

How food gardens based on traditional practice can improve health in the Pacific

May 24 2017, by Robert Edis, Geoff Dean And Graham Lyons



Traditional taro pits can be used to grow nutritious vegetables for the entire household. Credit: Graham Lyons

Around 70 percent of deaths in Pacific Island countries are due to [diabetes, heart disease, high blood pressure and cancer](#).

We wanted to know whether it's possible to reduce the alarming rates of these non-communicable diseases in these countries, and Pacific atolls in particular, while improving nutrition security and income. So we started

a project with the aim of diversifying [food](#) crop production, including nutritious leafy vegetables, on outer island atolls of Kiribati and Tuvalu.

But our work in the region had started much earlier. In a 2013 [study in the south-west Pacific](#), we had identified the most [nutritious tropical leafy vegetables](#) that were native to the area.

We collected leaf samples from the same species growing at different locations on different soils, as well as different species growing in the same location. The leaves were analysed for mineral nutrients and carotenoids, such as beta-carotene (pro-vitamin A).

This kind of research is known as a GxE study; it separates the effects of environment (mostly soil type) and genetics (plant species) on the mineral and carotenoid levels.

Nature's delights

In our current study, we have found almost all of these nutritious leafy vegetables already growing in gardens and hedges on the atolls of Kiribati and Tuvalu. We only had to add another two.

Our most atoll-friendly leafy vegetables are *Chaya* (*Cnidoscolus aconitifolius*), [drumstick](#) (*Moringa oleifera*), [Ofenga](#) (*Pseuderanthemum whartonianum*), hedge panax (*Polyscias fruticosa*), [amaranth](#) (*Amaranthus spp*), [kangkong](#) (*Ipomoea aquatic*) and beach cowpea (*Vigna marina*).

There is little awareness of the nutritional value of these plants in Pacific Island countries – or other parts of the world generally for that matter. Drumstick, for instance, is high in protein, beta-carotene (pro-vitamin A), sulphur and selenium.

Hedge panax is high in zinc and can increase lactation. *Ofenga*, which is an anti-inflammatory, is high in magnesium. And beach cowpea is a legume, able to extract nitrogen from air and make it available for other plants. It is thus high in protein, as well as iron.

These plants are easy to grow and prepare. Simply chop up, steam or boil for 15 minutes, then add coconut cream and cook for a further 15 minutes. They also happen to taste great.

Due to misinformation spread by a local doctor, many people in Kiribati thought that *chaya* caused hepatitis. But the opposite is true; when steamed or boiled for a few minutes [the plant protects the liver from damage by toxins](#). It is also [high in quality protein](#).

Increasing awareness of the dietary value of these leafy vegetables is thus a key aim of our project. Activities with schools, churches and community groups is proceeding, along with supply of seeds and other planting material.



Chaya is high in protein, has anti-diabetes effects and grows well on atolls.
Credit: Graham Lyons

Tackling diabetes with food gardens

To return to our initial aim of reducing [non-communicable diseases](#), [chaya](#), [drumstick](#), [ofenga](#) and [amaranth](#) can also reduce diabetes risk. Diabetes could, in fact, be beaten with an improved, sustainable food system that provides more of these nutritious foods.

And, of course, fewer refined flour products, sugar, polished rice and fatty animal foods. Growing foods locally to improve nutrition can also

reduce trade deficits incurred by importing foods in the Pacific.

[In Kiribati and Tuvalu, imported food](#) comprises about 65 percent of the food consumed. In Tuvalu, imported rice, frozen chicken, biscuits, bread, butter, corned beef and flour comprise 61 percent of food expenditure.

And how better to grow these crops than with traditional giant swamp taro pits? These have been historically dug by hand down to the water table. But many pits are now neglected even though they provide a strong connection to both culture and underground water.

Adapting to this pit system of traditional gardening, the project team proposed that *kangkong* be grown in the water alongside the swamp taro, while the other crops are grown on terraces forming the pit walls. Drumstick, *ofenga*, hedge panax and beach cowpea would be planted around the pit at ground level.

Other crops, such as bananas, pawpaw, sweet potato and annual vegetables can also be included. This "mini food system" can, once established, provide virtually complete nutrition for a family.

The space required for all of this can be as little as 100 m² or as large as 0.3 hectares. This much gardening area is usually available to families on the targeted atolls.

Creating productive atoll soils

The main problem is that atoll soils are formed almost entirely from coral (calcium carbonate with some magnesium). They are sandy with no clay, so water runs straight through them, and [droughts in this part of the world are frequent](#).

[The soil is often salty, highly alkaline and low in nutrients](#), such as potassium, iron and manganese, which are needed by plants. Atoll crops, then, need to tolerate drought, salt and alkalinity.

[Inorganic fertilisers and chemical pesticides are banned on some atolls](#) as they could pollute underground water. Traditionally, soil fertility for growing crops, such as swamp taro, has been improved by adding compost. Apart from providing the necessary nutrients, this buffers against drought, salinity and high soil pH.

But rather than just making compost with whatever material is available, we decided to take a more scientific and targeted approach. We're evaluating the nutrient content of leaves from atoll plant species and other materials, such as ash from cooking fires and fish by-products, to find the best mix.

Nutrient deficiencies can be determined from a soil test and to fix these, suitable leaves and other materials are added to the compost. To correct for low levels of iron in the soil, for example, supplements of ash, lagoon algae and plants that accumulate iron, such as beach cowpea and *chaya*, can be included in the compost mix.

Potassium is generally required by plants in large amounts. Fortunately, ash contains high levels of potassium, as do coconut shells and husks, which are commonly used in cooking fires. Another excellent source of potassium is the seaweed genus *Kappaphycus*.

Improving soil health and growing and eating nutritious crops on these isolated atolls will lead to improved diet, nutrition and health. Our approach can also increase rural employment and income and the resilience of atoll food systems to climate change and local households to price rises of imported foods. And all of this will help strengthen nutrition security on atolls.

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