PACIFIC BREADFRUIT ROUNDTABLE

BREADFRUIT IN AGROFORESTRY SYSTEM

SOLOMON ISLANDS EXPERIENCE

15 - 16 September 2016

KINGDOM OF TONGA

Dr. Richard Pauku

Outline of Presentation

- About NGASI
- Traditional Agroforestry System
- Improved Traditional Agroforestry System

About NGASI…

Vision: Solomon Islanders sustainably using their indigenous fruits and nuts resources resulting in an enhanced resilience of people, the economy and the environment leading to sustainable development.

Mission Statement: To promote and support sustainable use of indigenous fruits and nuts resources in Solomon Islands to sustain livelihoods, to protect the environment, and to preserve our traditions.

GOAL: To promote and support sustainable production and Fair Trade practices in the commercialization and traditional uses of nuts in the Solomon Islands.

OBJECTIVES OF NGASI:

1. To develop a network for information sharing and training for members to increase awareness and enhance trading opportunities, transparency and accountability.

2. To provide income generation opportunities for members through participatory approaches and activities.

3. To provide a forum for advocacy for all members and affiliated member organizations.

4. To facilitate nut resource improvement and distribution of improved planting materials, marketing and export of nut products..

OBJECTIVES OF NGASI *Cont.*

5. To promote best environment practices and promote sequescent of carbon through perennial crop planting.

6. To promote gender equality in all its activities

7. To encourage and advocate a safe and health working environment for all employees of its members.

Key Strategic Themes

THEME 1: PRODUCTION

Strategy Objective: To increase production of IFN through domestication and propagation of IFN with desirable attributes, promoting productivity, diversification and commercialization program, recognizing different levels of stakeholder collaborations and partnerships.

THEME 2: PROCESSING

Strategy Objective: To promote and facilitate IFN processing industry for value addition and diversification of IFN products and satisfy the requirements of the markets and appropriate food safety standards thus securing markets for the products.

THEME 3: MARKETING

Strategy Objective: To promote and facilitate the marketing of IFN products through appropriate market research and product development and active partnership with members and affiliated member organizations in the development of an effective supply chain.

Key Strategic Themes *Cont.*

THEME 4: FINANCE

Strategy Objective: To seek, evaluate and negotiate different financial opportunities and options deemed appropriate and feasible to implement and facilitate access to finance for members.

THEME 5: GOVERNANCE & POLICY

Strategy Objective: To establish NGASI secretariat, and work close with relevant government authorities and agencies, civil society organizations and private sector to draft, review or recommend important laws, regulations and policies affecting the development and utilization of IFN resources.

THEME 6: NETWORKING

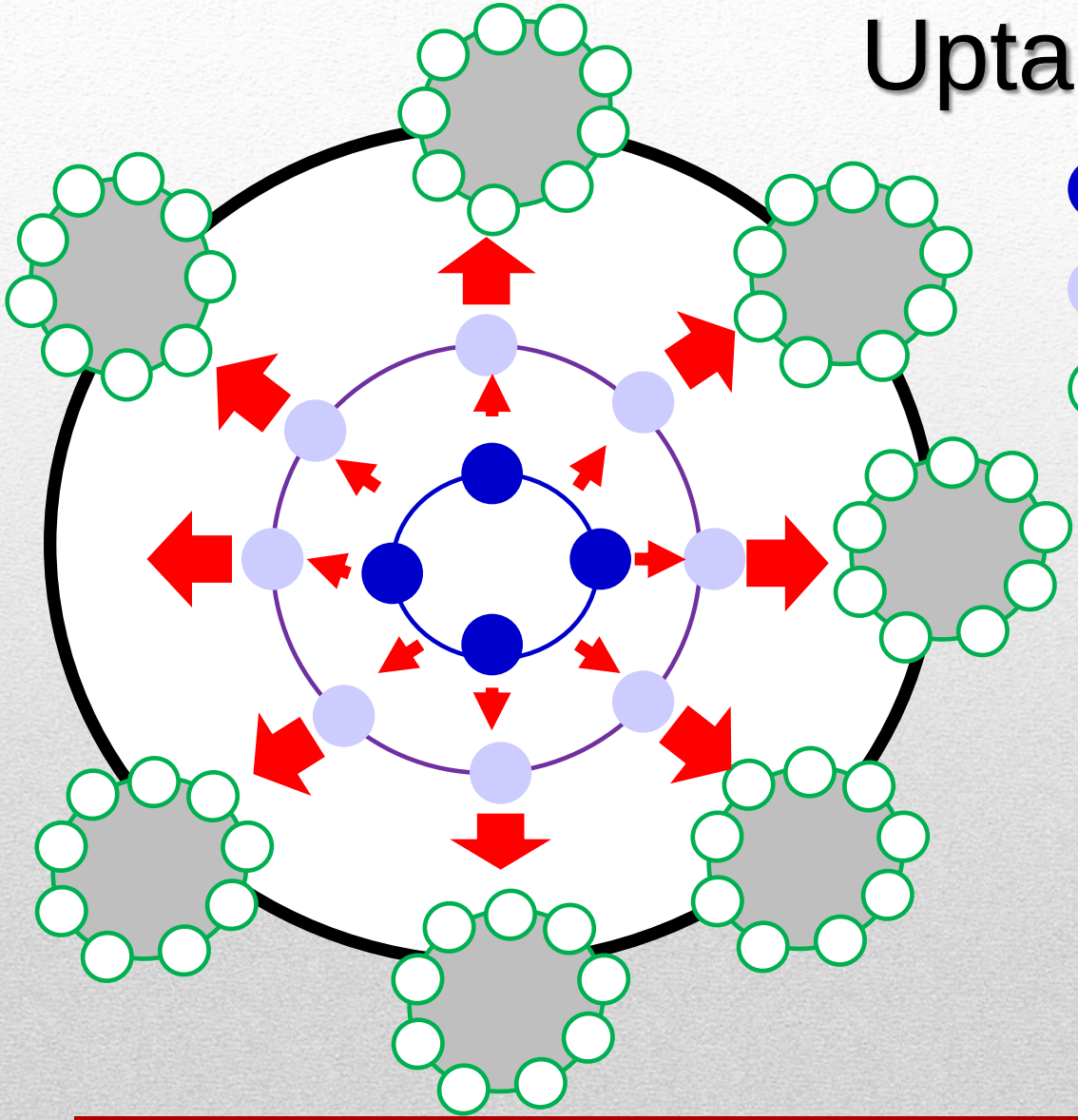
Strategy Objective: To establish a network of producers, processors and exporters of commercially viable IFN, and create agribusiness opportunities for members.

Key Strategic Themes *Cont.*

THEME 7: ACQUIRE / DOCUMENT INDIGENOUS KNOWLEDGE

Strategy Objective: To conduct a research to acquire and document traditional knowledge on IFN in partnership with resource owners throughout the Solomon Islands.

Uptake strategy



- Lead member farmers
- Impact -1
- Impact - 2

EXAMPLES OF INDIGENOUS FRUITS AND NUTS IN SOLOMON ISLANDS

Canarium indicum (Ngali nut)

Barringtonia procera (Cut nut)

Artocarpus atilis (Breadfruit)

Incarpus inofilum (Tahitian Chestnut)

WHERE TO FIND INDIGENOUS FRUITS AND NUTS? (NATURAL HABITAT)

- Montane forests
- Hill forests
- Lowland forests
- Freshwater and Riverine forests
- Saline swamp forests
- Grassland and other non-forest areas
- Surroundings / Peripherals of dwellings

INDIGENOUS FRUITS AND NUTS IN TRADITIONAL AGROFORESTRY SYSTEM

More than 80% of Solomon Islands population live in rural areas, and dependent upon traditional farming system (= traditional agroforestry system)

Traditional agroforestry system involves:-

- Enrichment planting of groves
- Nurturing of wild siblings / seedlings
- Planting in fallows
- Planting within and along land boundaries
- Planting in boundaries of food gardens

INDIGENOUS FRUITS AND NUTS IN IMRPOVED TRADITIONAL AGROFORESTRY SYSTEM

Increase population put pressure on land, thus the need to improve traditional agroforestry system.

Improved Traditional Agroforestry System involves:-

- Training of farmers
- Establishment and Management of nursery
- Field planting of selected IFN
- Integrated Plantations
- Planting in boundaries of existing cocoa / coconut plantations

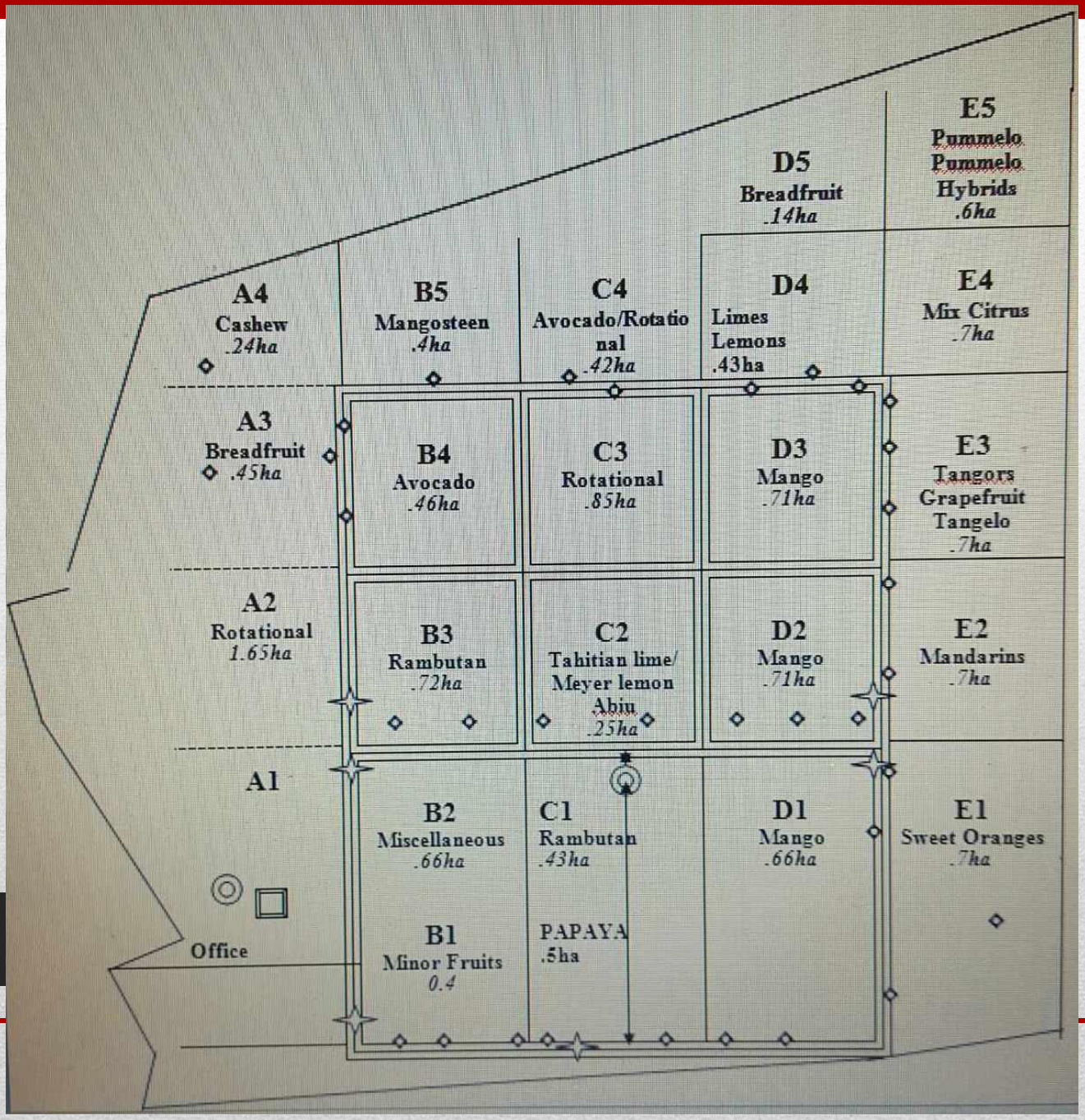
INDIGENOUS FRUITS AND NUTS IN IMRPOVED TRADITIONAL AGROFORESTRY SYSTEM

- Collections / Distributions of IFN planting materials.
- Boundary planting of Sago palms
- Integrated planting in plantation forestry

Taqiu Tumas


Breadfruit
Samoa

MA


A4
Cashew
.24ha
B5
Mangosteen
.4ha
C4
Avocado/Rotatio
nal
.42ha
D5
Breadfruit
.14ha
E5
Pummelo
Pummelo
Hybrids
.6ha
D4
Limes
Lemons
.43ha
E4
Mix Citrus
.7ha
A3
Breadfruit
.45ha
B4
Avocado
.46ha
C3
Rotational
.85ha
D3
Mango
.71ha
E3
Tangors
Grapefruit
Tangelo
.7ha
A2
Rotational
1.65ha
B3
Rambutan
.72ha
C2
Tahitian lime/
Meyer lemon
Abiu
.25ha
D2
Mango
.71ha
E2
Mandarins
.7ha
A1
B2
Miscellaneous
.66ha
C1
Rambutan
.43ha
D1
Mango
.66ha
E1
Sweet Oranges
.7ha
Office
B1
Minor Fruits
0.4
PAPAYA
.5ha

Breadfruit Block A2
Block Size : 1.65ha
Spacing : 7m x 9m

	A264 Puou 2002	A263 Puou 2002	A262 Ulu Falaoa 2002	A246 Maafala	A247 Maafala	A248 Maafala 08.03	A249 Maafala 08.03	A250 Maafala 08.03
		A261 Puou 2002	A260 Puou 2002	A241 Maafala 08.03	A242 Maafala	A243 Maafala 08.03	A244 Maafala 08.03	A245 Maafala
			A259 Puou 2002	A236 Puou	A237 Puou	A238 Puou	A239 Puou	A240 Puou
		A258 Puou 2002	A257 Puou 2002	A231 Maafala	A232 Puou	A233 Puou	A234 Puou 08.03	A235 Puou
A256 Puou 2002	A255 Puou 2002	A254 Puou 2002	A253 Puou 2002	A226 Maafala 08.03	A227 Maafala	A228 Maafala 08.03	A229 Maafala	A230 Maafala
				A221 Maafala	A222 Maafala 08.03	A223 Maafala	A224 Maafala	A225 Maafala
				A216 Ulu Ea	A217 Ulu Ea	A218 Ulu Ea	A219 Ulu Ea	A220 Ulu Ea
				A211 Ulu Ea	A212 Ulu Ea	A213 Ulu Ea	A214 Ulu Ea	A215 Ulu Ea
			A252 Ulu 2002	A2O6 Ulu	A207 Ulu	A208 Ulu	A209 Ulu	A210 Ulu
			A251 Ulu Hawaii 2002	A201 Ulu	A202 Ulu	A203 Ulu	A204 Ulu	A205 Ulu

Key: A226
A2 : block number
26 : position
planting date: 08.03

BLOCK A3: *BREADFRUIT*
Block size: 0.45ha
Spacing: 15x15m

	A308 **Maopo** **10.96**	**A309** **Puou** **10.96**	**A320** **Puou** **10.96**
	A307 **Maopo** **10.96**	**A310** **Ulu maa** **10.96**	**A319** **Ulu maa** **10.96**
	A306 **Ulu ea** **10.96**	**A311** **Maafala** **10.96**	**A318** **Maafala** **10.96**
	A305 **Ulu ea** **10.96**	**A312** **Ulu kala** **10.96**	**A317** **Ulu kala** **10.96**
A302 **Aveloloa** **10.96**	**A304** **Ulu manua** **10.96**	**A313** **Ulu sina** **4.97**	**A316** **Ulu sina** **4.97**
A301 **Aveloloa** **10.96**	**A303** **Ulu manua** **10.96**	**A314** **Ulu fagufagu** **4.97**	**A315** **Ulu fagufagu** **4.97**

KEY:

A301: A3 indicates block number

01: position

10.96: planting date

Varieties in Atele Orchard

- Ulu Uea
- Ulu Hawaii
- Ulu Puou
- Ulu Maafala
- Ulu Manu’a
- Ulu Fagufagu
- Ulu Sina
- Ulu Aveloloa
- Ulu Kala
- Maopo
- Ulu Maa
- Ulu Momolega

BREADFRUIT EXPORT


FRESH BREADFRUIT
PRODUCE OF SAMOA
ULU
SAMOA

YEAR	Number of Consignments	Number of Boxes	Number of Fruits Boxed	Total Weight (kg)	Exporters	Number of Treatments
2004	2	30	213	192.35	1	2
2005	50	2900	26836	25964.72	2	97
2006	77	3982	38789	43606.82	2	155
2007	52	2962	19215	22991.39	2	99
2008	62	3002	26173	30407.88	2	117
2009	4	53	734	774.38	5	1
2010	9	144	2361	2206.28	2	11

Procedures for Preparing Breadfruit for Export

1. Registration & Practices

Exporter Licensing: Exporters of Breadfruit are to be registered with MAF and have access to certified treatment and packing facilities.

Farmer Registration

Farmers who intend to grow breadfruit for export must complete the "Farmer Declaration" form and follow all procedures. Farmers will be issued with a registration number to be recorded on exports. Only breadfruit from a registered farm will be allowed for export.

Field Sanitation

Breadfruit is a fruit fly host. Trees require four protein bait sprays applied prior to 1st harvest, then at 2-weekly intervals during harvest. Farms of registered growers will be inspected by MAF for:

- Field & tree maintenance.
- Removal & disposal of ripe fruit.
- Fruit fly management program.

2. Harvest & Transfer

Harvesting

Harvest at the mature green stage when fruit shows a small amount of white sap in the skin. Harvest during cool of day using secateurs or knife. Trim stem to 8 mm using square cut. Place fruit stem down to drain sap. Always soft handle and never drop or throw fruit.

Sap Blemish

Export breadfruit should be free from sap blemishes. Take care to avoid sap running over fruit by pointing stem-end downwards after trimming until sap flow stops.

Transfer to Packing House

Select only export quality breadfruit. Transfer to HTFA facility within 24 hours from harvest. Transfer in baskets or plastic crates is ideal. Alternatively, line vehicle with thick bed of leaves. Pack with fruit stem pointing downwards. Cover and keep cool.

3. Washing & Grading

Packing House

Unload breadfruit at delivery gate & weigh before placing in wash tank. Fruit from each farmer is to be identified through all processes to ensure trace-back.

Washing

Wash breadfruit in clean water with soft sponge to removal all plant material & pests. Inspect fruit for export quality and remove over-ripe, undersized or damaged fruit.

Grading

Grade to three sizes based on weight of fruit.

Size Grades	Weight (kg)
Large	1.25 - 1.5
Medium	1.0 - 1.25
Small	0.75 - 1.0

4. Quarantine Treatment

Pre-treatment Inspection

The final inspection before loading into the HTFA Chamber is to check for infected , bruised or blemished fruit.

HTFA Treatment

Breadfruit is a fruit fly host and requires treatment in the High Temperature Forced Air Chamber.

Post-treatment Inspection

This is the final inspection by MAF Quarantine. If satisfied that all pathway requirements have been met, a Phytosanitary Certificate will be issued before shipment.

5. Packing & Labelling

Packing

Pack breadfruit in a single layer carton of good strength with same size fruit. Only one variety should be packed in each carton. Close and seal.

Labelling

Weigh and record on each carton the net weight, fruit count, size grade and exporters reference no. Record the packing house and grower number for trace-back purposes and print "product of Samoa" and "breadfruit" on each carton.

A quarantine stamp is to be placed on each package, once cleared for export

6. Transport & Quarantine

Inspection Clearance in NZ

Document compliance at port of entry and inspection to quarantine protocol is conducted by MAF BNZ.

Storage & Transport

Place breadfruit in cool room at 15ºC until transfer to the Airport. In case of a flight delay, cartons are to be held in cool storage.

Protect from Insects

All certified fruit and packaging must be protected from pest contamination during and after packing, storage & movement to port.

Ministry of Agriculture and Fisheries, Samoa
Crops Division

Phone: Savaii 51222/58030
Upolu 20605/23416

Fax: Savaii 51395
Upolu 20607
Web: www.maf.gov.ws



Developing commercial breadfruit orchards in Fiji – role of intercropping

NATURE'S WAY COOPERATIVE

PACIFIC BREADFRUIT PROJECT

Breadfruit needs to be planted in orchards to have a major impact

- Currently grown “wild” in forest, household backyard gardens or around villages.
- Such cropping systems cannot make a major contribution to **national food security** - as do not offer sufficient supply of produce of consistently good and known quality.
- Orchards are an essential requirement to support fresh exports and commercial processing

"WILD" HARVEST TO ORCHARD PRODUCTION

Breadfruit Orchard Models in Fiji

Conventional 'square' model

- Mono crop
- Spacing of 9 m x 9 m
- Approximately 50 trees per acre

Breadfruit Orchard Models in Fiji

Farm perimeter model

- Planted along the farm edges or roads
- Spacing of 9 m x 9 m
- Approximately 50 trees per acre

Breadfruit Orchard Models in Fiji

Conventional 'square' model with intercropping

- Spacing of 9 m x 9 m
- Intercropped with a range of crops – kumala, eggplant, cassava, pineapple etc.

Current status of commercial breadfruit orchards in Fiji

- A total of 1464 trees in the field
- A total of 32 participating farmers involved
- A total of 30 acres (12 Ha) under commercial orchard system.

NWC approach to commercial orchard development

- Working with our interested export farmer members
- Present the expected returns – engage with and exporter
- NWC provided the trees with farmers contributing the land, labour and agro-inputs
- Start small (50 trees) and then expand the good farmers

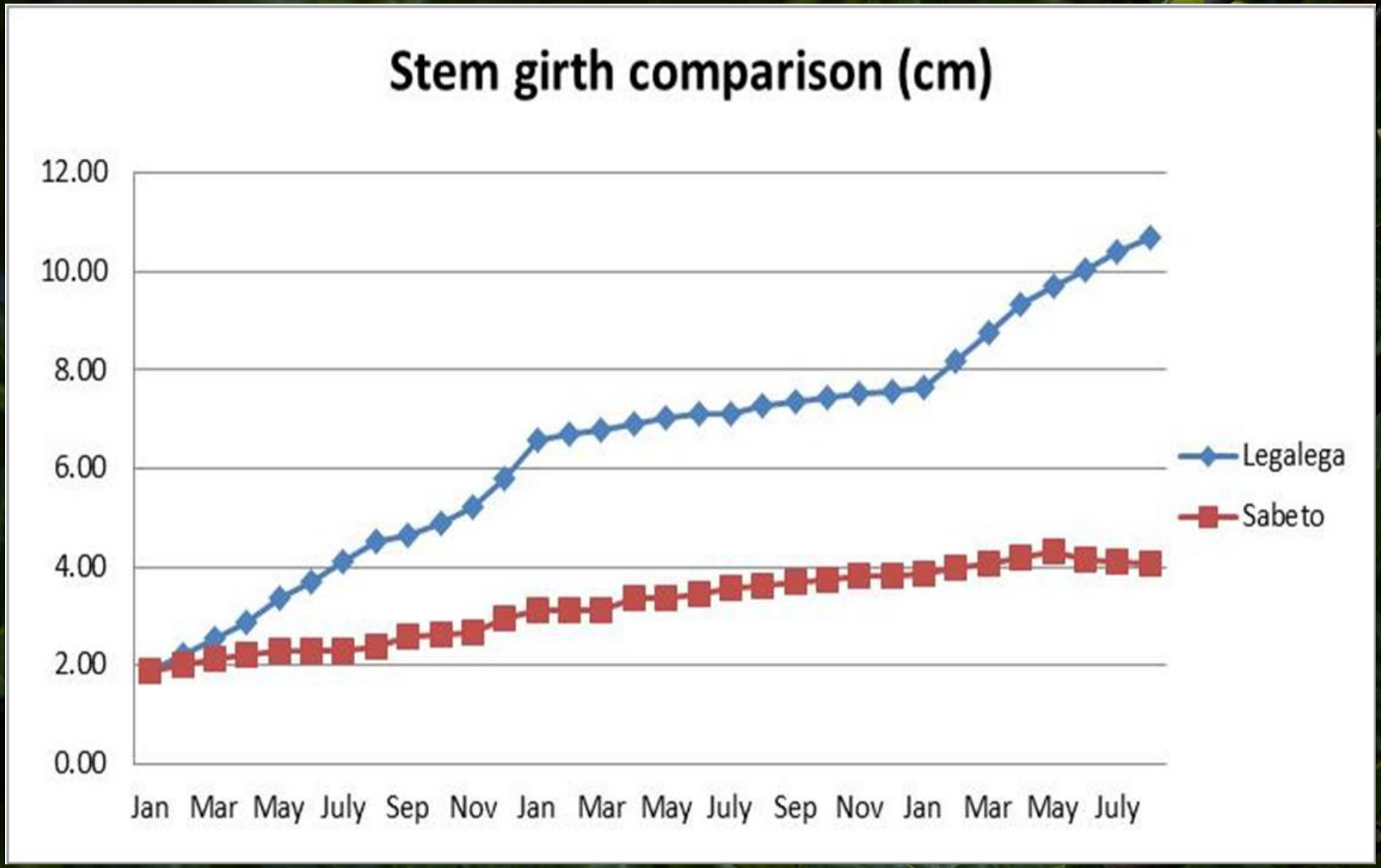
Lessons from NWC model

- Many farmers show interest when there are free trees but few spend the time looking after the young trees (water, weeding)
- Need to be selective with participating farmers
- Farmers should allocate good land
- Importance of intercropping

Lessons from field trials

Evaluation of breadfruit orchards on different agro-ecological conditions

Comparison of a sloping degraded site (Sabeto hill site) compared to a flatter, more fertile site (Tui's farm @ Legalega)


Stem girth comparison (cm)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Mar
May
July
Sep
Nov
Jan
Mar
May
July
Sep
Nov
Jan
Mar
May
July
Legalega
Sabeto

Lessons from field trials

Returns to farmer

The breadfruit orchard planting uptake by farmers has been high and based on the relatively high expected returns to labour compared with the main alternative of planting sugar cane.

Lessons from field trials

Returns to farmer

The breadfruit orchard planting uptake by farmers has been high and based on the relatively high expected returns to labour compared with the main alternative of planting sugar cane.

Lessons from field trials

Returns to farmer

Gross margin analysis has been conducted utilizing currently available data generated by the PBP. The standard model used is for a farm household in western Viti Levu, planting 50 breadfruit trees on 0.4 hectare of land .

Lessons from field trials

Returns to farmer

Based on conservative marketable yield and price assumptions it estimated that this small orchard will earn an average annual income of FJD 2,700 (USD 1,490) over a 16-year period.

More importantly the resulting average annual return per day of household labour is estimated at approximately FJD70 (USD 39).

Lessons from field trials

Returns from intercropping with pineapple

By incorporating pineapples as an intercrop, for example, it is estimated that a farm household can earn an average of FJD 1,450 per annum in the first 5-years when there is no breadfruit income .

This translates to some FJD90 per day of household labour.

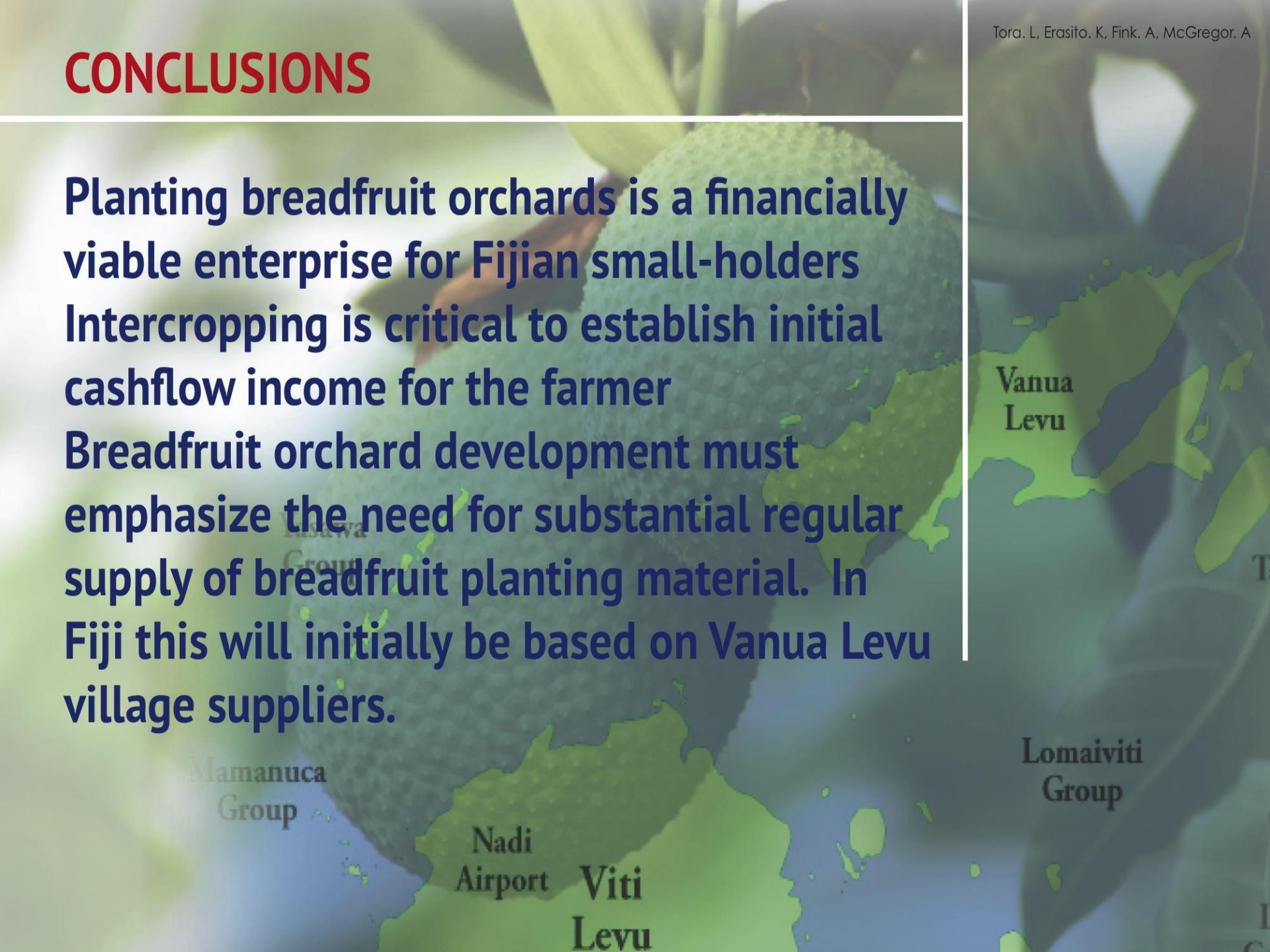
Tora. L, Erasito. K, Fink. A, McGregor. A

CONCLUSIONS

Planting breadfruit orchards is a financially viable enterprise for Fijian small-holders

Intercropping is critical to establish initial cashflow income for the farmer

Breadfruit orchard development must emphasize the need for substantial regular supply of breadfruit planting material. In Fiji this will initially be based on Vanua Levu village suppliers.



Next step orchard management research

- Pruning and training research
- Nutrition trial work (rates and timing)
- Just received ACIAR funding to carry this out