

# Pacific Breadfruit Project - Vanua Levu Germplasm Collection and Characterisation: Trip Report



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*project* Pacific Breadfruit Project

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## **1 Introduction**

The field trip to Vanua Levu was coordinated by Livai Tora the Pacific Breadfruit Project (PBP) Manager. The team comprised of Kaitu Erasito and Arshni Shandil (SPC, Centre for Pacific Crops and Trees - CePaCT), Manoa Iranacola (Sigatoka Research Station), Kelera Baleidrokadroka and Maleli Tamainai (Seaqaqa Research Station), Shiu Prasad (Savusavu – MPI), Fr Petero Matairatu (Tutu Rural Training Centre (TRTC) and Andrew McGregor the PBP Project Leader.

Cakaudrove Province is regarded as a “hot spot” for breadfruit diversity in Fiji. Closer networking with Vanua Levu began in mid-2012 when the PBP team in collaboration with the TRTC, undertook a preliminary survey of several villagers in the Natewa/Tunuloa peninsula.

This current field work included a rapid breadfruit variety and fruiting pattern survey; propagation training to village farmers; replacement and expansion of PBP planting material collection that was lost in the March 2012 floods; and the establishment of an ongoing planting material source for the commercial development of the Fiji breadfruit industry. A total of 116 people were surveyed and trained during this exercise, 40% of whom were women.

The team has been working to identify varieties that could significantly extend the breadfruit fruiting season. Thus the Vanua Levu field trip closely evaluated varietal and fruiting patterns. Independent field surveys were conducted in person and through interviews along the Natewa and Tunuloa peninsula in the province of Cakaudrove.

Four village based “breadfruit nurseries” were established. It is envisaged that these nurseries will ensure not only a steady supply of planting material but also extend the production base and long term food security impact for the villagers in Cakaudrove.

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## **2 Vanua Levu field work objectives and activities**

The Vanua Levu field work had four (4) primary objectives:

Objective 1: To characterize and document the diversity of breadfruit in the Cakaudrove coastal region and conduct analysis on fruiting patterns.

Objective 2: To establish small scale breadfruit nurseries to regularly supply breadfruit planting material to Viti Levu for orchard establishment. Provide the required training and inputs.

Objective 3: To collect planting material for orchard establishment.

Objective 4: To initiate a technical exchange on pineapple production for intercropping in breadfruit orchards.

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### **Objective 1: To characterize and document the diversity of breadfruit in the Cakaudrove coastal region and conduct analysis on fruiting patterns.**

This work was built upon earlier work undertaken by the MPI and SPC where some 8 varieties were collected in Vanua Levu and planted at Seaqaqa Research Station. A further 18 varieties were established at Legalega Research station in Nadi. The PBP has been active in characterising these research station collections in Legalega to develop a Fiji breadfruit database. The project has been supporting targeted collecting missions based on consultations with land owners, provincial officers, MPI extension officers and lead farmers. The trees have been characterized in accordance with the “FAO-IPGRI multi-crop passport descriptors” of December 2001 as well as the Breadfruit Descriptors developed by Dr. Diane Ragone of the National Tropical Botanic Gardens— July 2003.

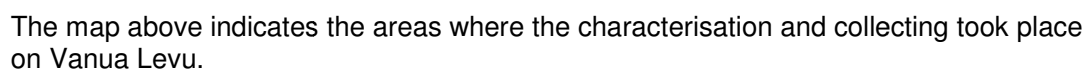
The Vanua Levu trip allowed for a thorough survey where varietal characteristics and fruiting patterns in these areas were carefully examined. A field work strategy was formulated to make sure that resources were maximised in this widely geographically dispersed area. This involved:

- An advance team establishing contact with local villagers previously visited by the PBP team along Natewa/Tunulua bay.
- Closer networking with Vanua Levu began in mid-2012 when the PBP team in collaboration with the TRTC, undertook a preliminary survey of several villagers in the Natewa/Tunulua peninsula.
- One team assisted by villagers identified different varieties. Personal interviews were conducted on fruiting patterns and traditional knowledge on different varieties. The breadfruit trees were characterised using the NTBGS descriptors template developed by Dr. Diane Ragone of Hawaii.
- A second team substantiated this information with field surveys and more in depth interviews with neighbouring villagers.
- The team then analysed this information and compared this with previous work done on breadfruit (Koroveibau, 1966)

#### **2.1.1 Varieties characterized**

A total of 20 different varieties were characterized. These were distributed as follows:

- 14 at Natewa
- 4 at Muana village



**Natewa Village:**

- Muana Village:**

- Uto Elesi
- Bucu coka
- Uto dina (kasa balavu)
- Uto Dina (kasa leka)

**Seaqqa Research Station:**

- Uto Samoa (kasa balavu)
- Balekana Dina
- Balekana ni Samoa
- Virosola
- Uto Samoa
- Uto Karawa / Loa
- Uto Lolo

Information gathered has resulted in a fruiting pattern calendar that illustrates the 20 varieties that were characterised. Note that this was specifically for the 20 varieties that were collected during the exercise.

 A young man with dark skin and short hair, wearing a light brown t-shirt and dark shorts, is standing outdoors in a grassy area. He is holding a large, green breadfruit marcott (a young tree with a single fruit) in front of him. In the background, there are trees and a black plastic sheet on the ground.	 A man with dark skin, wearing a light-colored striped shirt and dark shorts, is bending over a pink cloth laid on the grass. He is examining several large, green breadfruit leaves that are laid out on the cloth. The background shows a lush green field with trees.
<p>An Ex Tutu young farmer holding a harvested marcott that was propagated after PBP training in 2012.</p>	<p>Kaitu examines breadfruit leaves at Natewa village for characterisation work</p>

## NATEWA BAY FRUITING PATTERN CALENDAR

Variety	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Balokena Dina												
Uto Kogo												
Nirosole												
Uto Budo												
Uto Bokasi												
Balokena ni Sampa (small)												
Uto dina (yellow flesh)												
Uto dina (white flesh)												
Uto Tasewa												
Uto Uva												

Variety	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Uto Seisavi												
Budo Sampa												
Uto Sampa												
Balokena ni Sampa (large)												
Budo Risi												
Budo Coka												
Uto Dina (kasa Balevu)												
Uto Dina (kasa loka)												
Uto Sampa (kasa Balevu)												
Uto Lolo												

**Source<sup>1</sup>:** Natewa Village (Tomu Baca & Seru Taqali)

Muana village (Silio Qila)

Seaqqa Research Station (Kelera Baleidrokadroka & Maleli Tamainai)

<sup>1</sup> Note that this fruiting pattern calendar was information that was gathered from the villagers in Natewa bay and Seaqqa research station.

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## **Objective 2: To establish small scale breadfruit nurseries to regularly supply breadfruit planting material to Viti Levu for orchard establishment.**

Provide the required training and inputs. The PBP has received an overwhelming number of requests from farmers interested in planting breadfruit orchards. These requests have come from farmers all around Fiji including: Savusavu, Navua, Nadi and Rakiraki. However, farmers are currently constrained by the fact that they cannot source enough breadfruit trees of the two recommended varieties: Bale Kana and Uto Dina.

Although breadfruit can be seen growing wild around the country, there remains a real challenge for existing nurseries to access and propagate the preferred variety trees in large numbers. This issue is long standing and is the main basis for the work of the PBP in Fiji. Over the first 12 months of the PBP, the team has faced a number of obstacles in trying to source breadfruit trees including: limited availability of Bale Kana mother trees on Viti Levu, restricted access to mother trees because of land rights and cultural constraints and poor success rate of marcotted trees. To date, the PBP has had its best success in accessing large numbers of trees when land owners are trained in propagation techniques and then given commercial orders to supply breadfruit trees. This approach has worked particularly well in Taveuni and Vanua Levu, working in partnership with Young Farmers from the Tutu Rural Training Centre.

The setting up of small scale breadfruit nurseries was specifically to:

- expand the production base at village level;
- incorporate breadfruit tree cropping into their traditional food garden systems;
- ensure a regular supply of planting material for an emerging breadfruit industry; and, long term food security for resource owners

The approach used to establish small scale nurseries involved:

An advance team identifying Ex Tutu Young Farmer graduates who were already commercially orientated.

Materials were provided and a team constructed 4 nurseries at different sites.

Propagation techniques were demonstrated and hands on training was provided.

Fencing material was provided to secure the perimeter of the nursery.

Other inputs such as fertiliser and polybags were provided to ensure continuous planting of breadfruit.

	
<p>Villagers have hands on training on potting breadfruit suckers.</p>	<p>The PBP team pose with villagers after demonstrating how to propagate breadfruit root suckers.</p>
	
<p>Potted breadfruit being placed under the newly constructed nursery.</p>	<p>Kaitu explains the benefits of utilising the breadfruit nursery for future plantings</p>

### **Objective 3: To collect planting material for orchard establishment and provide training on marcotting**

A major component of the PBP is the mass propagation of preferred variety breadfruit trees that will enable the establishment of orchards. The propagation techniques used are marcotting and collection of root suckers. The preferred varieties that are being targeted for mass propagation are Uto Dina and Bale Kana. While Uto Dina is commonly found on Viti Levu and in the Nadi area, the variety Bale Kana has its centre of origin in the Cakaudrove Province that includes Vanua Levu and Taveuni. The propagation team has been working closely with land owners in the Nadi area as well as Cakaudrove to allow for trees to be collected.

However, the majority of the PBP planting material collection was destroyed by the "50 year" March 2012 flood. Of the 1,050 breadfruit root suckers that were in the nursery, approximately 60% were lost in the flood. Of the 112 marcotts that were in the nursery, approximately 70% were lost.

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Therefore, one of the goals of this exercise was to collect root suckers from these villagers. These were purchased at 50¢ per root sucker. The team placed orders through the Tutu network with a target of collecting 1000 root suckers. The target was surpassed with 1,731 Bale Kana breadfruit root suckers being purchased.

The team also provided hands on training on marcotting breadfruit. A total of 120 marcotts were done and 40 villagers from in and around Natewa benefited from the exercise. It is envisioned that these skills would be shared amongst other villagers and would enhance their capability to expand the production base in Natewa.

	
Kaitu records details of the planting material at Nawi village	Planting material is loaded onto the truck from Nawi village.
	
Villagers have a go at marcotting breadfruit under the guidance of MPI extension officer Maleli	Breadfruit suckers arranged according to size at Naqere

#### **Objective 4: To initiate a technical exchange on pineapple production for intercropping in breadfruit orchards**

According to farm budgets produced by the PBP, planting breadfruit orchards will give a good average return to farmers using household labour. However, it takes 3 - 4 years before full production is achieved and this might be viewed as too long by most households; particularly where land and labour resources are scarce.

Farm budgets indicate that the cash flow situation in the early years of a breadfruit orchard can be significantly improved by intercropping. Intercropping brings with it an early return of cash to the farmer and allows the cost of land preparation and weeding to be spread over a number of crops. Inter-cropping also makes it economical to have the wider spacing necessary for better disease control.

Pineapple has been a neglected crop that has considerable economic potential in the domestic and export markets. It is envisioned that this crop will provide a good basis for intercropping if it is planted and cared for in the right way. Hence the team required the services of Aad van Santen to investigate the possibility of incorporating pineapple as an intercrop. Aad managed the EU Pineapple Micro Project in Vanua Levu and is the owner/operator of a commercial pineapple farm at Nasarowaqa in Bua. Mr van Santen assisted the PBP in establishing a pineapple nursery for rapid multiplication using the bud propagation system. This system will ensure a systematic approach to farming pineapple that allows for year round production.

A package of practice is being developed to ensure that future breadfruit farmers have other alternatives for income generation in the short and medium term while waiting for a return from breadfruit.

 A photograph of Aad van Santen, a man wearing a hat and a patterned shirt, standing in a field and holding two pineapples.	 A photograph showing a large field of pineapple plants growing in rows.
Aad van Santen at his farm in Nasarowaqa in Bua.	Pineapple production in Nasarowaqa in Bua,

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Aad explains to the team the benefits of pineapple mass propagation at the Seaqaqa Research station



The team listens as Aad explains the possibility of incorporating pineapple as an intercrop with breadfruit.

### 3 Vanua Levu root suckers at PBP nursery

The transporting of the breadfruit suckers followed two routes. The first consignment was air freighted and the second consignment was sea freighted by the project truck. The first batch was quickly potted by the team at the Sabeto nursery while waiting for the second batch that arrived later. Potted breadfruit was then placed according to source and watered. The nursery however had to be modified with placing coconut leaves as a temporary insulation, to acclimatise the plants.

After 4 weeks of aftercare, the breadfruit suckers have indicated good survival rate with around 70% developing buds and nodes. It would take around 3 months until it is ready for hardening and another 2 months until they are ready for the field. This particular batch will be enough material for 10 acres of orchard development.

	
Nursery propagation specialist, Waisake Bole, leads the team in potting the plants	The second batch of material yet to be potted covered in wet sacks
	
Kaitu profiles the planting material at the PBP nursery	Coconut leaves act as an insulation for the plants

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## 4 Annex

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### 4.1 Program

#### **Vanua Levu Characterization and Planting Material Collection Excursion**

**Jan 29<sup>th</sup> – Feb 3<sup>rd</sup>**

##### **Objectives**

1. To characterize and document the diversity of breadfruit in the Cakaudrove coastal region and conduct analysis on fruiting patterns.
2. To establish small scale breadfruit nurseries to regularly supply breadfruit planting material to Viti Levu for orchard establishment.
3. To collect planting material for orchard establishment and provide training on marcotting.
4. To initiate a technical exchange on pineapple production for intercropping in breadfruit orchards

##### **Programme**

Date	Time	Activity
Monday 28 <sup>th</sup> Jan	6:00pm	Leave Suva for Savusavu on Goundar Shipping
Tuesday 29 <sup>th</sup> Jan	6:00am	Arrive in Savusavu. Meet with MPI at Wharf. Arrive at guesthouse.
	8:00am	Begin nursery prep work and establish nursery at Naqere.
	10:00am	Pick Fr Petero at Natuvu @ 10:00 am
	11:00 am	Begin breadfruit collection with Tutu young farmers at established locations
		Characterization work begins at these locations  LUNCH

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	12:00pm	Depart for Naqere guesthouse
	4:30pm	
Wednesday 30 <sup>th</sup> Jan	8:00am	Travel to Natewa and Tunuloa coastal areas to establish breadfruit nurseries with Ex Tutu young farmers . Target to establish 2 nurseries.
		Characterization team continue with their work
	12:00pm	LUNCH
	1:00pm	Breadfruit sucker collection and establishment at village nurseries
	4:30pm	Leave for Guesthouse
Thursday 31 <sup>st</sup> Jan	8 am – 12 pm	Full team continue work on characterization and breadfruit collection.
	1 pm – 5pm	Travel to Seaqaqa research station to see breadfruit germplasm and TC orchard – meet with MPI research staff.  Accommodation (TBC)  Continue potting and nursery work at Naqere and sleep at Guesthouse
Friday 1 <sup>st</sup> Feb	8:00 am – 4:00 pm	Carry out characterization work at Seaqaqa  Work on pineapple multiplication project with Aad at Nasarowaqa.  Team 3 continue marcotting and suckers collection around Hibiscus Highway
	4:00pm	Drive back to Naqere Guesthouse

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Saturday 2 <sup>nd</sup> Feb	8:00 am – 4:00 pm	Continue root sucker collection and marcotting
Sunday 3 <sup>rd</sup> Feb	5:00pm	Team depart for Suva
Monday 4 <sup>th</sup> Feb	6:00am	Team arrive in Suva