

Biodiversity and the incredible resource of local foods

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There is a dynamic relationship between biodiversity and local food systems, which are rich and varied across the Melanesian countries.

Food serves many purposes. While it fills bellies and contributes to health, it also is used in ceremonial exchanges, provides income to its producers and impacts on the national economy. Some food is specific to the place it is grown; but with increasing globalization of food supplies, foods around the Pacific are reflecting less of the local specialty foods.

While biodiversity is important for supplying a wide variety of local foods, this is often not adequately appreciated. It is not taken into account in calculations of economic indicators such as Gross Domestic Product, for example. Yet biodiversity protects food security and provides a basis for living and eating that is in harmony with the environment. Food production, processing and distribution can have a significant environmental impact, depending on how the food is

produced, processed, stored and how far it is transported. Biodiverse local environments provide both employment and food. It is imperative to value the wealth of the diverse foods that comprise Pacific food systems.

Diversity in Melanesian food systems is gradually declining as lifestyles change and people depend less on subsistence farming to provide their food. Many imported foods can be stored more easily and are quicker to prepare and eat, which makes them popular. As imported foods such as rice and wheat flour products are used more in Melanesian diets, some traditional foods are being neglected - their delicious flavours and health values unappreciated. As diets and lifestyles have changed, there has been a related increase in overweight and diseases such as diabetes and problems due to low intake of micronutrients, such as Vitamin

A deficiency, because many of the imported foods do not provide the high nutritional value that local foods do.

Furthermore imported foods can place a significant burden on family budgets as well as the economy of small islands countries. As people have become more dependent on imports, there has been less production and marketing of traditional foods, making people in Melanesian countries more vulnerable to food insecurity. The global food crisis arising from a combination of poor harvests, competition with biofuels, higher energy prices, surging demand for grains and meat, and a blockage in global trade has driven food prices up worldwide. In Melanesian countries, price rises in imported foods such as rice has made it harder for people to buy enough good food.

Research in the Federated States of



Ripe and unripe banana bunches displayed in feast house Arohane Village, Makira, Solomon Islands (top left).

Dorothy Tamasia, Curator of the Bauro highland banana collection, Makira, Solomon Islands (Photo's by Jeff Daniells)



These highly nutritious Fe'i bananas are semi-erect bunches, red-purple or purple

found almost exclusively in the Pacific and are characterized by unusual erect and sap and a deep yellow, yellow-orange or orange flesh.

Micronesia (FSM) by Dr Lois Englberger and colleagues has shown that many Pacific plant foods have outstanding health-giving properties compared with the imported rice, noodles, biscuits, bread, sugar and commonly available processed and packaged foods, which provide lots of energy but less of the health protecting nutrients that are found in abundance in the colourful Pacific plant foods. Since the imported foods have been widely consumed in FSM, diseases including diabetes, stroke, heart disease, some cancers and blindness have increased. The FSM *Go Local* campaign promotes the 'CHEEF' benefits of eating local foods, which include Culture, Health, the Environment, the Economy and Food security. Many FSM banana, taro, breadfruit and pandanus varieties have been analysed in laboratories and found to be very high in nutrients and therefore very rich in health-giving properties. The more colourful yellow and orange-fleshed varieties were found to contain greater amounts of provitamin A carotenoids, the most important of which is beta-carotene. This substance is changed in the body to vitamin A and helps protect against infections, eye

disease and night blindness, and weak blood (anaemia). Carotenoid-rich foods also help protect against certain cancers, diabetes and heart disease. The work in the FSM showed that the Pohnpei Karat banana, a Fe'i banana of the Australimusa series (*Musa troglodytarum*) contains exceptionally rich concentrations of riboflavin (Vitamin B₂) in addition to beta-carotene and total carotenoids.

These highly nutritious Fe'i bananas are found almost exclusively in the Pacific and are characterized by unusual erect and semi-erect bunches, red-purple or purple sap and a deep yellow, yellow-orange or orange flesh. The ripe orange-coloured flesh of these bananas provides up to 100 times as much beta-carotene as the common white-fleshed Cavendish banana. Melanesia has a great diversity of Fe'i bananas, but there has been very little documentation or assessment of these varieties. Sweet potato is another important staple food in Melanesian countries and a great diversity of sweet potatoes has developed there. Orange-fleshed sweet potatoes also provide high levels of beta-carotene and contribute to protecting good health. This article

describes findings from a project designed to identify and raise awareness of the high nutritional value of orange- and yellow-fleshed sweet potatoes and bananas in Solomon Islands and Papua New Guinea.

Food diversity – the wealth of foods provided by divine beings – has in past generations been explained by legend. On Bellona in Solomon Islands, for example, legend has it that the *Ghabaghaghi* banana (a Fe'i variety) was thrown down to the island from the invisible heaven by a culture hero, Mautikitiki, but because the plant was reluctant to go down to earth, the fruit bunch always stands upright, pointing towards its place of origin. In the 1960s, a Danish researcher on Bellona, an uplifted atoll of only about 20 km², reported 6 Fe'i banana varieties (*Ghabaghaghi*, *Kangisi'ibai*, *Paunao*, *Takape*, *Tapipiingi*, *Tongaka*) were being used, in addition to about 10 other banana varieties. Just two generations later, the Fe'i bananas have almost disappeared from this island, due to repeated cyclone destruction compounded by replacement of the lost varieties by imported foods such as rice and by neglect of these varieties. The Fe'i banana varieties have become rare and

younger generations are now unfamiliar with them.

In Melanesia, cultural groups differ in their use of Fe'i bananas. On Malaita in Solomon Islands, Fe'i bananas, which are often referred to as 'wild' bananas (eg *Ba'u kwasi* in Kwar'ae language), are not usually cultivated in domestic gardens and little used. In the Marovo Lagoon in Western Solomons, the old people reportedly used to describe Fe'i type bananas as 'medicine food', but nowadays people there do not use them as much as before. Some people report being afraid of eating Fe'i bananas because after consumption, the urine becomes an unusually bright yellow colour. Jokes abound about this effect and modern myth suggests that this is a sign of disease – maybe yellow fever. However, the urine effect is harmless, and is due to the rich riboflavin (vitamin B₂) content in Fe'i bananas. The body excretes the excess riboflavin in the urine when it has absorbed enough.

On Makira in Solomon Islands, bananas, including many Fe'i varieties are an important staple food and the island is known for its banana diversity. Makira was therefore chosen for the first field site to investigate bananas in Solomon Islands. We aimed to identify orange- and yellow-fleshed bananas and sweet potatoes rich in beta-carotene, as well as other essential nutrients, and to raise awareness of the value of growing and consuming these foods. A main focus was on collecting samples of bananas and mature sweet potato and sending these to laboratories for analysis (Institute of Applied Sciences/University of the South Pacific (USP) in Suva, Fiji, and University of Adelaide in Australia) assessing for carotenoids, riboflavin and essential minerals, as well as collecting germplasm material for conserving in tissue culture. A regional germplasm genetic resource bank is maintained by SPC Centre for Pacific Crops and Trees in Suva, Fiji so that it can provide

healthy planting material to replace species that are lost due to pests, diseases or natural disasters, such as destructive cyclones which often devastate gardens in small Pacific communities. Banana samples collected on Makira were collected specifically to be conserved for the communities that supplied them and permission from the Premier of the province and local farmers was obtained before collecting samples. Formal permission for the export of the plant material for conservation and testing was obtained. This included phytosanitary certificates from the SI Ministry of Agriculture and Livestock to accompany the samples and import permits from Fiji.

A participatory, inter-agency multiple methodology approach (including ethnography, key informant interviews, informal focus group discussions, photography, market survey, and literature review) was used to study the varieties of banana and sweet potato and their uses. In 2007 two areas in Makira Island were visited, Kirakira on the northern coast and a more remote area on the weather coast, reached by flying to Santa Ana, and then going by canoe to Manivovo, Mami, and Mwakorukoru villages. Local partners provided great support in arranging for data collection and the awareness workshops. Around 700 participants took part in the seven workshops. Over 460 photographs were collected for a visual record. In 2008 further awareness workshops were held on Malaita in Solomon Islands, at Malu'u, Basakana Island, Gou'ulu, Royal Harbour and Kolofe and attended by around 320 people in total. Further workshops were also conducted in Papua New Guinea.

A visit to West Taraka (now known as "Newest") on the outskirts of Lae was a highlight of our Morobe stay. The *Family Poverty Rehabilitation Association Mama, Newest* provides an inspiring example of what a women's group can achieve in making positive steps in alleviating extreme



Fe'i banana, cv Bonubonu (top), showing bunch growing upwards (Photo by Jeff Daniells). Orange sweet potato collection growing (above) at Kastom Gaden Association, Honiara (photo by Lois Englberger).

Dramatisation of the nutritional benefits of orange fleshed sweet potato (far left), West Taraka, PNG (Photo by Graham Lyons). Local champion Francis Wehi (left) protects food futures by teaching children about the value of local foods using the Pohnpei banana posters, Mami village, Makira (Photo by Wendy Foley).





adversity and improving the lives of those in their community. The group has a local food growing and plant distribution program which includes orange-fleshed sweet potatoes. After the visit, members of the Newest community conducted a local food/nutrition workshop of their own at the local primary school.

During our time on Makira, a customary *Houra* feast was being prepared in Arohane village, close to the capital of Kirakira. This feast demonstrated the cultural significance of traditional foods, including bananas. For days leading up to the feast, a feast house was gradually filled with a cornucopia of bananas, including Fe'i varieties, known on Makira as *Toraka*, together with other culturally valued foods including yams, fermented taro pudding in enormous wooden bowls and pigs, tethered outside, awaiting the feast day.

Although Fe'i bananas clearly are still important in ceremonies on Makira, their limited use as an everyday food reflects dietary changes happening all around the Pacific: the use of old traditional staples like *Toraka* is declining in most areas. Despite its high cultural value in feasts, the *Toraka* fruit is now infrequently used for family consumption and is rarely sold in markets. One woman, who had learned about the health benefits of *Toraka* at the awareness workshop before the *Houra* feast, encouraged people during the feast food distribution not to waste *Toraka*, but to eat them because they are so healthy to eat. We found that people often feel empowered by the message of how rich their local foods are.

As we travelled around Makira, we saw

about 65 banana varieties, and recorded common names, cultivation details, culinary uses and cultural value. We also heard of about 20 other varieties, although time did not allow fuller investigation of these. About 9 or 10 of the banana varieties we saw were different Fe'i cultivars, which ranks Makira as one of the most important locations for diversity and abundance of Fe'i banana anywhere. Banana diversity in Melanesia far surpasses that in its nearest big neighbour, Australia, where 99% of commercial bananas come from just two varieties which are not as rich nutritionally as many Melanesian varieties.

Great diversity of sweet potato varieties was also observed. Some people reported having more than 20 varieties of sweet potato growing in their gardens – to maximise production and resistance to pests and diseases as well as providing a variety of tastes, textures and ripening times.

Very important conservation work is being carried out by local champions who actively maintain community based conservation sites – collections planted to preserve the biodiversity of food crops. The two community based banana conservation sites visited on Makira, in the Bauro Highlands and on the weathercoast at Manivovo, contained at least 52 banana varieties. The Manivovo banana collection, however, is currently untended and some varieties originally established there are no longer growing. Some of this collection is being reestablished at Nana and Wairogurogu. Although there are significant challenges in maintaining these remote living collections, they are particularly important at this time when

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food habits are changing rapidly. They are repositories of food diversity, which may otherwise be lost to future generations, and can enhance utilization of these plant foods which can contribute to good health of people in Melanesian communities.

Sweet potato collections are also being maintained in diverse locations: in the Solomons at Kastom Gaden Association (Honiara), International Potato Centre (CIP)'s Binu Farmer Field Trial site (35km E of Honiara), Star Harbour and Bauro (Makira), Busurata and Takwa (Malaita) and in Papua New Guinea at the National Agricultural Research Institute (NARI) in Bubia (Morobe Province) and Aiyura (Eastern Highlands Province). Around 15 local orange-fleshed sweet potatoes varieties which combine the traits of high beta-carotene, high yield, pest resistance, acceptable flavour and texture have been identified in Solomon Islands. Several of these are being bulked and distributed in Makira, Malaita, Guadalcanal and Santa Cruz (Temotu Province).

Despite difficulties due to transport and quarantine regulations with both the samples for nutrient analysis and the plant materials for tissue culture, we successfully collected 16 banana samples, including some *Toraka* varieties, for nutrient analysis at USP and also 18 samples to be maintained in a tissue culture collection held by SPC's Centre for Pacific Crops and Trees in Suva, Fiji, although several of these died during delays. In addition to bananas, 23 orange-fleshed sweet potato samples were collected for nutrient analysis. Many of these proved to be very nutritious, especially when compared with rice.

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This project brought together intersectoral collaboration in agriculture and nutrition, government and non-government, to work with local communities to raise awareness about the value of local food varieties in comparison with many of the popular imported foods. This work is important as it has the potential to help communities become aware of the cultural, health, environmental, economic and food security benefits of local food resources. The awareness campaign, has so far involved 21 workshops in communities in Solomon Islands and 7 in PNG. The *Go Local* message has been taken up enthusiastically by people in all walks of life in both countries and also highlighted in articles in national newspapers. However, the lack of knowledge of the health-promoting properties of the rich local foods remains widespread.

Diversity Fairs held in local areas also provide an opportunity for promoting awareness of the wealth of local food crop varieties to both local people and visitors. These events enable the dissemination of important agricultural information, such as improved banana and sweet potato planting methods and how to minimize pest damage to crops. They also serve to enhance villagers' pride in their local foods and highlight their advantages over imported processed foods. Events like this are great celebrations of community and food biodiversity.

Conclusion

While there is a wonderful diversity of plant foods in the Pacific, younger generations are frequently exposed to limited food varieties

in boarding schools and in towns and often prefer to consume food from a narrow selection of imports that are high in cost but nutritionally inferior. A result of this is the neglect of very rich, diverse and delicious local foods. As Melanesian countries adopt yet more imported foods, it is of vital importance to evaluate and publicise the foods that grow in local environments before it is too late. This investment in Melanesia's food future will help to protect food security, ensure local food biodiversity, celebrate the superior food value of many Pacific plant foods and make them widely available for people to grow, buy and eat, so they can enjoy healthy lives into the future with all the benefits of traditional and locally grown foods.

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Variety of Fe'i banana (*Toraka*) fingers (top), Makira, Solomon Islands (photo by Lois Englberger). *Suria*, one variety of Fe'i banana, showing both the unpeeled and peeled fruit (above centre) to show the rich orange flesh coloration. Orange-fleshed sweet potato (centre) and sweet potato leaves (above).

Preparing delicious, local food. Caroline and Elsabet cooking Fe'i bananas Manivovo, Makira, Solomon Islands (Photo by Wendy Foley) (top left, page 26)