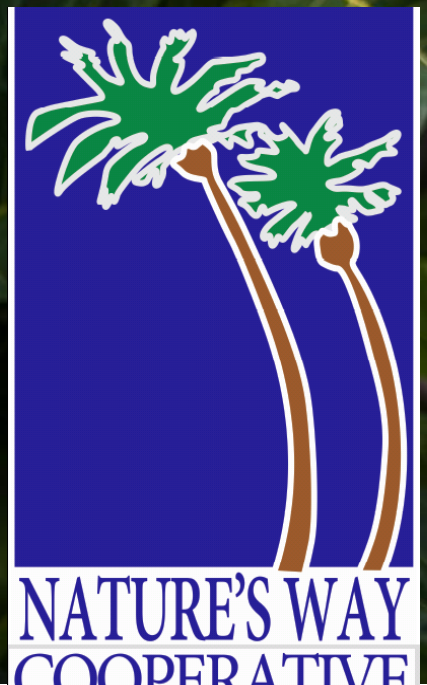
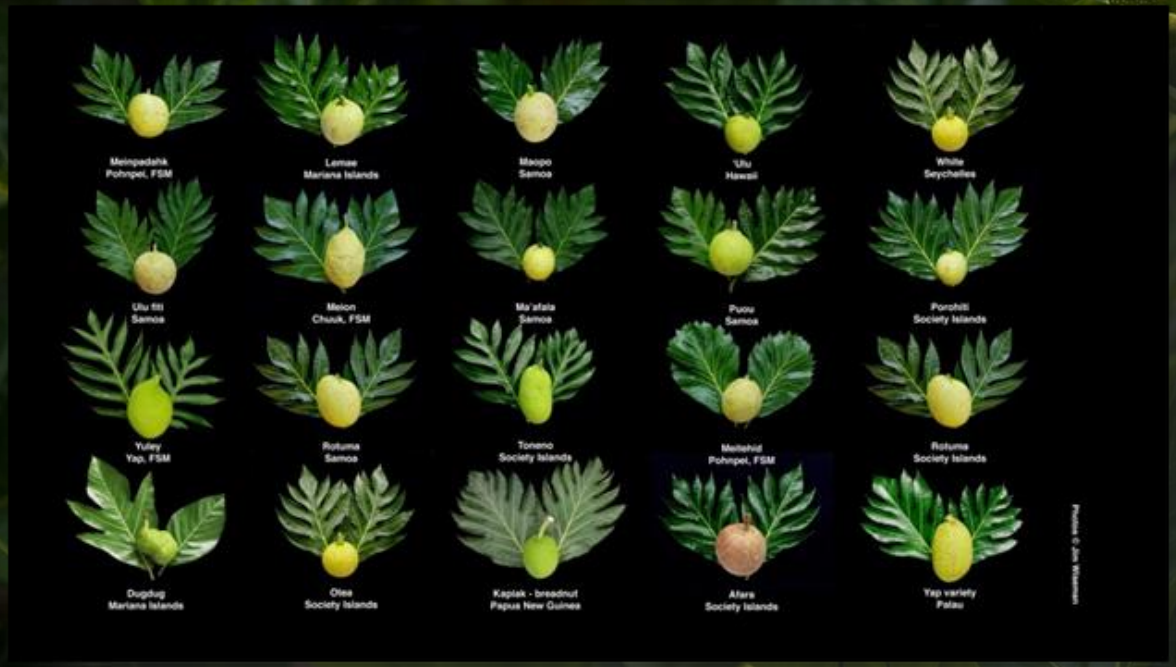
Introduction to Nature's Way Cooperative (NWC)



Experience in breadfruit characterization in Fiji



Historical work

In 1966 Dominiko Koroveibau named 70 breadfruit varieties in Fiji.

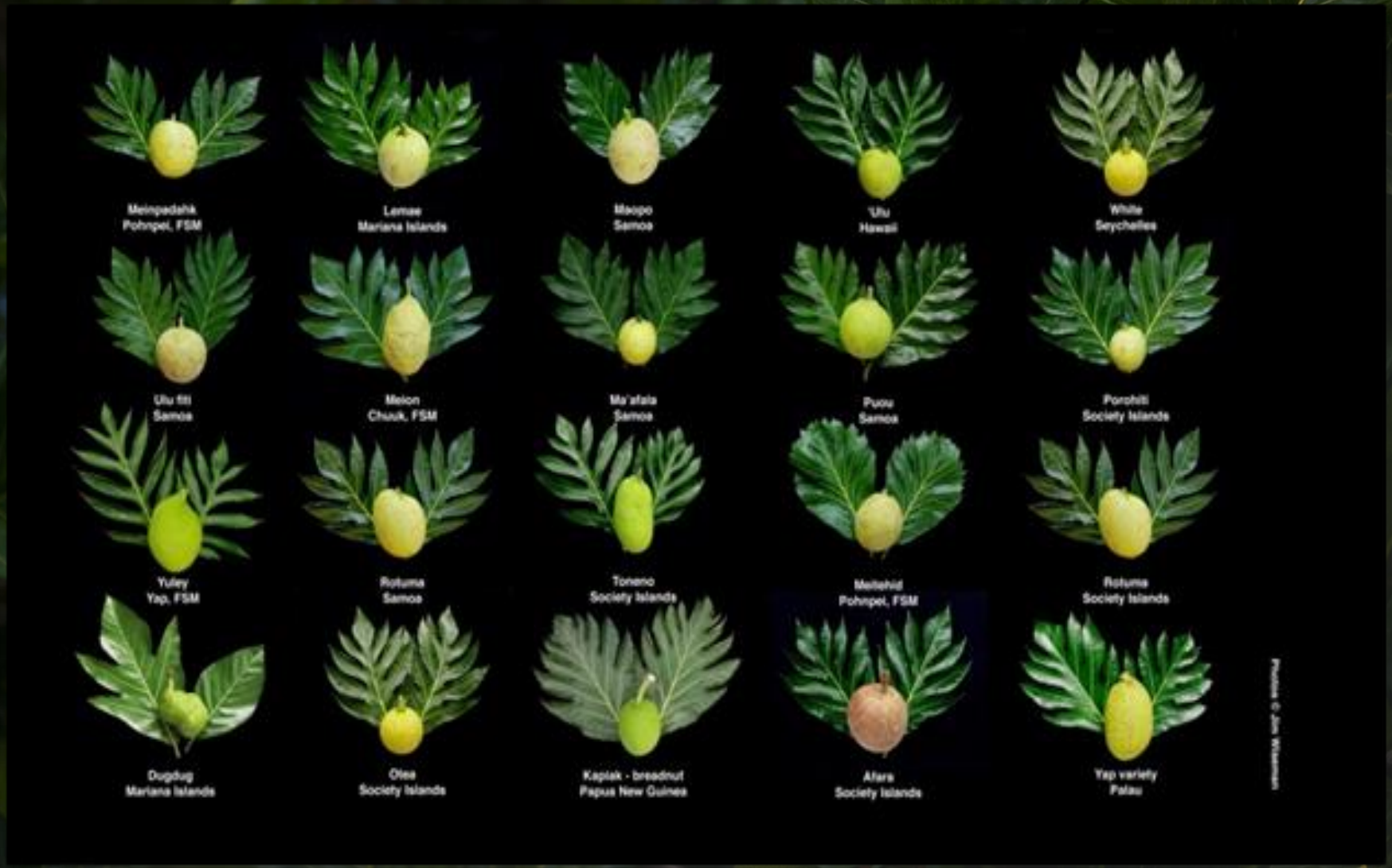
The characterization included documentation of the morphological characteristics of the fruits, leaves, length of the male flowers, fruiting time, and the food value of each variety.

Funded by the South Pacific Commission.

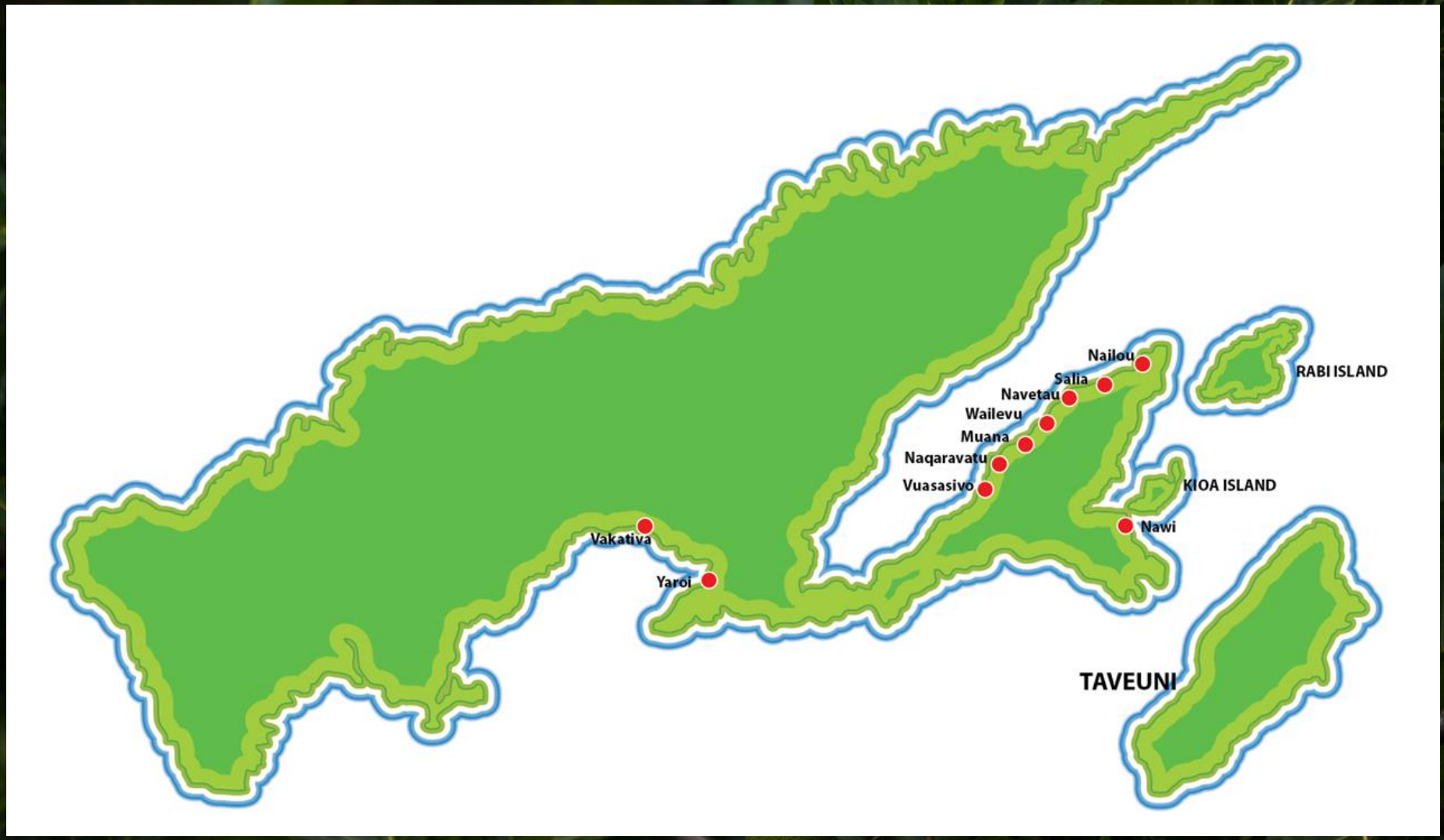
Summary

My goal was to develop a practical understanding of breadfruit varieties to assist resource owners, nursery operators and farmers maximize the diversity that exists in Fiji

Breadfruit varieties and Characterization



Fiji's Breadfruit Genetic 'Hot Spot'



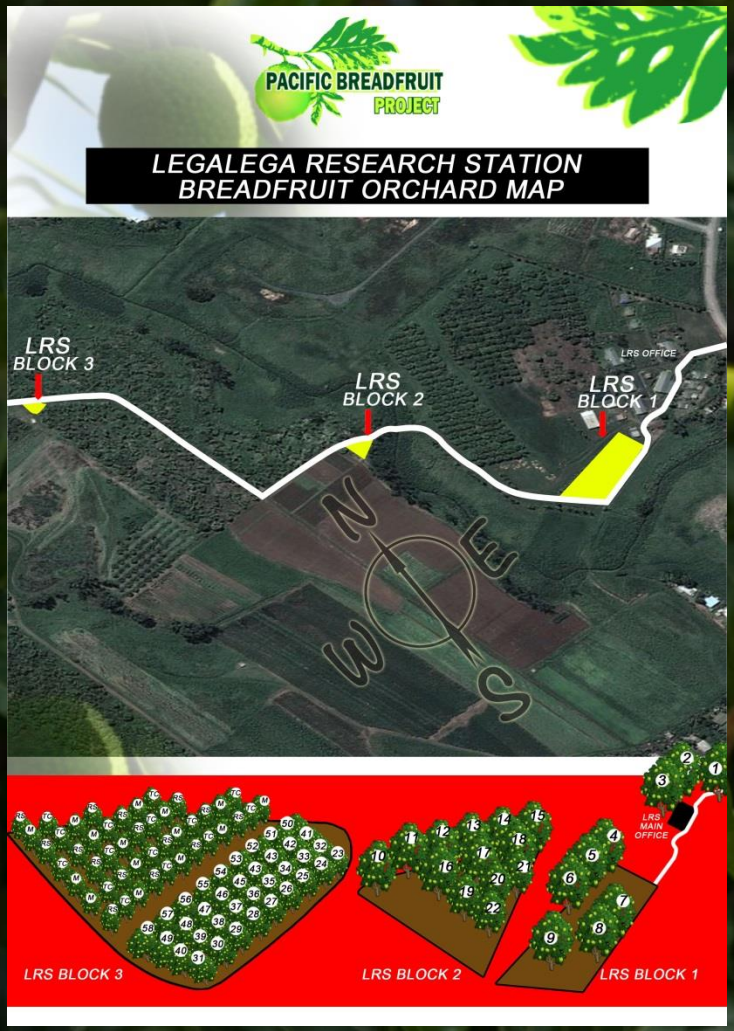
Capturing Traditional knowledge

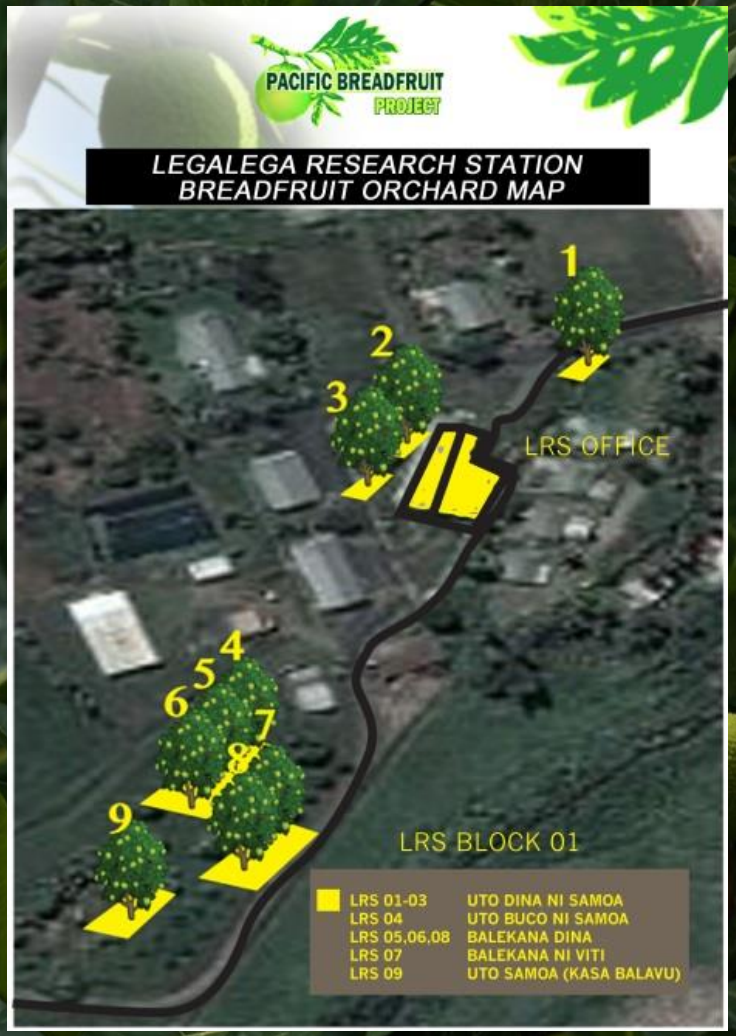
Research station characterisation

LRS: 10 varieties

- Uto Dina NI Samoa
- Uto Buco ni Samoa
- Balekana Dina
- Balekana ni Viti
- Uto Samoa(kasa balavu)
- Uto Dina
- Balekana ni Samoa
- Uto Buco
- Buco Balavu
- Uto Samoa

Legalega Research Station





Fruiting Pattern

Variety	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Balekana Dina												
Uto Kogo												
Virosola												
Uto buco												
Uto Bokasi												
Balekana ni samoa (small)												
Uto dina (yellow flesh)												
Uto dina (white flesh)												
Uto lasawa												
Uto Liva												

Methods of breadfruit propagation

Results from marcotting trials and update on propagation field trials

NATURE'S WAY COOPERATIVE

Overview of Breadfruit Propagation

- **Propagation Methods and Planting Materials of Breadfruit trees are generally propagated vegetatively**

  (MacCaughey 1917; Pope1926; Otanesand Ruiz 1956; Chandler 1958; Purseglove 1968; Handy et al. 1972; Rowe-Dutton 1976; Ragone1991a)

from root shoots or root cuttings, by air-layering branches (marcottage) or from seeds.

- Breadfruit can also be grafted using various techniques.
- Seeds are rarely grown because they do not develop true to type.
- Vegetative propagation is a must for seedless varieties, and root shoots or root cuttings are the preferred methods for both seeded and seedless varieties. They are traditionally propagated from root cuttings or Root shoots (suckers).

Breadfruit Propagation Methods

1. Seed
2. Root sucker
3. Root cuttings
4. Marcottage/Air Layering
5. Tissue culture

Seed

- Seeds - extracted from soft, ripe fruits.
- Plant immediately - seeds lose viability within a few weeks.
- Plant in loose, well-drained soil and keep moist.
- Seeds germinate within 10-14 days.
- Seedlings grow quickly and are ready to plant into the field in about one year.

Note:

Seeds cannot be stored - damaged by chilling or drying.

1 year old seedling

ROOT CUTTINGS

- For mass seedling production.
- Roots are readily available - 10–25 cm sections.
- Time taken – 9 to 12 months.
- Requires suitable potting mix.
- Appropriate in Rescue varieties

ROOT SUCKERS

- For producing limited number of plants (availability of suckers).
- Time taken to raise seedlings – 4 to 6 months

Root Sucker Potting - Transfer

Select healthy, juvenile RS

Sow in Rich Potting Mix

Re-growth shoots

RS planted in the Field

- Select juvenile root suckers
- Remove 75% of leaves
- Cover or keep the RS moist to prevent drying – decrease viability
- Nursery condition - Intense shading (70%) + coconut leaves to keep RS cool.

MARCOTTAGE (Air Layering)

- For limited and quick seedling production.
- Requires large plant population, re-growth common (upright shoots give better results than laterals).
- Labour intensive.
- Requires further nurturing – 2 months.
- Approximate cost of production $?

Steps - Marcotting

Marcottage

Research Paper presentation

IHC 2014 Brisbane

An evaluation of marcotting techniques on breadfruit (Artocarpus altilis) variety "*Balekana ni Samoa* for improved multiplication of planting material in Fiji

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1. *Pacific Breadfruit Project, Nadi, Fiji Islands,*
2. *Development Horticulturists, Etty Bay Exotics, Australia.*
3. *KokoSiga Pacific,Nadi, Fiji.*
4. *KokoSiga Pacific,Nadi, Fiji.*
5. *Ministry of Agriculture, Sigatoka, Fiji.*
6. *MSc Student, University of the South Pacific, Fiji.*

Commercially viable orchards require nurseries that supply trees that are high yielding and low bearing. Marcotting is examined as a propagation technique to meet these requirements and to compare it with the conventional method of propagation via root suckers. The emphasis is on determining best practice potting techniques for marcotts for the preferred commercial breadfruit variety *Balekana ni Samoa*.

Materials and Methods

Three trials were completed as part of this research. The experiments were laid out in a split block design. A breadfruit tree is treated as a block and receives the various treatments for each trial.

- **Trial 1 – Evaluation of various marcotting medias**
- **Trial 2 – Evaluation of branch size and location**
- **Trial 3 – Evaluation of shade and leaf removal on success rate of removed marcotts.**

Data collected includes: root development, physiology of marcotted branches and mortality rate.

Results

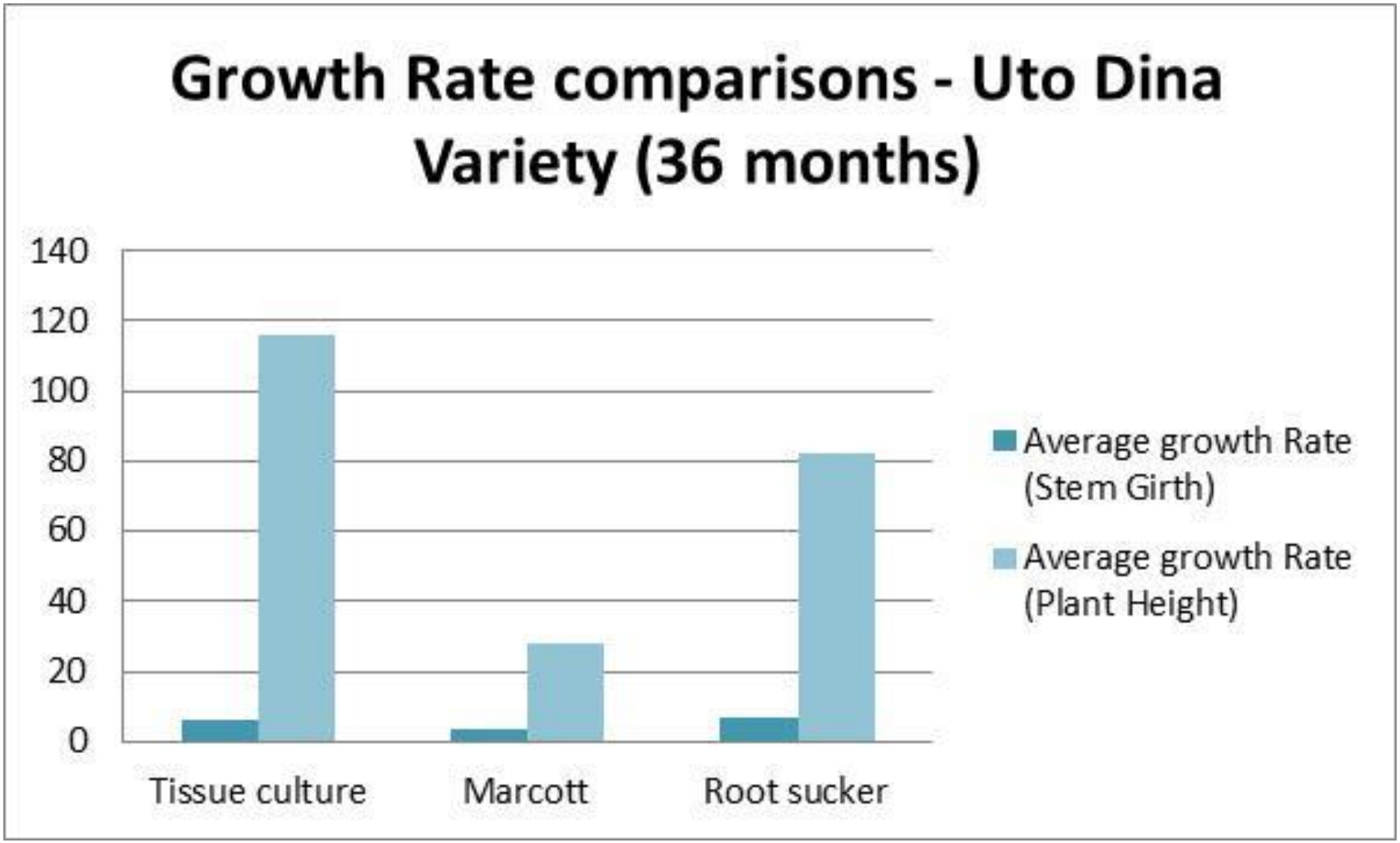
The recommended best package of practice of marcotting breadfruit (*Balekana ni Samoa* variety) under Fiji conditions are as follows:

- The results from Trial 1, indicated that the use of plain sphagnum peat moss had the best success in terms of first sign of root development, percent root ball and overall success rate.
- Trial 2 indicated that the highest success rate can be achieved from larger branch sizes located on the higher part of the tree.
- Trial 3 indicates that the best way to treat after care of marcotts is 75% leaf removal under 50% shade conditions.

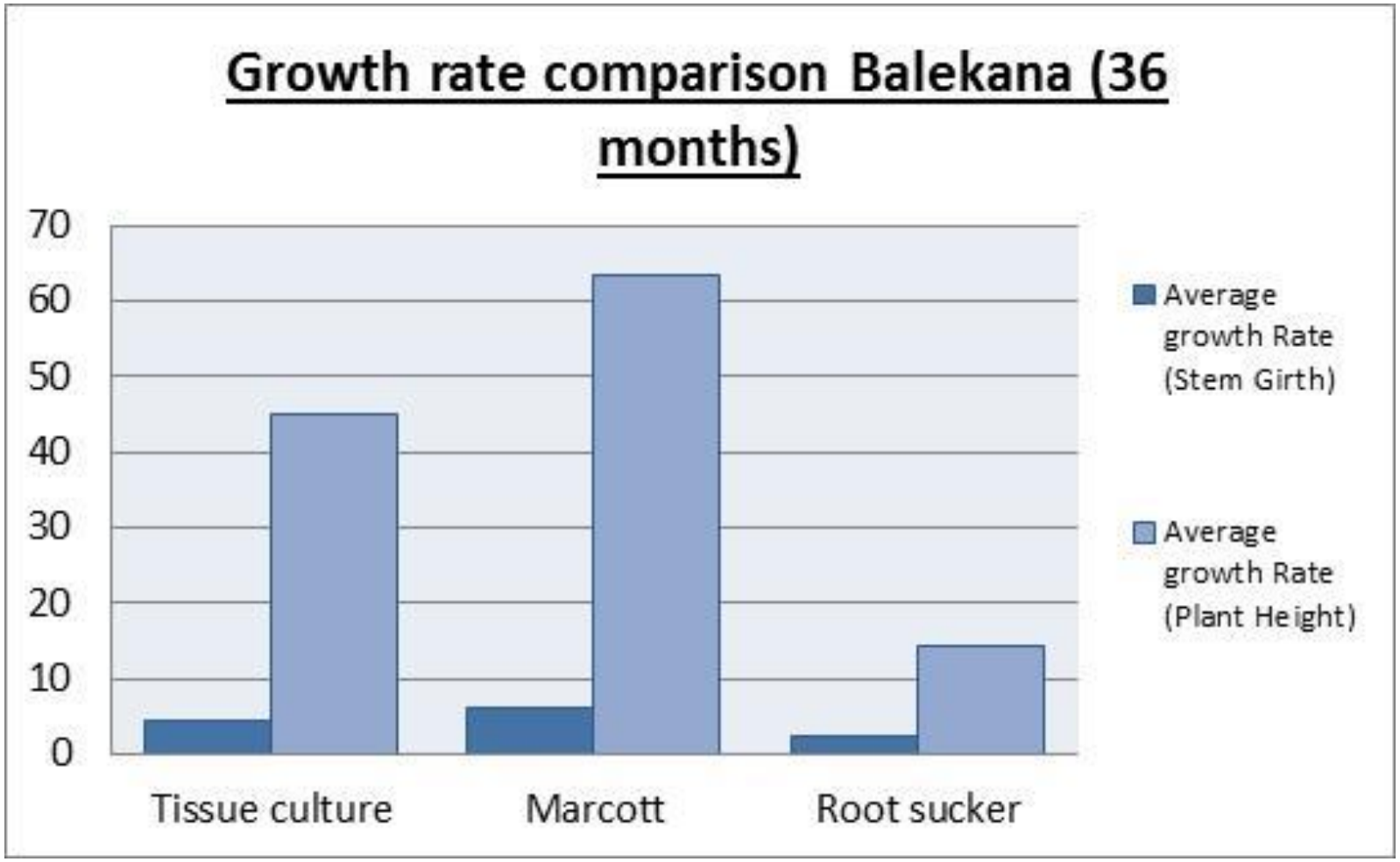
Field evaluation of various propagation types

- Comparison between the 3 propagation types – Root sucker, marcot and tissue culture
- How do they perform (vigour, yield, susceptibility to cyclones)
- Farmer field trial

Uto dina variety



Balekana Variety



Tree of Bread

"Regarding food if a man plant ten (breadfruit) trees in his life, which he can do in about an hour, he would completely fulfill his duty to his own as well as future generations"

Sir Joseph Banks 1769

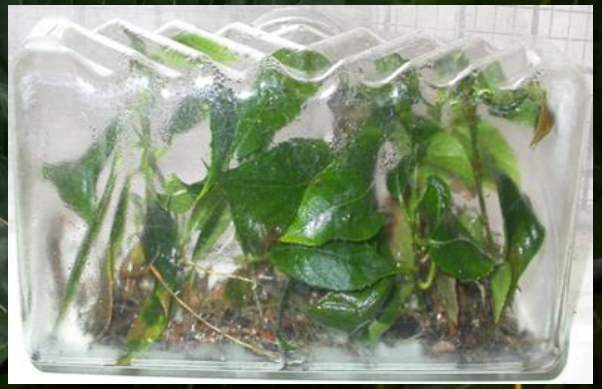
VINAKA VAKALEVU

Mass propagation of breadfruit Planting material to develop a commercial industry – experience with a village based approach in Fiji.

- In order to facilitate orchards farmers need to have access to large volumes of high quality planting material of the preferred varieties.
- This proved to be a major challenge for NWC and the PBP

Initial strategy

- Source root suckers and marcotts from Viti levu – wild trees
- Source tissue culture from CePACTFrom tissue culture laboratory



Results from initial strategy

Only one variety available(Uto Dina. Difficult to access trees because of land issues. Low success rate of marcott and roots suckers

Tissue Culture

- Limited amounts – no commercial TC lab in Fiji.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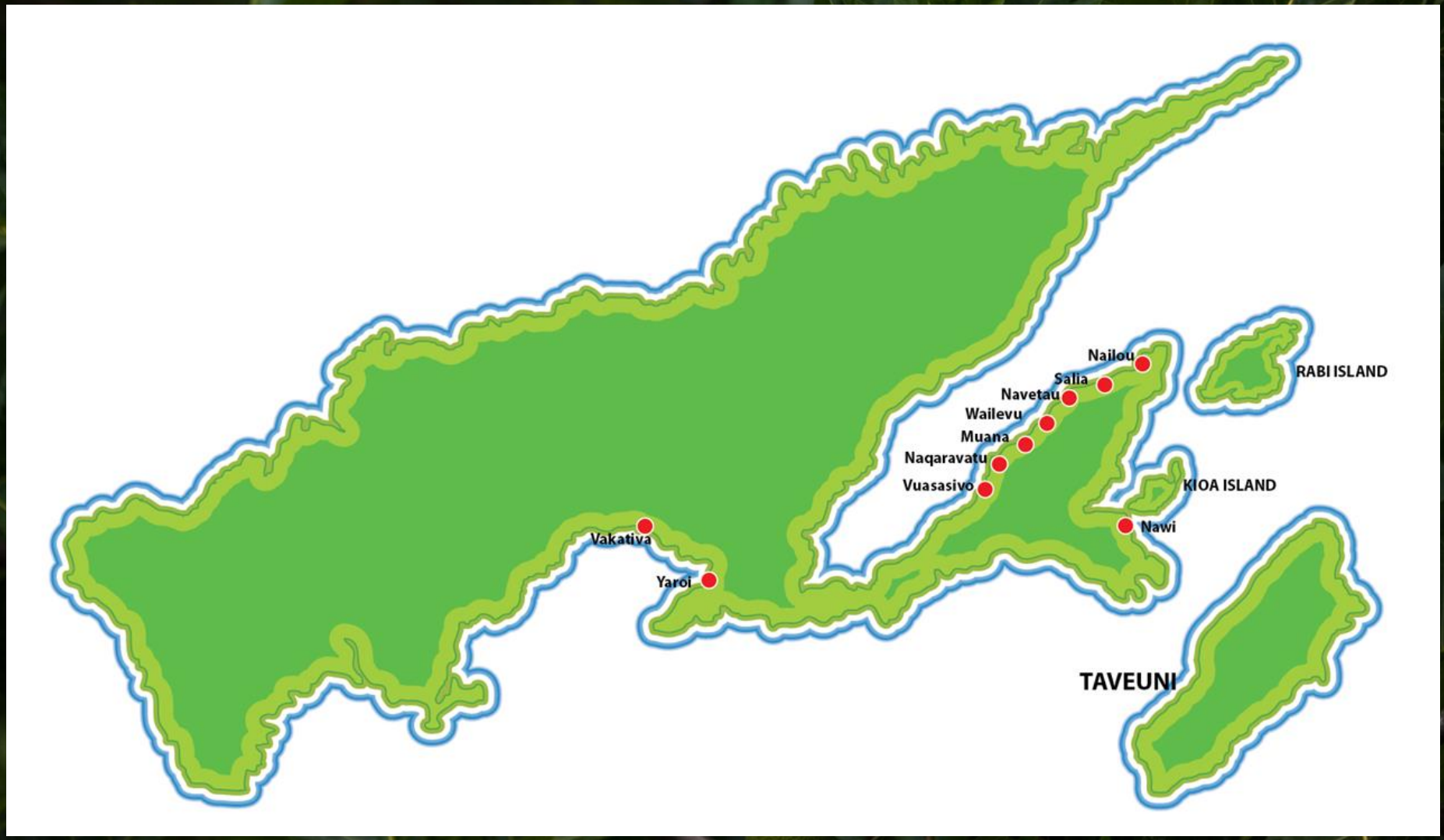
Our second strategy

- Go to the source of the preferred varieties – Vanua Levu
- This require establishing relationships and networks with the resource owners - made possible through the relationship with Tutu Rural Training Centre.

Map of Vanua Levu

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Key lessons from Fiji collection and mass propagation activity

- Relationships need to be established with resource owners based upon sound business principles
- Link with private nurseries is critical.
- To initiate the development of commercial breadfruit orchards it was essential to source a large volume of planting material from the outer islands.
- In the future it is expected that planting material will be sourced from the established breadfruit orchards and commercial tissue culture enterprises.

Vinaka Vakalevu.