demand. Trials for this purpose could be introduced at a future point in time.

2.4 Promotion of Sustainable Farm Practices

A suite of sustainable interventions is proposed to address soil constraints and climate risks:

- **Soil Management:** Techniques such as mulching, composting, and the introduction of cover crops can retain moisture and enrich soil health.
- **Nutrient Balancing:** Given the high alkalinity and low levels of Nitrogen, Potassium, and Zinc, application of sulphur-based fertilisers like *Ammonium Sulphate* is advised to lower soil pH and enhance nutrient uptake.
- **Pest & Disease Management:** Continued monitoring and integrated pest control should be incorporated into orchard planning.

2.5 Water Management

Agricultural production in Niue is largely reliant on rainfall, making it susceptible to water scarcity during the dry season. This vulnerability highlights the critical need for efficient water management systems, such as:

- Rainwater harvesting using tanks
- Installation of appropriate irrigation systems, with consideration of two options:
    - Overhead sprinkler systems (estimated at NZD 12,000–14,000 including pipes, fittings and freight) offer fast delivery that is preferable for productivity and may help to address heat stress.
    - Drip irrigation systems target root zones directly, optimising water use and are a more cost-effective option for scalable application.

The Government farm on Vaiea has a borehole for water supply to the proposed avocado orchard, however further due diligence is needed before it is utilised for a sizeable orchard. Since the plan is to cultivate up to 500 avocado trees, it is critical to estimate the volume of water needed for the orchard. By year five, the 500 mature trees, require about 50 cubic meters of water per week. This is based on the estimation that each mature avocado tree needs 100 litres of water every week. During the dry season, water tanks can be used for the storage and distribution of water through irrigation systems. Large bladder tanks with a capacity of up to 2,000,000 litres can be imported from New Zealand. More information can be found using the link https://www.flexitanks.co.nz/

2.6 Rootstock Selection & Gene Block Development

Widely adopted in global commercial nurseries, clonal rootstocks offer tailored disease resistance, salinity tolerance, and adaptability to sub-optimal soils. Incorporating a diverse selection of rootstocks could strengthen orchard resilience and improve fruit consistency.

Creating a centralised gene block that houses both local and imported rootstocks and cultivars could:

- Serve as a propagation hub
- Allow site-specific trials
- Enable long-term orchard diversification

2.7 Capacity Building - Farm Management & Pruning Training

Regular field days and onsite training at Vaiea Farm for government staff and technical officers are recommended, focusing on pruning, orchard layout, and tree management. Practical demonstrations, using proven resources from New Zealand avocado publications, should be used to build a local pool of train-the-trainer experts.

3 Recommended Cultivars and Orchard Establishment Costs

If orchard establishment is planned, it's suggested that a selection of micro clones be imported to Niue by March, with cultivation planned for October. The estimated cost for these micro clones at the time of this report is NZD 39.00 per plant. The recommended varieties of avocado trees are listed in **Table 1**.

Table 1. Recommended Avocado Varieties for Niue

Avocado varieties	Rootstock
40% Hass	Rootstock: 45% Dusa, 45% Bounty, 10% Latas
40% Carmen Hass	Rootstock: 45% Dusa, 45% Bounty, 10% Latas
8% Fuerte	Rootstock: 50% Dusa, 50% Bounty
4% Zutano	Rootstock: 50% Dusa, 50% Bounty
4% Pinkerton	Rootstock: 50% Dusa, 50% Bounty
4% Reed	Rootstock: 50% Dusa, 50% Bounty

3.1 Brief Description of the Recommended Varieties

Avocados are botanically classified into Guatemalan, Mexican, and West Indian. There are two flowering types of avocado trees known as type A and type B. An avocado tree has both male and female flowers. Type A varieties open their female flowers in the morning of the first day, and the male flowers open in the afternoon of the second. Type B varieties open the female flowers in the afternoon of the first day, while the male flowers open in the morning of the second day. Type A and B varieties are needed for pollination and the production of avocado fruits.

3.1.1 Hass

As the world's leading cultivar, Hass is valued for its taste, shelf life, and marketability. In Niue, fruit size has appeared reduced, likely due to elevated temperatures and farming conditions. Improved nutrition and irrigation, plus overhead sprinkler systems (as used successfully in Spain and Turkey), could mitigate temperature stress.

3.1.2 Carmen Hass

Carmen Hass stands out for Niue due to its multi-seasonal flowering and fruiting. In warm climates like Mexico and California, it sets fruit 3–4 times per year, while in cooler climates, it yields biannually. Its continuous fruit cycle helps avoid flower drop during peak rains, though harvest training is needed due to its fewer visual ripeness cues.

3.1.3 Additional Cultivars for Trial

- *Reed, Fuerte, and Pinkerton* are suitable for diversity and comparative trials
- *West Indian greenskin varieties* are known for high cropping potential; recommended for local market expansion, and can be sourced from Florida, Israel, or South Africa

Avocado trees grafted to a rootstock in the nursery can bear fruit within 3 to 5 years. This is much faster when compared to avocado trees grown from seeds, which take 10 to 15 years to bear fruit. Trees grown from seeds are hybrids and take a longer time to mature, whereas the grafted trees are clones of mature fruiting trees and bear fruit quickly. Table 2 shows the flowering and fruiting cycles of different avocado fruits.

Table 2. Cropping Calendar for Avocados in Niue

Cultivar	Flowering Period	Fruit Set & Growth	Harvest Window	Notes
Hass	Oct–Nov	Nov–Mar	Apr–Jun	Sensitive to Nov–Feb rains
Carmen Hass	Multiple/year	Year-round	Feb–Mar, Jun–Jul, Nov	Staggered harvests possible
Reed / Fuerte	Dec–Jan	Jan–May	Jun–Aug	Consider trialling on blocks
West Indian Var.	Aug–Sep	Sep–Dec	Dec–Feb	Suited for wet-season fruiting

*Niue's peak tourism season is May to August, which aligns with the heightened demand for fresh avocados in the hospitality industry. This seasonal surge underscores the importance of selecting avocado varieties that can reliably mature during the peak tourist season. Further consideration of suitable varieties would ensure adequate and consistent supply at these times, as well as more consistently for local consumption. In parallel, varietal planning must accommodate year-round local consumption needs, without creating intervals of oversupply that may lead to postharvest losses or market saturation.

3.2 Cost for Micro Clones

Investing in 500 avocado seedlings imported from New Zealand requires a breakdown of the costs associated with purchasing the clones, rootstocks, phytosanitary fees, freight charges, and other miscellaneous costs.

Table 3. Estimation of Costs for Importing Avocado Seedlings

Details	Price (NZD)
Micro clones	39.00 per plant
Royalties for Dusa	4.00 per plant
Royalties for Bounty	3.95 per plant
Royalties for Carmen Hass	5.18 per plant
Phytosanitary costs	To be Estimated
Freight Charges	2110.00 for 500 trees

3.3 Nursery to Orchard Investment Costs

A breakdown of costs associated with importing avocado seedlings from New Zealand to Niue and propagating these seedlings on the farm is described in Table 4. The visit by the specialist for technical support would be inclusive of air fares, accommodation, and consultation fees.

Table 4. Estimated Cost of Production for Avocado From Nursery to Orchard

The table below estimates the known costs for orchard establishment.

Recommended Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Total (NZD)
Trees (Freight cost included)	$26,000.00					$26,000.00
Shade House Construction	$2,000.00					$2,000.00
Growing-on Costs	$5,000.00					$5,000.00
Land Preparation at Vaiea Farm (Tractor Time Included)		$2,000.00				$2,000.00
Application of Sulphur and Fertiliser		$2,000.00				$2,000.00
Tree Planting		$6,000.00				$6,000.00
Ongoing Care[1] Year 2: 1 person/1 day a week /10 weeks Year 3, 4, 5: 1 person/1 day a week/full year		$1,600.00	$8300.00	$8300.00	$8300.00	$26,500.00
Fertilisers and Sprays			$1,000.00	$1,000.00	$1,000.00	$3,000.00
Total Expenses	**$33,000.00**	**$11,600.00**	**$9,300.00**	**$9,300.00**	**$9,300.00**	**$56,500.00**
Technical Support by a Specialist through visits[2]	$17,000.00	$17,000.00	$17,000.00	$17,000.00	$17,000.00	$85,000.00
Virtual Support	$1,000.00	$1,500.00	$6,000.00	$6,000.00	$6,000.00	$20,500.00
Total Expenses Inclusive of Technical Support	**$51,000.00**	**$30,100.00**	**$32,300.00**	**$32,300.00**	**$32,300.00**	**$178,000.00**

[1]NZD 160 per day for 1 person
[2]Two visits per year by the specialist

In addition to these costs, decisions will need to be made on a range of other inputs needed to ensure the success of the initiative. Such costs include irrigation systems, water capture and storage, tools and equipment for orchard maintenance, and harvesting, packing, and storage/transport requirements.

Using NZD32,300 as the annual production cost, and assuming a yield of 8-10 tonnes of fruit 5 years after planting, each fruit cost would be NZD0.72-0.90. It must be noted that this is a very preliminary estimate, that will need further verification. While this initial scoping has not been able to fully cost all inputs, current retail prices for avocados in Niue are NZD4-6 per fruit. This is thought to be a sufficiently robust profit margin to recapture initial capital outlays and make the orchard establishment financially viable, provided the initiative is approached with a long-term business plan in mind.

4 Developing the Avocado Value-Chain – Key Areas

Local varieties of avocados are available for domestic consumption, but to ensure a consistent supply of high-quality avocados during the tourist season, strategic development of the entire value chain has to be considered. Some key areas of the value chain would be:

4.1 Input Supplies

Investing in high-quality inputs, such as seedlings, fertilisers, technology, and technical support for training and capacity building, is essential for improving avocado production and quality. The imported seedlings, which are true-to-type, disease-free varieties (e.g., Hass, Fuerte), should be sourced from certified nurseries.

Inputs, such as fertilisers and agrochemicals, organic and synthetic, are essential for improving soil pH and fertility, and for pest and disease control. Their application and volume requirements will be based on the orchard area.

Management of the orchard would require investment in proper tools and technology. Tools and equipment, such as pruning shears, irrigation systems, and harvesting kits. Technical support, extension services, training on orchard management, and climate-smart practices can also add value to the avocado production.

4.2 Production

The production aspect of the value chain focuses on orchards that are mainly government-led and, over time, can include smallholders. Boosting avocado production involves investing in practices such as intercropping, agroforestry, and regenerative techniques through training and capacity building.

Factors that affect production would need to be considered for better planning and management. These limiting factors can be challenges caused by climate variability, limited access to finance, and varietal mismatch with the tourist market demand and season.

Investing in gender-responsive training would create opportunities for youth and women in the avocado sector. Varietal trials for seasonal alignment are also essential to determine the production capacity and seasonal alignment with the peak tourist season on Niue.

4.3 Harvesting & Postharvest Handling

Avocado varieties with a harvest season between May and August are ideal for the hospitality sector as it aligns with the peak tourist season. The harvest period is also critical to ensure fruit maturity and shelf life. Investment in postharvest training, such as picking, sorting, and grading of the fruit, and infrastructure, such as cold chain development, ensures quality control and high standards for the hospitality sector.

5 Risk Management and Capacity Gaps

While this initiative is promising, the cost of inputs, environmental conditions, and the maturation period of avocado trees must be taken into consideration as constraints. Additionally, many local growers lack training in orchard management, pruning, irrigation, and pest control, which raises the risk of seedling loss. Long-term planning, investment, and commitment will be needed to make the initiative successful and see returns on investment. Monitoring and evaluation frameworks should track survival rates and yield performance, with adjustments made to practice over time.