August 2013

Issue 8

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Number of commercial breadfruit farmers on the rise

The number of commercial breadfruit farmers in Fiji has risen to 17 as a result of access to high quality trees from the Pacific Breadfruit Project (PBP). The 17 farmers are considered commercial because they have planted at least 50 trees (1 acre) of a preferred export variety and are following a package of management practices to prepare for fresh exports. Prior to the beginning of the PBP there were no commercial breadfruit farmers in Fiji. In total 1,100 breadfruit trees have been planted which equates to around 22 acres. The established breadfruit orchards include both conventional square or grid planting patterns and also plantings along the farm perimeters. Several of the square of grid orchards are utilizing the area between rows to intercrop, primarily with cassava and other staple food crops.

The development of breadfruit orchards has taken place primarily in the Western Division of Viti Levu (between Sigatoka and Rakiraki), due to the proximity to the quarantine treatment facility at NWC and the Nadi International airport. The breadfruit orchards have been established on a range of different soil types from the rich river bank 'bila' soils to the degraded and low fertility upland soils. Interest from potential farmers has been overwhelming and expansion has only been limited by the availability of breadfruit trees. It is expected that another 500 trees (10 acres) will be planted by the end of 2013.

Orchard establishment at the Saunaka Methodist Circuit farm in Votualevu, Nadi

A commercial farmer plants breadfruit in Sabeto, Nadi.

Farmer, Jagdish Chand of Johnson Rd, Lautoka with his newly planted breadfruit orchard.

Breadfruit planting material supplier network expands

The development of commercial breadfruit orchards on Fiji's main island of Viti Levu is made possible through the purchase of planting material (root suckers) from a network of farmers and villages around the islands of Taveuni and Vanua Levu. Through an extensive awareness campaign over 18 months and tremendous support from the Cakaudrove Provincial Office and Tutu Rural Training Centre, the breadfruit planting material supplier network has expanded to nearly 240 people.

In the most recent collecting breadfruit collecting mission to the island of Vanua Levu (July 2013) a total of 15,000 root suckers were purchased from 7 villages in the District of Natewa in the Province of Cakaudrove. Prior to the start of the collecting mission, the District representatives informed all of the Turaga ni Koro's (Village Headmen) of the collecting date, quality requirements and purchasing arrangements. The PBP along with district representatives then travelled to the 7 villages to grade and purchase the root suckers. The root suckers were then transported by truck to the jetty where they travelled by boat to Viti Levu. The PBP would like to thank the Roko Tui Cakaudrove and his team for their support of this initiative which has enabled a strong business partnership between the PBP and the breadfruit planting material supplier network.

PBP Activity Leader, Livai Tora carries out awareness training with potential planting material suppliers in Natewa.

Breadfruit suckers are graded and purchased from villagers who are paid cash on the spot.

Breadfruit suckers transported by truck and boat back to the PBP nursery in Sabeto.

Potting and planting breadfruit suckers in the PBP nursery.

MPI Research stations evaluate tissue culture breadfruit

In July 2013, a new trial has been established at the Legalega Research Station in Nadi to evaluate breadfruit trees derived from different propagation methods. The trial involves a total of 45 breadfruit trees of the Bale kana variety, up to 15 marcotted trees, 15 root sucker trees and 15 tissue culture trees. Preliminary data collection will focus on comparing the vigor of the trees by measuring stem girth and tree height. Other data to be collected will include; height and occurrence of lateral branches, time to first fruiting, overall yield and performance of trees under strong winds.

The MPI research station in Seaqaqa on the island of Vanua Levu was the first to receive tissue cultured (TC) breadfruit trees for field evaluation. The TC breadfruit trees were produced by SPC's CePaCT division as an output from a series of trials they are conducting under the PBP.

MPI officer, Salend Reddy and Breadfruit Technical Officer, Kaitu Erasito plant a tissue culture breadfruit tree at Legalega Research station as part of a newly established evaluation trial.

Breadfruit pruning and training exercise underway

The first breadfruit orchards established under the PBP are ready for pruning and training and the PBP is working with local expertise to ensure trees reach the desired shape and size. Under the direction of PBP Technical Advisory Board Member, Sant Kumar, the PBP and collaborating farmers have begun removing the growing tip of trees that have reached a desired height in order to encourage more lateral branching. The team is also tying and staking selected lateral branches to encourage them to continue to grow laterally instead of growing vertically.

The overall objective of the pruning and training exercise is to bring trees to a desired shape and size that will allow for easy harvesting with minimal physical damage to fruit. The PBP team will make bi-monthly pruning and training visits to work with collaborating farms through the life of the project. Pruning and training is a part of the recommended package of practices for breadfruit farmers growing for export.

Sant Kumar works with the PBP team on the training and pruning of breadfruit trees at commercial orchards.

Breadfruit orchards as a climate change adaptation strategy

The expected future real price increases for imported grain threatens food security in the Pacific islands

The Handbook of Climate Change and Agro-ecosystems (2013) (jointly published by American Society of Agronomy, Crop Science Society of America, and the Soil Science Society of America) predicts that there will be 10-40% decline in rice production by 2100, unless agriculture adapts. Around 90% of rice produced globally is consumed in the country in which it is grown (FAOSTAT online database). This would put severe upward pressure on the price of imported rice. Grain crops require high amounts of purchased inputs. A major constraint to maintaining global grain production is the increasing cost of fertiliser and fuel for mechanisation. Thus the real price of rice imports can be expected to trend upwards. This will severely threaten food security in the Pacific islands which have become increasingly dependent on imported grain.

Planting breadfruit orchards as a food security strategy in the face of climate change

Rice and other grain crops depend on high inputs derived from fossil fuels. This is because they remove substantial quantities of nutrients from the soil, which needs to be replaced if yields are to be maintained. A recent study for rice found that the total nutrients removed through harvested products are over 200 kgs *nitrogen (N) per ha per year (Sukristiyonubowo et.al. (2012). Nitrogen, phosphorous, and potassium removal by rice harvested products in newly opened wetland rice, International Journal of Plant Science Vol. 3(4) 3-68.* In contrast, a study just studied in Vanuatu found that Pacific island staple food crops extract very little from the soil *(Lebot, V. et.al. (2013). Use of NIRS for the rapid prediction of total N, minerals, sugars and starch in tropical root and tuber crops. New Zealand Journal of Crop & Horticultural Science.* The ability of breadfruit to secure food energy from the atmosphere, thanks to its large leaves and canopy, and at the same time be relatively undemanding of the soil is a major advantage in a world where purchased inputs to maintain soil fertility will become increasingly expensive.

Fresh breadfruit can be converted to high quality gluten free flour and paste products. However, breadfruit is not yet cultivated as an orchard crop; it is either grown wild in the forest, in household backyard gardens or around villages. Such cropping systems cannot make a major contribution to national food security as they do not offer sufficient supply of produce of consistently good and known quality. This is an essential requirement to support commercial processing as well as fresh exports. For this reason, the PBP has one of its key objectives as the establishment of breadfruit as a commercial small holder based orchard crop. The planting target for the completion of stage 1 of the PBP (end of 2015) is 20,000 planted trees. At the full production, it is estimated that these trees could conservatively supply the food energy equivalent of 11,000 tonnes of boiled rice.

In planting breadfruit orchards, it is also recognised that the breadfruit tree, with its large leaves and big canopy, has the ability to absorb carbon from the atmosphere. Thus the establishment of breadfruit orchards also has an important climate change mitigation role to play.

Proposed stage 2 of the PBP to focus on commercial processing

With a sufficient breadfruit supply base now being assured, a stage 2 of the PBP is being developed that will focus on the commercial processing of breadfruit. Collaborating private sector partners in several Pacific Islands are being identified to work on this initiative. The plan is to also replicate the Fiji orchard experience in other Pacific island countries.

The Breadfruit Institute (Hawaii) expands breadfruit plantings worldwide using tissue culture

Reports from The Breadfruit Institute`s Spring 2013 newsletter highlight the spread of breadfruit planting material around the world through tissue culture. The Breadfruit Institute is a part of the National Tropical Botanical Gardens (NTBG) and has been at the forefront of breadfruit research and development for the past twenty years under the leadership of Dr. Diane Ragone. Through the development of tissue protocols and partnership with commercial tissue labs under 'Global Breadfruit', high quality planting material is now available in large volumes to be shipped around the world.

The Breadfruit Institute newsletter reports that Tahiti has just received their order of 2,500 Ma'afala trees to the Ministry of Agriculture. In March 2013, Josh Schneider of Global Breadfruit delivered the trees during a trip to three islands where he met with the President, the Minister of Agriculture, and other staff, and joined more than 2,000 people at an 'Uru (Breadfruit) Festival in Papeete to celebrate their traditional staple. Tahiti is renowned as the source of breadfruit cultivars now growing in the Caribbean and other tropical countries as a result of Captain Bligh's voyages in the early 1790s. The Breadfruit Institute and Global Breadfruit have returned the favor, and, at the request of the government of French Polynesia, introduced a new breadfruit to Tahiti!

The Breadfruit Institute newsletter also reports on a project with the Ceres Trust, which involves the distribution of more than 4,000 Ma'afala trees in Hawai'i. The project is partnering with myriad community organizations, schools, churches, and other groups to provide residents with breadfruit trees to plant in their yards and communities. Nearly 1,300 trees have been distributed on Kaua'i and O'ahu, and 3,000 trees are being tended in nurseries on four islands for distribution. Hawai'i's Department of Land and Natural Resources Kaulunani Community & Urban Forestry Grant Program has provided additional funds for outreach materials.

The Samoan Government has recently benefited from their breadfruit agreement with the NTBG**.** In December 2013, Dr. Ragone presented a cheque to the Honorable Fonotoe Nuafesili Pierre Lauofo, Deputy Prime Minister of Samoa and Acting Minister of Agriculture, in the capital of Samoa. This payment represents revenues from the first full year of Ma'afala tree sales. The full Breadfruit Institute Spring Newsletter can be accessed on the NTBG website: http://ntbg.org/breadfruit/resources/display/cat/4/#18

Feature Recipe: Breadfruit Chips with Avocado Pineapple Salsa

This recipe combines savory breadfruit chips with a sweet and spicy salsa as a perfect appetizer.

Breadfruit chips

1 Breadfruit, baked and grated
Pinch of salt
Pinch of sugar
Cooking oil

1. Combine breadfruit, salt and sugar.
2. Form into thin patties;
3. Deep fry in oil until crisp.
4. Drain on paper towels.

Avocado Pineapple Salsa

¼ sweet pineapple, chopped
1 avocado, mashed
1 firm red tomato, chopped
1 onion, diced
1 young coconut, grated
Lemon juice, to taste
¼ cup coriander, chopped
1 tbsp vegetable oil
1 Red bongo chili, chopped
Pinch salt
Pinch white pepper
1 cup canned tomato juice

1. Combine all ingredients together

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Growing the Pacific. Growing our future together.
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MPI