

Cost Analysis of Root Crop Exports - Fiji

TECHNICAL REPORT

#118



Cost Analysis of Root Crop Exports
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Acronym List

Acronym	Description
PHAMA	Pacific Horticultural and Agricultural Market Access Program
MAWG	Market Access Working Group
STA	Short-term advisor
MoA	Ministry of Agriculture (Fiji)
CIF	Cost, insurance and freight
FJD	Fijian Dollar
USD	US Dollar
NZD	New Zealand Dollar
AUD	Australian Dollar

Background

Fiji has experienced declining export volumes of most horticultural commodities during the last five years. Exporters consider that this is due to the high costs incurred in the export marketing pathways which have reduced the profitability of exporting compared to domestic marketing.

However, a clear description of the key steps of the value-chains and associated costs is not available. Stakeholders have requested this analysis be done for all current horticultural exports from Fiji, so to test the approach the initial analysis has been done on root crops (taro and cassava) as the major export commodities.

The Fiji Market Access Working Group (MAWG) proposed that PHAMA should undertake a value chain analysis for taro and cassava exports including: a map of the value chain structure; economic value; pricing structure; historic and forecast trade volumes, value and key types of products; key participants; challenges and opportunities. It is expected that follow-up work will be done in 2017-18 to refine the approach, (as needed) do further analysis of the root crop exports, do similar analysis for other priority horticultural exports, and hold stakeholder consultations. This is expected to be done with a combination of inputs from international and local STA plus MOA and other relevant stakeholders.

Approach

The cost analysis was undertaken in August 2017 and involved consultations with several active root crop exporters as well as compilation of official statistics on the production and marketing of taro and cassava. The work focused on the two main root crop export pathways: fresh/ chilled taro to New Zealand and frozen cassava to Australia.

Export Marketing Pathways for Root Crops

The export marketing pathway for taro and other root crops exported chilled involves the following steps.

1. Harvest into field bins, baskets or sacks
2. Transport to packhouse by road or sea/road
3. Wash, trim and discard defective material
4. Drain and pack in polybags and export bins or pallets
5. Stow in reefer container and chill
6. Move container to port
7. Complete biosecurity and phytosanitary formalities
8. Wash container
9. Load container onto ship

For frozen cassava and other root crops exported in frozen form, the following steps are undertaken.

1. Harvest into field bins, baskets or sacks
2. Transport to packhouse by road or sea/road
3. Peel, sort and discard defective material
4. Wash in water
5. Rinse in sodium metabisulphite solution
6. Drain and pack in wholesale (20-25 kg) or retail (3-5kg) plastic bags
7. Freeze (in blast freezer or freezer container)
8. Stow in freezer container
9. Move container to port
10. Complete biosecurity and phytosanitary formalities
11. Wash container
12. Load container onto ship

Key Trends in Production and Marketing of Root Crops

Annex 1 provides an overview of key trends in the production and marketing of the principal root crops, taro and cassava, based on Ministry of Agriculture (MoA) statistics.

Taro

The amount of taro planted and produced has declined steeply since 2013, a period in which Fiji was affected by two severe tropical cyclones and a prolonged drought. The area planted to taro in 2016 was only a quarter of that planted in 2013. Production also fell by more than half from almost 93,000 tonnes in 2013 to 43,480 tonnes in 2016. This has had a major impact on the availability and price of taro for export.

Taro exports peaked at 12,500 tonnes in 2011 but declined every year since then to a low of 5,500 tonnes in 2016. However higher export prices has seen the value of taro exports maintained in the FJD 20-25 million range. Taro exports to Australia and the US have been fairly stable. Most of the decline in exports is due to erosion of the New Zealand market share from 8,660 tonnes in 2011 to just 2,770 tonnes in 2016. Average export prices (in FJD/kg) approximately doubled from 2009 to 2016. However, exporters have had to compete with strong domestic demand for taro and dwindling supplies which saw municipal market prices soar into the FJD 4.00-8.00/kg range in much of 2015 and 2016, occasionally higher.

Cassava

The decline in cassava plantings and production has been less precipitous than for taro, but substantial nonetheless. Production declined by 18% from 77,720 tonnes in 2014 to 63,670 tonnes in 2016. Cassava exports have declined steadily since 2009 to reach a low of only 780 tonnes in 2016.

The decline in the value of cassava exports has been moderated by rising prices but export revenue still halved between 2009 and 2016. Exports to all destinations contributed to the overall decline. Exporters have also had to contend with higher domestic prices during the last two years as shortages pushed retail prices into the FJD 2.00-4.00/kg range.

Profitability of Exporting Root Crops

Annex 2 presents an analysis of the costs and returns incurred in two of the main root crop export marketing pathways, fresh/chilled taro to New Zealand and frozen cassava to Australia. The analysis confirms that both of these marketing pathways are marginally profitable at present, especially considering the risks incurred.

Taro

Taro exporting is estimated to generate a gross margin (as a percent of costs) of around 12% at current prices. There have been long periods over the last few years when domestic taro prices were such that profitable exporting would have been impossible, which explains why export volumes have contracted so much. Those who continued to export during these periods were probably doing so at a loss in order to stay in the market.

Table 1: Estimated Cost of Exporting one Container (12.5 tonnes) of Taro from Fiji to New Zealand (FJD)			
	Per Container	Per kg	% of Total
Farmgate cost of taro	35,714	2.86	76.0
Ocean freight	5,140	0.41	10.9
Packhouse costs	2,233	0.18	4.8
Transport to packhouse	1,734	0.14	3.7

Port charges: Auckland	910	0.07	1.9
BAF charges	730	0.06	1.6
Port charges: Suva	285	0.02	0.6
Cartage, packhouse to port	220	0.02	0.5
Total	46,966	3.76	100.0

Table 1 shows that by far the largest cost incurred is the purchase of taro from farmers. This is assumed to be FJD 2.00/kg purchased or FJD 2.86/kg shipped since about 17.9 tonnes has to be purchased to fill a 12.5 tonne shipping container (assuming 70% packout). In total, taro purchase, ocean freight, packhouse costs and internal transport make up 95.4% of the costs.

As shown in Table 2, small variations in the farmgate price of taro and the CIF price in Auckland have a large impact on gross margins, which emphasises the risks associated with low margin commodity trading. The table shows that margins become very small or negative if exporters have to pay more than about FJD 2.00/kg for taro at farmgate, or if they receive less than around NZD 2.50/kg in Auckland.

Table 2: Gross Margin from Exporting one Container (12.5 tonnes) of Taro from Fiji to New Zealand (percent of costs)						
CIF Price NZD/kg	Farmgate Price of Taro (FJD/tonne)					
	1,600	1,800	2,000	2,200	2,400	
2.00	9.1	0.1	-7.5	-15.0	-19.7	
2.25	20.6	10.7	2.3	-4.9	-11.2	
2.50	32.2	21.3	12.1	4.1	-2.7	
2.75	43.7	31.9	21.8	13.2	5.8	
3.00	55.2	42.5	31.6	22.3	14.3	

Cassava

Cassava exporting is also found to be marginally profitable at current prices. However, since cassava is a lower value product, and is mostly traded in frozen form, the cost structures are different to taro. The farmgate price represents only 33% of the total cost, compared with 76% for taro. The estimated gross margin (as a percent of costs) is around 9%, which is very marginal considering the risks involved. Like taro, there have been long periods over the last few years when domestic cassava prices were such that profitable exporting would have been impossible.

Table 3: Estimated Cost of Exporting one Container (14.0 tonnes) of Cassava from Fiji to New Zealand (FJD)			
	Per Container	Per kg	% of Total
Farmgate cost of taro	8,750	0.63	32.8
Ocean freight	5,660	0.40	21.2
Packhouse costs	5,578	0.40	20.9
Transport to packhouse	1,699	0.12	6.4
Port charges: Sydney	910	0.07	3.4
BAF charges	750	0.05	2.8
Port charges: Suva	285	0.02	1.1
Cartage, packhouse to port	220	0.02	0.8
Total	23,852	1.91	100.0

Table 3 shows that the largest cost incurred is the purchase of cassava from farmers. This is assumed to be FJD 0.50/kg purchased or FJD 0.63/kg shipped since about 17.5 tonnes has to be purchased to fill a 14.0 tonne shipping container (assuming 80% packout). In total, cassava purchase, ocean freight, packhouse costs and internal transport make up 81.3% of the costs.

As shown in Table 4, small variations in the farmgate price of cassava and the CIF price in Sydney have a large impact on gross margins. The table shows that margins become very small or negative if exporters have to pay more than about FJD 0.50/kg for taro at farmgate, or if they receive less than around AUD 1.50/kg in Sydney.

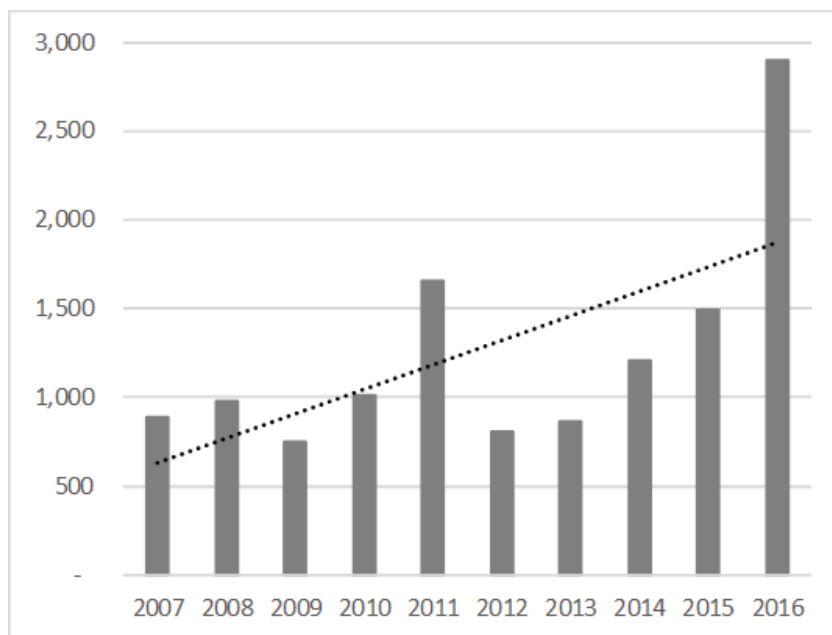
Table 4: Gross Margin from Exporting one Container (14.0 tonnes) of Cassava from Fiji to New Zealand (percent of costs)					
CIF Price NZD/kg	Farmgate Price of Taro (FJD/tonne)				
	400	450	500	550	600
1.20	-4.4	-11.9	-18.8	-25.2	-31.2
1.35	10.5	2.5	-4.9	-11.8	-18.3
1.50	25.4	16.8	8.9	1.5	-5.4
1.65	40.3	31.2	22.7	14.8	7.5
1.80	55.3	45.5	36.5	28.2	20.4

Profitability of Exporting Root Crops

Fiji's root crop exporters have faced a number of headwinds during the last decade, but particularly in the last 3-4 years, when a series of natural disasters greatly reduced availability and increased domestic prices. Increasing prices in export markets have been insufficient to compensate for these events, and the volumes of taro and cassava have consequently declined from the peak levels by around 50% for taro and 70% for cassava. Exchange rate movements for the major currencies have been moderately positive for the USD and NZD and neutral for the AUD. Analysis of the costs and revenues of exporting taro and cassava show that margins are currently unattractive considering the risks incurred, and that there would have been extended periods in recent years when exporters would have incurred losses. This explains why export volumes have fallen so steeply.

Fiji's competitors, Tonga and Samoa, have apparently been less affected by these trends and have managed to increase market share at Fiji's expense. The taro export sector in Samoa is recovering as TLB resistant taro varieties are multiplied up and exporters work to recover Samoa's once dominant position in the New Zealand market before the TLB outbreak in 1993. As shown in Figure 1 below, Tonga has been notably successful in expanding cassava exports over the last decade, in marked contrasts to Fiji's export performance.

Figure 1: Export of Cassava from Tonga, 2007-2016 (tonnes)



This situation poses serious questions as to why the root crop export sector of Fiji is in decline, whilst it is growing in Samoa and Tonga. There are a number of possible explanations which need to be investigated in order to formulate policy responses:

- Root crop production in Fiji is declining, exacerbated in recent years by natural disasters, whilst domestic demand is strong, meaning that exporters find it difficult to compete with domestic marketing channels.
- Export marketing pathways in Fiji are less efficient/more expensive than in Samoa and Tonga due to the longer internal transport routes (land and sea) and other cost components.
- Samoa and Tonga have much smaller domestic markets and therefore less competition for exporters.
- There are market/consumer preferences for taro and cassava from Samoa and Tonga.

Annex 1: Production and Marketing Data

Table 1: Area Planted to Taro, 2009-2016 (hectares)

The area planted to taro peaked at 10,060 ha in 2013 but has fallen dramatically since then to reach 2,550 tonnes in 2016.

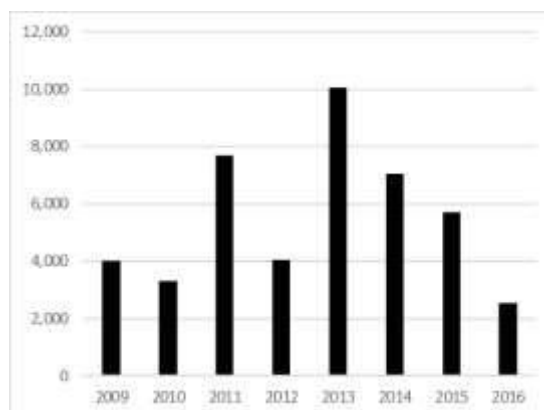


Table 2: Area Planted to Cassava, 2009- 2016 (hectares)

The area planted to cassava also decreased from 7,300 ha in 2014 to 4,240 ha in 2016.

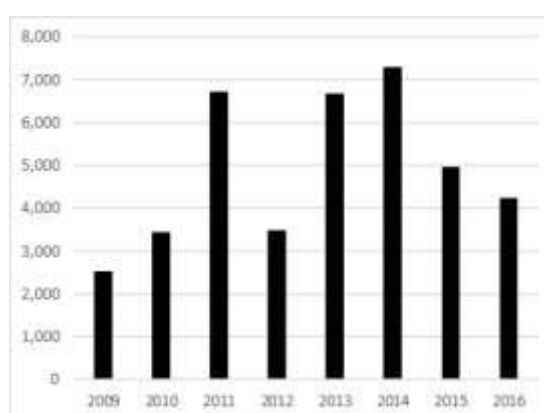


Table 3: Production of Taro, 2009-2016 (tonnes)

Because of the steep decline in taro plantings, production of taro also fell by more than half, from almost 93,000 tonnes in 2013 to 43,830 tonnes in 2016.

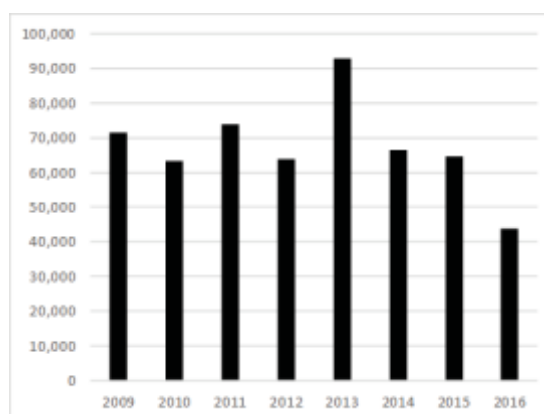


Table 4: Production of Cassava, 2009-2016 (tonnes)

Cassava production declined by 18% from 77,720 tonnes in 2014 to 63,670 tonnes in 2016.

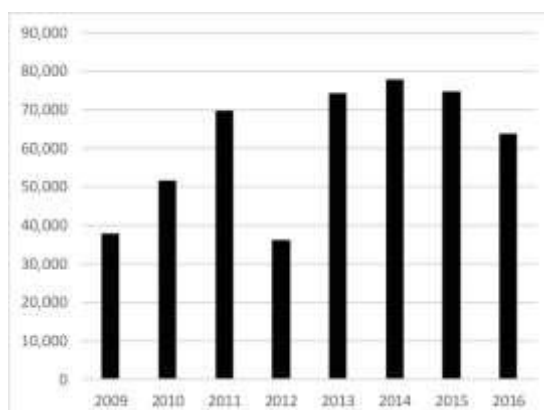


Table 5: Production of Taro and Cassava, 2009-2016 (tonnes)

Looking at taro and cassava together total production declined by more than a third from 167,170 tonnes in 2013 to 107,500 tonnes in 2016.

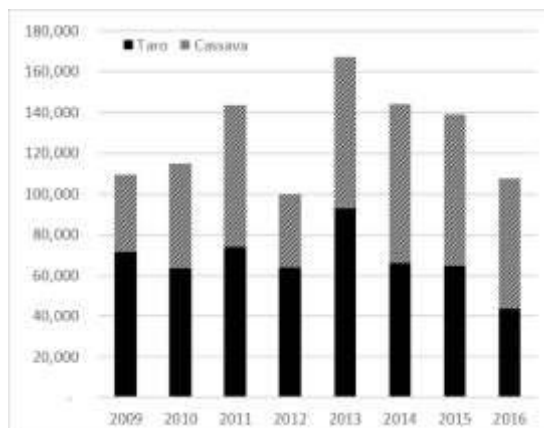


Table 6: Tonnes of Taro Exported, 2009- 2016

Taro exports peaked at 12,500 tonnes in 2011 but have declined every year since then to a low of 5,500 tonnes in 2016.

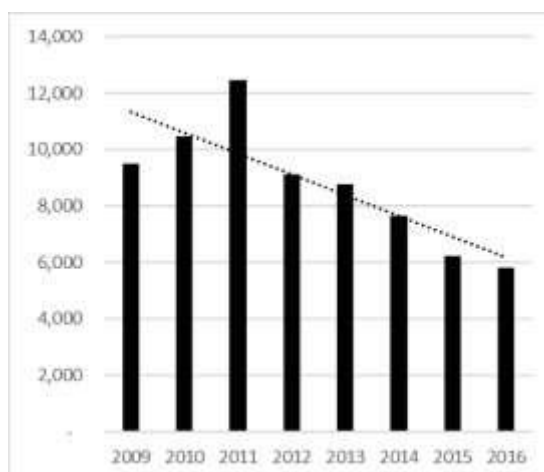


Table 7: Value of Taro Exports 2009-2016 (FJD'000)

However, higher taro prices in the key export markets have seen the value of exports maintained in the FJD 20-25 million range.

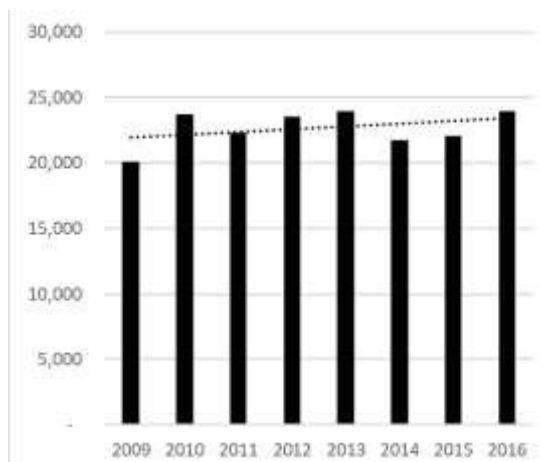


Table 8: Taro Exports to Principal Destinations, 2009-2016 (tonnes)

Taro exports to Australia and the US have been fairly stable. Most of the decline in exports is due to erosion of the New Zealand market share from 8,660 tonnes in 2011 to just 2,770 tonnes in 2016.

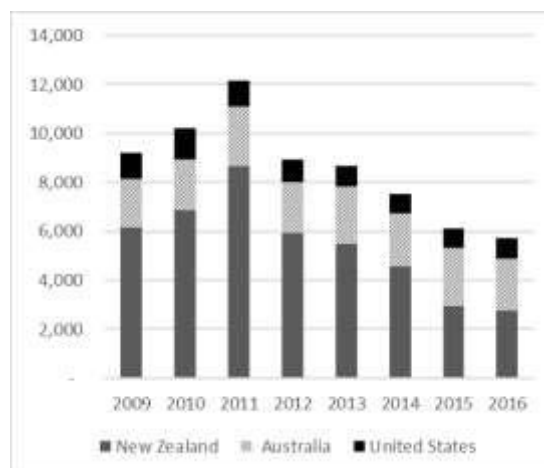


Table 9: Value of Taro Exports, 2009-2016 (FJD/kg)

Average export prices for taro have approximately doubled from 2009 to 2016.

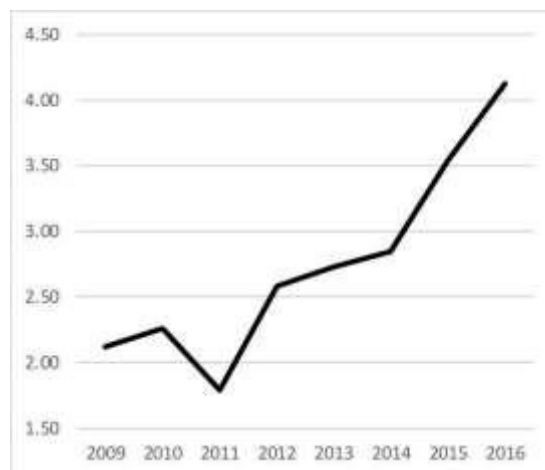


Table 10: Tonnes of Cassava Exported, 2009-2016

Cassava exports have declined steadily since 2009 to reach a low of only 780 tonnes in 2016.

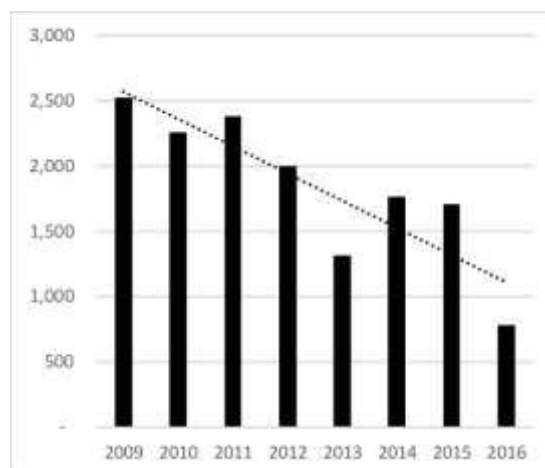


Table 11: Value of Cassava Exports 2009- 2016 (FJD'000)

The decline in the value of cassava exports has been less precipitous but still halved between 2009 and 2016.

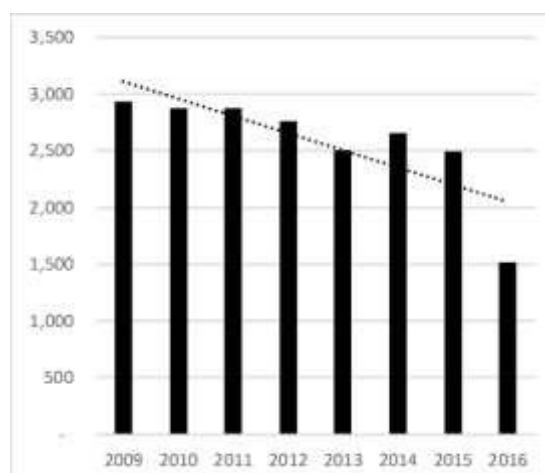


Table 12: Cassava Exports to Principal Destinations, 2009-2016 (tonnes)

Cassava exports to all destinations have contributed to the overall decline

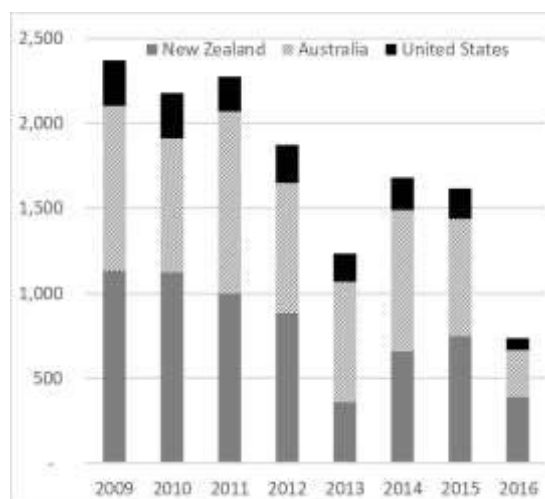


Table 13: Value of Cassava Exports, 2009-2016 (FJD/kg)

Cassava export prices have fluctuated over time but reached a record average of FJD 1.95/kg in 2016

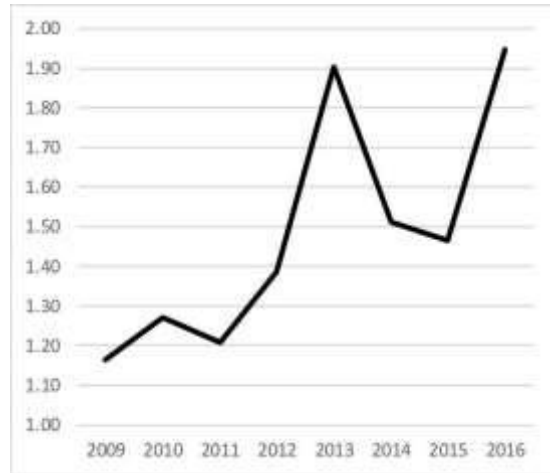


Table 14: Exchange Rates, 2009-2017 (FJD per AUD, USD and NZD)

During the period of decline in root crop exports there have been favourable movements in the USD and NZD exchange rates. The AUD rate improved from 2009 to 2012 but has become less attractive to Fiji exporters since then.

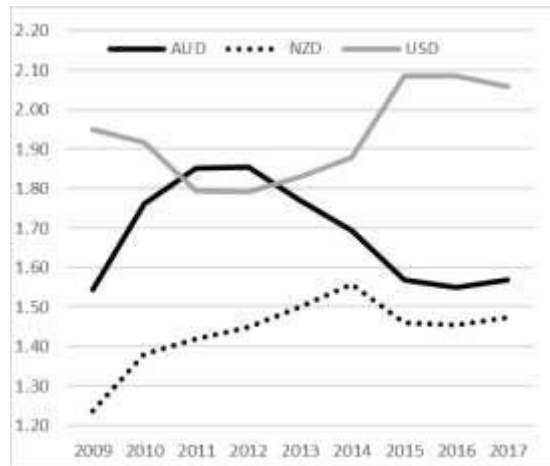


Table 15: Exchange Rate Indices, 2009-2017 (2009 = 100)

In index terms the NZD exchange rate has appreciated by around 20% and the USD by about 5%. The AUD exchange rate has risen and fallen and in 2016 was about the same as in 2009.

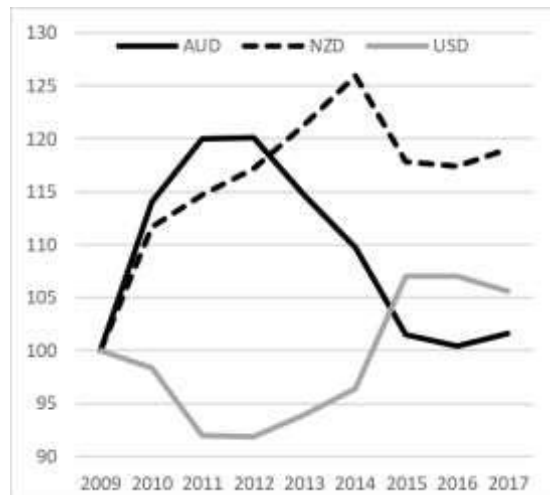
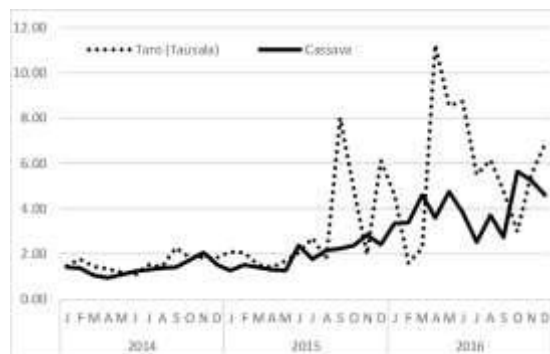


Table 16: Municipal Market Prices for Taro and Cassava, 2014-2016 (FJD/kg)

During the last two years exporters have had to compete with rising domestic prices for both taro and cassava



Annex 2: Gross Margin Analysis for Root Crop Exports

Table 1: Assumptions Used in Analysis

Exchange Rates			Operating Costs: 4 tonne truck		
FJD/NZD	1.47	Average for 2017	20,000 km/year	FJD/year	
FJD/USD	2.06	Average for 2017	Fuel: 20 L/100 km @ FJD 2.60/L	10,400	
FJD/AUD	1.57	Average for 2017	Registration and insurance	2,700	
			Servicing (2 per year)	1,500	
			Tyres (six tyres every 2 yrs)	1,200	
			Repairs and maintenance	2,000	
			Total Operating Costs/year	17,800	
			Total Operating Costs/km	0.89	
Product Prices: Taro			Domestic Transport		
Farmgate price of taro	2.00	FJD/kg	Taveuni to Suva	FJD/t	
CIF price of fresh/chilled taro	2.50	NZD/kg	Viti Levu to Suva	120	
CIF price of fresh/chilled taro	3.68	FJD/kg		74.17	
Local market price of taro	1.50	FJD/kg			
Taro Packout Ratios		Percent	Grading, Washing and Packing etc.		
Fresh/Chilled			Fresh/Chilled Taro		
Export grade	70		Piece rates for packers	2.00	per 20 kg sack
Domestic grade	25		Piece rates for packers	100	per tonne
Trimming, shrinkage & waste	5		Frozen Cassava		
Reefer Container Specifications			Piece rates for packers	0.30	per 2kg freezer bag
Volume per 20 foot container	27	m ³	Piece rates for packers	150	per tonne
t of fresh taro (max)	12.5	t/container	Packing Materials		
			Taro sacks (20 kg/sack)	0.85	per sack
				42.50	per tonne
			2 kg freezer bags	0.33	per bag
				165	per tonne
Product Prices: Cassava			Refrigeration		
Farmgate price of cassava	0.50	FJD/kg		kW	FJD/kWh FJD/day
CIF price of frozen cassava	1.50	AUD/kg	Reefer container	5.0	0.42 50
CIF price of frozen cassava	2.36	FJD/kg	Freezer container	8.0	0.42 81
Local market price of cassava	1.00	FJD/kg			
Cassava Packout Ratios		Percent			
Frozen					
Export grade	80				
Domestic grade	10				
Trimming, shrinkage & waste	10				
Freezer Container Specifications					
Volume per 20 foot container	27	m ³			
t of frozen cassava (max)	14.0	t/container			

Table 2: Costs and Revenues for One Container of Fresh/Chilled Taro

12.5 tonnes of taro per container

	Tonnes	FJD/t	FJD
Purchase taro at farmgate	17.86	2,000	35,714
Sales Revenue			
Export quality fresh/chilled taro	12.50	3,675	45,938
Local market	4.46	1,500	6,696
Trimming, shrinkage & waste	0.89	0	0
Total Sales	17.86		52,634
Variable Costs per Container			
Transport to Packhouse			
Sea freight from Taveuni (50%)	8.93	120	1,071
Road transport (50%) a/	8.93	74	662
Total transport to packhouse	17.86		1,734
Packhouse Costs			
Labour to grade, wash and pack	12.50	100	1,250
Packing materials (bags)	12.50	42.5	531
Timber pallets 10 x FJD 20			200
Electricity for refrigeration (5 days)			252
Total Packhouse			2,233
Packhouse to Auckland			
Cartage, packhouse to port			220
Ocean freight - reefer container to Auckland			5,140
Suva port charges			285
BAF charges			730
Destination port charges			910
Total Packhouse to Auckland			7,285
Total Cost per Container to CIF			46,966
Gross Margin per Container			5,668
Gross Margin (percent of costs)			12.1

a/ 250 km travel for 4t truck to collect 3 tonnes taro

	FJD
Packhouse to Port	
Cartage: packhouse to port	220
Ocean Freight	
Basic ocean freight for 20ft reefer to Auckland	4,730
Standard bunker adjustment factor	410
Subtotal	5,140
Port Charges: Suva	
Customs service fee	60
Agency fees	110
Forklift	60
Wharfage	25
Lolo (lift on - lift off) fee	20
Stamp duty	10
Subtotal	285
BAF Charges	
BAF inspection fees (\$0.03/kg x 12,500 kg)	375
BAF phyto fees	45
Pickup phyto certificate costs	30
Fumigation inspection fees	190
Fumigation fees for 10 pallets	90
Subtotal	730
Port Charges: Destination	
Terminal handling services	750
Documents fee	130
Admin fee (wharfage)	5
Other documentation fees	25
Subtotal	910

Table 3: Costs and Revenues for One Container of Frozen Cassava
14.0 tonnes of cassava per container

	Tonnes	FJD/t	FJD
Purchase cassava at farmgate	17.50	500	8,750
Sales Revenue			
Export quality frozen cassava	14.00	2,355	32,970
Local market	1.75	1,000	1,750
Trimming, shrinkage & waste	1.75	0	0
Total Sales	17.50		34,720
Variable Costs per Container			
Transport to Packhouse			
Sea freight from Taveuni (50%)	8.75	120	1,050
Road transport (50%) a/	8.75	74	649
Total transport to packhouse	17.50		1,699
Packhouse Costs			
Labour to grade, peel, wash, cut and pack	14.00	150	2,100
Packing materials (2 kg freezer bags)	14.00	165	2,310
Timber pallets 10 x FJD 20			200
Electricity for refrigeration (12 days)			968
			5,578
Packhouse to Auckland			
Cartage, packhouse to port			220
Ocean freight - reefer container to Sydney			5,660
Suva port charges			285
BAF charges			750
Destination port charges			910
			7,825
Total Cost per Container to FOB			23,852
Gross Margin per Container			2,118
Gross Margin (percent of costs)			8.9

a/ 250 km travel for 4t truck to collect 3 tonnes cassava

	FJD
Packhouse to Port	
Cartage: packhouse to port	220
Ocean Freight	
Basic ocean freight for 20ft reefer to Sydney	5,250
Standard bunker adjustment factor	410
Subtotal	5,660
Port Charges: Suva	
Customs service fee	60
Agency fees	110
Forklift	60
Wharfage	25
Lolo (lift on - lift off) fee	20
Stamp duty	10
Subtotal	285
BAF Charges	
BAF inspection fees (\$0.03/kg x 14,000 kg)	420
BAF phyto fees	45
Pickup phyto certificate costs	30
Subtotal	495
Port Charges: Destination	
Terminal handling services	750
Documents fee	130
Admin fee (wharfage)	5
Other documentation fees	25
Subtotal	910