PACIFIC SOIL LEARNING EXCHANGE

23rd – 25th September 2015 | Taveuni, Fiji

PIFON

'If not us, who, if not now, when?' - *John F Kennedy*

MTCP2

IFAD
Investing in rural people

Schweizerische Eidgenossenschaft
Confédération suisse
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Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

PAPP
Pacific Agriculture Policy Program

Pacific Community
Communauté du Pacifique

EUROPEAN UNION

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Foreword

It is not often that you get over 50 farmers from five Pacific island countries to gather in a farming establishment for over one week – to learn and exchange ideas about the importance of the soil and how they can improve farming techniques.

This great gathering of some of the Pacific's most committed farmers and farmer organisations took place from 23rd to 25th September, 2015 at the renowned Tutu Rural Training Centre, on Fiji's beautiful garden island – Taveuni.

The Pacific Soil Learning Exchange was supported by the European Union and Pacific Community through the Pacific Agriculture Policy Project and the IFAD funded medium term cooperation programme for farmer organisations in Asia and the Pacific phase 2.

The learning exchange achieved significant progress towards a common understanding in the Pacific about the various methods and techniques for maintaining healthy soil in the region – a key element for the Pacific if it is to grow its crucial agricultural industry.

There were a number of key soil issues addressed in the presentations – how certain farming practices in the past have damaged the soil, sharing of sustainable soil technologies & the need for farmer-led research, the introduction of new biological initiatives such as Mucuna Beans, and new technologies and methods that could transform Pacific agriculture to ensure it is both sustainable and commercially productive.

The meeting also set the platform for a concerted effort towards educating Pacific farmers, and the wider Pacific public about nurturing healthy soil, with emphasis placed on taking this campaign to a wider audience.

The Tutu Rural Training Centre and the island of Taveuni provided a perfect backdrop to the discussion on soil health and nourishment. Once touted the region's centre of taro and kava exports, to the world, and renowned for its rich soil and fertility, Taveuni saw production decline and crop sizes reduce after years of unfettered farming.

The formation of the farmers organisation – Teitei Taveuni in 2009 enabled Taveuni farmers to take stock of where they were, relook at their methods, and undertake groundbreaking collaboration and research to find a more sustainable and soil-friendly way forward.

By involving farmer organisations from other Pacific countries – the SPC and the Pacific Island Farmers Organisation Network (PIFON) enabled farmers groups to share information, and disseminate information from the soil exchange to a wider group and membership.

Many of the farming participants saw the importance of farmer organisations in playing a greater connecting role to forge a way forward on agricultural developments.

The workshop combined in-house presentations and research findings with in-the-field practical explanation. It was both technical and inspirational.

A key highlight of the Pacific soil learning exchange was the visit to Taveuni farms where farmers saw how some of the new methods were being implemented and made connections and exchanged ideas.

A lot of the ideas have now taken root and are set to flourish across the region through the efforts of farmer organisations:

Farmers and farmer organisations are beginning to recognize that they have to take ownership of agricultural developments and foster greater understanding of the value of good farming practices – particularly on soil management. The Pacific Soil Learning Exchange in Tutu, Taveuni has now set the foundation for a way forward.

For more information please visit: www.pacificfarmers.com

"Upon this handful of soil our survival depends. Husband it and it will grow our food, our fuel, and our shelter and will surround us with beauty. Abuse it and the soil will die taking man with it."

Ancient Hindu Holy Text: Vedas (2000 – 1500 B.C)

Cherishing the soil in the year of the soil

PIFON manager
Kyle Stice

Why did you undertake to have a Pacific Soil Learning Exchange?

2015 is the International Year of Soils and here in the Pacific we have a number of activities going on in promoting sustainable soil management through PIFON. Our idea is to bring other farm organisations and share experiences between these organisations. PIFON organized this workshop to promote the sharing of information on sustainable soil management amongst our farmer organisations in the region.

Why Taveuni?

We're lucky that we have two members of PIFON here in Taveuni. The first Is Teitei Taveuni and the second is Tutu Rural Training Centre. Fundamental to PIFON is its members, the members are really the ones who drive the activities and priorities when it came down to promoting sustainable soil management. Taveuni was the obvious selection because of the work they've been doing over last five or six years trying to address some of the issues that they have here on the island.

Describe some of the activities and experiences over the past three days?

Some of the case studies and presentations that we've had over the three days have highlighted the really good work that's happening at the community level, at the farming organisation level trying to address these challenges of maintaining soil fertility, of continuing to earn an income, of continuing to be able to grow food on small areas of land.

I believe we've had a very good range of examples. We've had stories from Solomon Islands related more to backyard gardening, good use of composting, and growing food for their own home. We've had examples from Samoa commercial agriculture operators producing their own agriculture inputs to battle the high cost of imported fertilisers, and then we had the most prominent example of the commercial power industry here Taveuni. What we've been hearing are the farmers' response to these issues. So you get a lot of responses from a lot of different people but I think what's been different about this particular forum was the farmers sharing – about how they are responding to these issues. I think farmers talking to famers was really valuable over the course of the workshop.

What were some of the lessons learnt – and what would farmers take back with them? I think the most clear message is that environmental sustainability and commercial sustainability are closely linked. We need to look after the soil not just because we are called to be stewards of it, not because it's our obligation to look after the environment, but we have to look after the soil so we can continue to earn an income from the soil. Environmental sustainability and economic sustainability are closely linked. That's an important message going forward - what motivates somebody to conserve the soil to continue to build up and nurture the soil. These are two very important motivating factors that are inter-linked. I think one of the other clear messages that came out is that as we are developing solutions to these problems, the only way to do that is to engage the farmers themselves.

We've heard very good examples of participatory research where the farmers are doing the research themselves, where they're taking their ideas, they're combining it with some good science that's come from outside and they're tailor suiting these technologies to their own needs and that produces very good local sustainable solutions to these problems. Moving forward we believe this is the way forward in trying to solve any of these issues - moving away from central research where you're just looking at one university or one research station. We should be trying to provide a solution for the whole country through this decentralized research where farmers themselves are the key drivers of these innovations.

Strong partnerships for soil initiatives

SPC Sustainable Land Management Adviser
Maria Elder

Why is SPC supporting or involved in projects like these?

2015 is International Year of Soils and it is an auspicious year for us to advocate healthy soils. This is also another good year to raise awareness on the importance of healthy soils and to advocate for sustainable soil management. SPC is supporting these projects and networks as a platform to communicate the importance of soils for the Pacific people.

In a nutshell could you explain the partners involved in this project. Why have they come together to support this?

SPC has been involved in implementing soil related activities targeting soil health improvement, crop production and rehabilitation of degraded lands funded by ACIAR, EU, USAID, FAO and working in collaboration with our government, nongovernment counterparts and communities. Strengthening this network and partnership is very essential to ensure higher recognition of the central role of soil resources as a basis for food security and their provision of key ecosystem services

How important is a healthy soil to a sustainable agricultural industry in the Pacific?

Soils are essential for growing our food, and constitute the foundation of vegetation and agriculture. Forests need it to grow. We need it for food, feed, fibre, fuel and much more. We must manage soils sustainably. There are many ways to do this. Crop diversification which is used by most is one giving time for important nutrients to regenerate. Healthy soils are needed to achieve our food security and nutrition goals, to fight climate change and to ensure overall sustainable development.

What's the key message to farmers?

Healthy soils make healthy farms. You must manage soils sustainably and to do this you need to understand your soils type, soil biology and chemistry, soil structure, manage soil organic matter, soil health and soil erosion.

So what would be measurement of success for you for this project say next year what would you like to see happen?

Farmers can continue farming on their existing landholding without the need to encroach into new forest areas.








Profitable and Sustainable Cropping Systems:

Pacific Farmers meeting the challenges and opportunities of climate change

Presentation by Andrew McGregor (Agricultural Economist and PIFON board member)

In his presentation McGregor presented key findings from the book "Climate Change and Pacific Islands Agriculture" which is about to be released.
While there have been a lot of glum predictions on climate change, the book notes that climate change also provides opportunities. It explores how Pacific farmers can meet challenges and take advantage of opportunities.

The book observed and projected changes in the climate of the Pacific Islands and the vulnerability of Pacific Island agriculture and forestry to climate change, in particular:

- Traditional Food Staples
- Export commodities
- Horticultural crops and spices
- Livestock

Among the projections by the book:

- increase in temperature by 1°C by 2030; possible 2°C by 2050 and 4°C by 2090.
- Increase in rainfall – though not uniform
- Increase in frequency and intensity of extreme events (temperature & rainfall)
- Cyclones: increase in intensity, but probably not frequency; Impact of ENSO cycle

The key overall messages from the book are that that the severity of impacts from climate change will increase over time and that the biggest impact will be caused by extreme weather events.

It points out that climate change will impact on global staples such as grains –therefore the Pacific's reliance on imported food threatens food security.

For instance rice production around the world will become an issue, and this will see an increase in the Pacific's import bill as rice will become more expensive.

Grains – which dominate Pacific food imports, will also become expensive and scarce.

However Pacific Island staple food crops are likely to be more resilient – and strengthening the production and processing of these staples will be a key element of adaptation efforts.

McGregor urged Pacific farmers to look at the comparative advantage which will shift in their favour, and how Pacific farmers can unlock this comparative advantage.

It was clear that profitable and sustainable cropping systems had to be developed. He said that in the past it was difficult to tell farmers not to use paraquat and other pesticides as they could not control the weeds but now they use biological alternatives such as mucuna beans and other soil friendly fertilisers.

He urged farmers not to have short term gain for long term loss – by causing damage to soils.

McGregor pointed to the damaging experiences of unfettered ginger farming in Waibau and taro farming in Taveuni. The key message from that he says is the need to adopt more sustainable agricultural practices to stay in business.

The Agricultural Economist and PIFON Board Member said the learning exchange was what PIFON was all about.

"Exchanging information and experiences. This is the way forward. Farmer to farmer exchanges. It is costly, but critical to the way forward."

TUTU FARM VISIT

Declining soil fertility on Taveuni and the emergence of Teitei Taveuni

A group of farmers respond to the increasing farming problems on Taveuni

Presentation by Peter Kjaer (Commercial farmer and TTT board member)

In 2009, the Fiji Ministry of Agriculture together with SPC called Taveuni farmers together for a meeting at the Mua Research Centre. The reason for the meeting was to present the critical finding that dalo production had peaked in Taveuni in 2007 and had started to decline.

The key message was that the way farmers were practicing dalo production in Taveuni was in fact mining the soil - and that if nothing was done to address it, it would collapse within a number of years.

The island's water catchment areas and reefs were threatened and they needed to rethink the way they were producing to become more sustainable.

"That was in 2009, at that time a lot of us had our own problems at our own farms and one of the big eye openers during the meeting was when we went on a field trip on our own island where we saw from a high point all these areas which were abandoned," said Peter.

"That was ultimately what caused us to start Teitei Taveuni."

"The main problem in Taveuni, if you look at it from a mining aspect is that the potassium doesn't come back, the calcium doesn't come back, silica and all. It gets lost. The remaining ones – nitrogen if you got good biological soil, you can get a lot of it from the air. We have mostly phosphorous soil on Taveuni but it's completely locked off. So if we can develop systems where we can access it then that's not a problem."

"But the loss of the other ones - mainly potassium is a big problem."

According to Peter, the major crops in Taveuni have been coconut and dalo and in pursuing the crop, the farmers were unwittingly mining the soil.

"If you look at coconuts, if you look from 1875 up to today, we have shipped about 600,000 tons of copra that is about 21,600 tons of potassium oxide. For dalo from the 1900s to date, we have shipped about 150,000 tons. Its 1,100 tons of potassium oxide plus three 3 other tons of calcium. We don't have the calcium figure for coconuts."

"We decided to establish Teitei Taveuni to do something about our soils. We were going to work for sustainable farming, soil rejuvenation, food security and sustainable livelihood, conservation and environmental awareness. This was our vision and statement for our organisation," said Peter.

"We started the organisation and sat on our first meeting but we had absolutely no idea how to tackle a problem of this proportion. One of the first things we did was hold soil schools. It was the first soil school for Teitei Taveuni and during the two years as we kept developing the program, it gave us a platform and specific solutions. It's an ongoing process though."

"All the participants for the soil school were farmers from all over Taveuni. When we were halfway through we realized some problems. We had a problem with long term follow up with the farmers."

"In other words, they were training and passing information on to farmers but were not monitoring how farmers were making use of this knowledge and the issues and challenges they faced in doing so."

"So the next thing we did was we decided to start 40 farm groups with 5 farmers in each group and then we went to AusAid to fund an Australian volunteer to come and monitor the farm groups for the following two years. AusAid approved it and they gave us money and a car making it possible for us," said Peter.

"The issue that we learnt at the soil school was the calcium content and the phosphorous so we went to the Ministry of Agriculture and got them to set up a lime taskforce to look into the need for lime in Fiji's agriculture."

"When SPC brought Mucuna seeds to Taveuni, we started to propagate and use it."

The Taveuni farmers have been trying different biological inputs and combinations to see what is best for their soil.

"We've done woodchips, worm juice, seaweed in our compost and whatever and its all helping the sustainable approach," says Peter.

"We became by default, a famer component for the soil health project. It has been an advantage for Teitei Taveuni and for the soil health project because we could give farmers a response to what is going on all the time."

On the soil health project, the farmers are working with different government, regional and international organisations and they praise the initiative as very participatory.

So where do they stand today?

The soil health project is coming up with the best approach to make taro production better and save the dalo industry in Taveuni.

The project has also proven that soil health must be part of any attempt to make the dalo industry sustainable.

"You can't do it with the traditional NPK. The project has shown that the continuation of NPK results in decrease in biological diversity and a system that is favoring parasites while yields are going down."

What did they learn or not learn?

"We need to find solutions on how we're going to rebuild soil fertility to previous levels because the soil health project did not teach us that. It taught us how to arrest it, it was production oriented and like any good research project, it raised a lot of new questions."

"A crucial part of rebuilding the soil fertility is to restore the carbon levels of the soil."

"We need to do more farm produced input...farmers need to recycle more, put up worm farms."

"We need more capacity building and more farm implementation of soil health projects. Even today when we have all the resources from soil health projects but these have to now be rolled out with more farmers."

How will Teitei Taveuni further contribute?

"We have to further improve the training of our champion farmers who are leaders of our farm groups in the different villages," says Peter.

"We have to expand the capacity building of the farmers in the island."

"We have to get more farmers to adopt and implement the lessons learnt from the soil health project."

"We need more research and development in rebuilding carbon levels in Taveuni soils. There needs to be more use of cover crops, eco-agriculture, agro forestry, more systems, and more research on how it actually happens. Work has been done with farmers in Australia and the United States where they used multi cropping system and they are actually building carbon levels in soil. They can measure it; it can be

done."

"That means you're building new top soil. Ten years ago the general opinion was if you have worn the soil down then you have to wait another 1000 years before the minerals break down and let the process take place. But it can be done if you work with the different natural and biological systems which is already in the soil."

"Then we have to do more on the produce input."

How do we do that?

"We need more money, ideally that's when you talk to the different agencies – we'd like to see the system where the farmer through his improved production capacity and more output will pay for the extension research. If they can do it in Europe, why can't we do it here?" Peter challenged.

"We need funding for a manager for example to take care of some of these trainings and the development of our resource centre. We need a local graduate to do further extension work with the farm groups. We've been doing that for three years with our first volunteer."

"Our second volunteer came and did it for six months before she returned home. It's better if we have the funding to have someone who lives in Taveuni, locally trained and comes out of the local agriculture college and be employed to do the job. It would a great advantage."

"On research and development, on rebuilding carbon levels, cover crops, agro forestry and eco forestry, we prefer the participatory approach which has been done through the soil health project."

Teitei Taveuni Office Visit

Lessons in starting and sustaining a farmers group Resource Centre for soil friendly inputs

Alan Peterson – Teitei Taveuni
"To be a farmer, we had to be clever"

Alan Peterson is a qualified engineer turned farmer. He played an instrumental role in the formation of Teitei Taveuni and engaging new biological techniques in soil management.

He told participants how they went around achieving two goals: how to get farmers more informed about their soil through soil schools and resource centres, and how they could access the inputs that enable them to biologically nurture and nourish the soil.

"A key issue we faced then was how we could get soil sustainable elements to our farmers. We had set up a soil school in Taveuni back in 2010. At the end of these soil schools, we came up with our mission for Taveuni to be a model for sustainable agriculture everywhere; and the other one was for our families to have food security and financial stability. This was our vision."

"We identified two critical areas after our soil schools. The inputs have to be readily available to the farmers. We found out after soil tests, that we needed these soil inputs. These were critical to keeping our soils alive, but we didn't have them."

Our farmers have to understand and appreciate biological farming or the make up of the soil that they're using. It is a continuous process. Most of us weren't soil scientists or had been through agriculture schools, we came from diverse backgrounds. I am an engineer.

Farming is an education and gone are the days when you look down on farmers and say any old fool who can't reach anywhere becomes a farmer. We learnt that to be a farmer, you've got to be clever and it's a business. So we had this problem of how do we get the inputs, and how do we make them available? It costs money, how would we market it, how would we distribute it? And then at the end - how do we monitor whether our inputs were doing well?

A big challenge was the cost. Here we were a new organisation, a bunch of farmers who had no idea. We had our first grant to run our first soil school from UNDP. Then we were sitting there scratching our heads – where do we go next?

So Peter and I bit the bullet, and we went on a trip to Suva, knocked on Embassy doors and went around just asking questions on where we could get some funding. We wanted two things – teach our farmers more on the soil, and get some inputs. Eventually we came upon an NGO and they advised us about a program under Aus Aid called FCDP – Fiji Community Development Program.

So we went there and filled all the application forms, we went through a process for about a year before it was finally approved. We had enough funding to start a resource center for three years (it was a two year project) and we had funding for the inputs. At first we had to have a building to be based in, and that was a bit of a problem. The Ministry of Agriculture came in and helped us obtain an empty space, we spent a bit of time cleaning it up, renovating it and last year, 2014, we opened up our resource center.

The resource center serves two purposes: one to serve as an output where we can sell fertilisers to our farmers and the second – it's a place where farmers can come in and read or use the computer and do some research on the internet. We have a small library there to build the capacity of our farmers.

'Teitei Taveuni' is still developing, we're a very new organisation. We had no money for marketing. Donor agencies don't give you money for marketing so we used our farm groups and trials. Unfortunately last year, as soon as

our new inputs came in, we had a drought so all our trials, we couldn't show for anything. The Agriculture Department did a trial and it was really good, so this is our actual focus: for farmers to do trials and use it because farmers see things and they follow. We talked a lot about using the radio, farmers use radio a lot more so that's the path we're looking at.

For distributors - In Taveuni, 70% of the dalo farmers are small farmers, we don't have very big farms. So we re-package fertilisers into 1kg or 2kg packs which farmers can afford and can take back with them in the bus. The other thing is when we started it, it was not only to make the inputs available to farmers but make it available to them at a very low cost. So we worked on a 10% markup. Our initial idea is this input business would finance the running of Teitei Taveuni to make us sustainable.

Monitoring – Since it's still a new thing, we monitor by looking at our sales records. We see which fertilisers are doing well and we base our re-ordering of our stock on that.

Some issues we've faced:

Tax - We are an NGO, a voluntary organisation. We couldn't register for VAT, but everything we bought we had to pay 15% VAT, so we had to pass this on to farmers and the bigger farmers who registered for VAT couldn't claim that back. So with help from PIFON, we made a submission to Government to take off that VAT on inputs for dalo producers. They have that for the sugarcane industry so hopefully they can do the same for our dalo producers. If that goes through, the price for our inputs will be decreased further.

Weather – we opened up in 2014, then we had this drought, so our sales went down because nobody was farming.

Government – We came in with these ideas of bringing in good fertilisers, soil friendly fertilisers, but government had different ideas. The government was subsidizing fertilisers that were not good for us, the business farmers went for the free fertilisers, so that affected our sales a bit.

Our operational costs – as a business we had to try keep it down. We looked at ways to save money. We were fortunate that Government has allowed us to use the resource center rent free for three years. We haven't got that on paper, but verbally they've agreed to that.

Our resource center is based in Waiyevo. We're pretty proud of what we've done. We're slowly changing the mindset of the farmers. Farmers are used to using harmful fertilisers and so on, it's a slow process to get them to change their farming methods and to work with nature rather than against it. Farmers in Taveuni have taken the lead in this direction and I hope that after this soil symposium, that we go back with new ideas, the ideas of working with nature. We've got to address this problem of our degrading soils. If we don't do something now –who will?

VUNIVASA FARM VISIT

Improving our soils "The Mucuna Way"

An overview of Dalo Production in Fiji and Taveuni

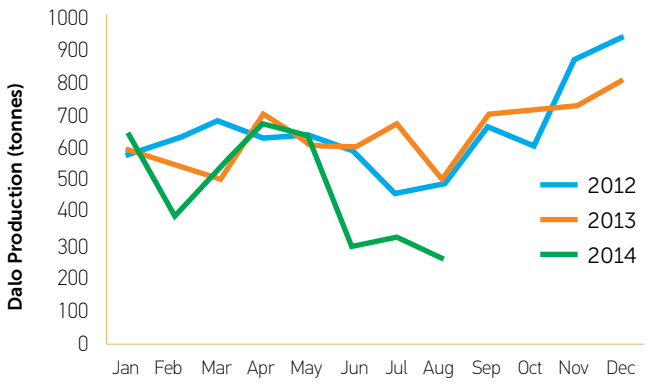
Presented by Rohit Lal, Fiji Ministry of Agriculture
Undertaking Phd Studies at Massey

Taro Industry

Despite taro (Colocasia esculenta also known as 'dalo' in Fijian and 'talo' in Samoan) being the staple diet for the Fijians for centuries, its cultivation as a highly significant export crop began only in 1993 when the taro leaf blight caused by the fungus Phytophthora colocasiae devastated the taro industry in the neighbouring country of Samoa. Fiji took advantage of the situation in Samoa and was soon supplying the same variety of taro internationally.

Fiji, Tonga, Solomon Islands, Kiribati and Samoa collectively produced 125,000 tons of taro in 2007 of which only 10,000 12,000 tons valued at USD14 million were exported (FAO, 2012a). Fiji currently accounts for 95% of these exports and 70% are grown in the island of Taveuni. Despite Fiji's ranking as the 14th biggest producer of taro in the world, it is the second biggest exporter of fresh taro globally (McGregor, 2011). The main taro export destinations are Australia and New Zealand while small quantities are sent to the USA and Japan.

Taveuni Dalo Production Trend



In terms of exports, we reached a maximum of close to 12000 tons in 2007. However, from 2008 our production started to decline. Last year we exported 7,649 tons and it is anticipated this year will be even less. The challenge lies with us on whether to maintain our exports or keep losing our market share to our neighbouring country.

Taveuni experience

With the increase in demand for exports, the number of growers increased over the years. In 1994 there were 900 growers but as we moved along the numbers have grown to 3600. The traditional shifting cultivation practices changed to more intensive mono-cropping systems favouring a single variety of taro for the specialised market. The traditional slash and burn system gave way to systemic herbicide-based land clearing. In order to meet food demands and income for the growing population, fertiliser use was inevitable with limited agricultural land area.

In 1994, the arable land in Taveuni was 23,000 ha and it still remains the same but the number of growers has increased forcing them to grow in the same piece of land year after year. With the same piece of land being continuously cultivated, nutrient loss through crop harvest and topsoil erosion has led to significant yield losses. The export industry requires taro corms to be between 1-3 kg but currently about 40% of the produce is below minimum standard. The study undertaken by Dr. Richard Markham of ACIAR has confirmed that there is declining trend in soil fertility on the island of Taveuni (Ministry of Agriculture, 2009).

Before 2007, we had six truckloads of taro leaving Taveuni in every boat trip. So, two boats in a week and 12 truckloads per week. But now it's only half loads of one to two trucks per week. Before the taro sizes were big but now we have smaller sizes.

Over the years inorganic fertiliser use surged, thus doubling the cost of production, narrowing farmer's profit margin and further depleting soil organic matter. According to Teitei Taveuni (2010), a prominent farmer group, the land has been farmed for more than 30 years in Taveuni, and the expensive chemical fertilisers are not improving yields. Furthermore, the costs of inorganic fertilisers have increased significantly over the years forcing farmers to use cheaper alternatives - which are doing more harm than good - or applying insufficient quantities. Our farmers travel to sugar cane growing areas, buy cheaper fertilisers which are meant for sugar production and are not good for taro production.

Chemical fertilisers have not replaced the function of organic matter and other management practices, rather excessive use of these fertilisers created environmental pollution, including soil and water acidification, contamination of ground and surface water resources, increased emission of greenhouse gases and soil degradation. As we harvested more taro from our farms, we also mined more nutrients (nitrogen,phosphorous and potassium) from our soil. Taro removes 31 kg/ha phosphorous at harvest and at annual production of 10,000 tons/ha we have removed 31,000 kg phosphorous annually. So imagine from 1993 till today - 22 years - what we have been doing is mining and mining our soils".

Farmers were forced to produce for the market for the market so the easiest way was to buy $10 worth of weedicide, spray, plant your 1000 plants and 7 months down the line you collect your money. The half-life for Paraquat in soil ranges from 6 to 13 years. So imagine if I sprayed my chemical today, there would be residues on my soil for 6- 13 years.

"We Did Not Inherit this land from Our Ancestors; We Borrowed It from Our Children" - the challenge lies with us to return the land in the state we borrowed it or in the degraded state due to our unsustainable farming

"Furthermore, when we reached the scenario where we could not grow taro in your backyard, we moved inland, chopped more forest and planted our crops in a new area. The first crop was very good, with the second crop sizes got smaller, and by the third we had rejects. We continued with deforestation cycle in search of higher yields."

According to Rohit, farmers started to illegally encroach in forest reserves and began chopping trees to plant their crop. Taveuni has two forest reserves and one of them is more than 100 years old but greed for more forced farmers to start destroying these reserves.

"Initially there was no burning but in early 2000, in search of more income in a short period of time, farmers went from 1,000 to 2,000 to 50,000 plants per farmer. So the easiest and fastest thing they did was to burn the forest for farming."

"We Did Not Inherit this land from Our Ancestors; We Borrowed It from Our Children" - the challenge lies with us to return the land in the state we borrowed it or in the degraded state due to our unsustainable farming..

Burning affects nutrient cycling and affects soils chemical, physical and biological properties. Organic matter of the soil is rapidly combusted and affetcs several chemical, physical and microbial properties of the soil. Removing vegetation cover by burning increases the risk of rain and wind erosion, removing our top soil."

"Meeting market demand was the focus at that time and nobody thought about the sustainability of the system". However, now they have realised the problem and they need to change their farming practices to sustain the current yield.

The future

Initially farmers were using low input system-shifting cultivation practices. Plant on a piece of area, harvest and then move to a new area because there was an abundance of land and numbers of farmers were low.

The next option was nutrient replenishment; however, high fertiliser prices, incorrect fertilisers and insufficient quantities did not do any good.

The third option was the use of mulch based farming system. Our brothers in Samoa use Leucaena leucocephala, Sesbania grandiflora, Gliricidia sepium and Erythina spp as living mulch. Leaves and petioles from these trees are chopped and used as organic mulches. However, huge quantities of mulch required and labour involved in this system has drawbacks.

The fourth option was to use fallow crops like mucuna. Fallow cropping is practiced mainly to manage soil fertility, soil quality, water, weeds, pests, diseases, biodiversity and wildlife in agro-ecosystems. Growing fallow crop increases carbon inputs and soil organic matter compared with bare fallow. Improved fallow management technologies can help accelerate soil restoration and intensify crop production. Planted fallow like mucuna if properly managed will add substantial amounts of fixed nitrogen and organic matter to the soil, recycle nutrients from the subsoil, provide effective ground cover against erosion, suppress weeds and pests, and improve soil physical condition.

Characteristics of mucuna

Mucuna is one of the best fallow crops based on the following characteristics:

- Very vigorous growth

- Non-palatability to cattle
- Shade tolerance
- High biomass production
- Low labour and chemical requirements for its establishment
- Easy establishment and low seed rate
- High drought tolerance
- Presence of allelopathic chemicals to enhance competitive ability against weed growth
- Tolerance to pest and diseases
- Good control against soil erosion
- Deep rooting system- helps in mining lost nutrient from the subsoil layer.

'Planting mucuna fallow crop improves your soil, increase your yield and profitability."

When we are buying fertilisers like NPK we are only buying nutrients- nitrogen, phosphorous and potassium but for healthy soil there has to be an addition of organic matter.

Soil organic matter retains nutrients and provides buffering and water holding capacities. Mineralisation of decomposing fallow crop provides nutrients such as N, P and K in weathered soils.

"Sugar cane farmer have access to mill mud to add organic matter in their soils, farmers in mainland have access to poultry manure but what options do farmers of Taveuni have?"

Benefits of Mucuna fallow

Fallow Type	Nutrient uptake and recycled (kg/ha)		
	N	P	K
Traditional weed fallow	44	9	99
Mucuna Fallow	145	23	162

Mucuna Fallow

Traditional Fallow

"Mucuna produces large quantities of biomass in a short period of time, adds organic matter, nitrogen, phosphorous and calcium to our soils". Mucuna was first reported in Bali, Java, and Sumatra in the 17th century to recuperate worn out fields and it is used throughout the world today. In areas where mucuna is planted there is an abundance of soil biological activity. In Taveuni, areas that had mucuna had high numbers of earthworm.

In places where mucuna is planted, the weed numbers that come after the crop is low, so when you're planting taro after mucuna you can save on expensive harmful chemicals used for controlling weeds.

From the soil health project in Taveuni, we came to realise the use of mucuna fallow, fish meal, rock phosphate and liming of acid soils as the way forward for higher yields and long-term sustainability.

'Planting mucuna fallow crop improves your soil, increase your yield and profitability."

Zai Na Tina – A model for organic farming in the Pacific

Pacific Farmers meeting the challenges and opportunities of climate change

Shane Tutua

The late Mr Joini Tutua was known as the father of organic farming in the Solomon Islands. He was a pioneer in promoting organic farming and locally grown food in the country.

The farm called Zai Na Tina (meaning Grandmother) is now managed by his children including soil scientist Dr Shane Tutua.

"The farm was started by my father. When he passed away, I took over the management of the farm. It's a small farm – 3.2 hectares. The idea for the farm is to be a demonstration farm for organics in the Solomon Islands. So we have people coming into the farm to do their training, students from the rural training centre also come in every year to do their internship as part of their course program," says Tutua.

"My dad dedicated the farm to his mother because they fed him with organic food. It's also dedicated to the women of the Solomon Islands because in the Solomon Islands it's the women that mostly do the gardening."

"We have this farm for research and also trainings. We also have an organic stall on the side that we sell our organic produce from. It's a mixed cropping system with mostly seasonal vegetables to demonstrate organic practices."

So how do they maintain soil fertility?

"Since it's an organic farm, our approach is mostly an organic matter approach. Basically we bank on soil organic matter as a source of nutrients and also improve soil properties such as soil structures, infiltration and improving soil biology, as well as maintaining soil organic matter," says Tutua.

"Some of the activities we carry out on the farm include applying compost, adding manure, chicken manure which we add to the compost before we apply it to the farm. A big part of our activity is producing compost and training young people on how to make compost."

"We also use cover cropping, pig manuring practices. We also use the mucuna plant, and dwarf beans for fallow cropping."

"Another practice is rotating farm residues on the field. For instance cassava residues – we put them back to the plots. We try to grow trees on the farm or on the edge...weuse a lot of mulching as well."

One of the challenges they face according to Tutua is getting enough biomass for composting and mulching.

"We try to do minimum cultivation on the farm to maintain our soil organic matter," he says.

"We do a lot of crop rotation. We never plant the same crop on the same bed. We rotate them with legumes, corn and other vegetables. That's how we make use of the nutrients in the farm," he shared with fellow farmers.

"We do inter cropping...with peas, legumes, pumpkins and other crops and make them grow together. We also integrate animals on our farm, we keep chickens which supply us with manure compost."

"These were some of the things we've been doing for the last 20 years and it seems to be doing okay from what we can see," he said.

Tutua also shared some of the soil studies and tests he has been undertaking.

"I did a study - comparing conservation farming and traditional farming showing conditions that make soil particles stable and those that lead to collapse."

"I wanted to show how that happens when you do not have enough soil organic matter on your soil, the organic particles start to disperse," he said.

"So it's important to have organic matter on your soil, it stabilizes your soil particles."

Testimonials

Meresiana Vulavou

Farmer

I've learnt so many things - especially about being a sustainable farmer. We also learnt new techniques on how to make soil fertile. That we can use one piece of land over and over again if we treat it properly.

John Cox

Fiji Ministry of Agriculture

We need to be the eyes and the ears of the public, we need to go out and tell people this needs to be done. It needs to start right at primary school level and not for us to tackle it at this age. If it starts from our children, for us as parents we need to tell our children this needs to be done to soil in order for the soil to sustain the livelihood of the nation.

People have been turning farmland to deserts just because of negligence of how to sustain the soil and there is a need for the transformation of agriculture to take place in order for us to maintain the social, the economic and the environmental pillars of development.

The way forward is for people to understand what soil is and how to maintain its productivity.

Peter Kjaer

Teitei Taveuni

The way forward now is to get all the farmers in Taveuni to adopt long term farming practices where they replace some of the soil, make sure the whole biological system in the farm is working better so whatever is in the soil becomes available and then keep track of it so that we don't mine the soil but make a holistic approach where you work with the soil biology, you work with the minerals, you make sure your soils are covered and what not.

Lupe Lomani

Kadavu Youth

I represent young farmers from Kadavu. We are a youth club – Koroilolo Youth - The Millionaires Club. We are pursuing youth in in agriculture and rural development.

I hope that more people in the rural areas can attend these forums. As youths we are action oriented, we hope that our projects are future focused and value based and I'm very fortunate to be here so I hope that there are other people out there that can be as fortunate also. Maybe going down to grass roots level and getting these people there that are capable of looking after the community and the younger people.

Tutu Rural Training Centre

Teaching sustainable soil management through non-formal adult education

Fr. Petero Matairatu

"Tutu Rural Centre is a non-formal education centre training young single men, married farming couples and young single women to be successful farmers. The program as a whole requires participants to be farmers before they can enter into the program. For the young farmers program each participants are required to plant at their home garden- 1,000 yaqona plants."

"The participants are using land when they are in the program in Tutu and at home. Land is something valuable to the participants. Here in Tutu we are using biological farming techniques where participants are taught to use the land in such a way that they are not mining it.

This is the same concept that we want them to replicate at home."

"Farming organisation meetings like this is a way forward to transmit messages to individual farmers and a way for other farmers to learn from their peers' experiences. I believe sharing different ideas from farmers around the region can prove to be an important aspect for farmers themselves. I believe PIFON is doing a great job in bringing farmers together."

We're spreading the word to reduce the number of sprays on and at least spare the life span of the chemicals.

Using farmer soil schools to bridge the gap of understanding

Presentation by Mike Smith, Organic Matters Foundation

Mike Smith, who proudly describes himself as a 'Farmer' is the Director of Organic Matters Foundation and a soil school educator across the Pacific.

Organic Matters Foundation (OMF) provides South Pacific farmers with a viable, sustainable alternative to mainstream farming practices and chemical inputs in agriculture. This alternative delivers benefits directly to farming groups and their communities. The Foundation shares culturally appropriate learning experiences transferring sustainable and ecological farming methodology to those most in need.

"Wherever we go, we identify potential in country teachers known as path-breakers, we then teach them all we know so they may share the good news on sustainable and ecological agriculture with their community," he states.

Smith has run soil schools in Taveuni and around the region. He has been a farmer for 30 years and has urged fellow farmers in the Pacific to be proud about their occupation.

"Please don't say 'I'm just a farmer' because farmers are very important people as they grow food," Smith told participants.

"They are innovators, creators and problem solvers."

Smith said he has had an "amazing experience" in developing soil schools in Fiji, Samoa, Palau, PNG, Cook Islands and Tonga.

An excerpt of his work notes: "Soil School is teaching hundreds of people how to understand the soil and then how to improve it using cheaper, locally available and low chemical options."

"Education levels vary across the Pacific but some farmers have very little understanding of the chemistry of fertilisers and herbicides, how biological processes such as photosynthesis work or the agricultural practices they could use which can naturally improve their soil, such as crop rotation and growing nitrogen-fixing crops. Soil School lessons take place in small towns close to where the farmers live and in conjunction with local farmer collectives."

"The lessons taught at Soil School begin with the basics but continue up to an advanced level over a number of intensive days that include field work, soil testing, observations and classroom discussions."

"Students learn how to use simple tools such as a Brix meter and how to read soil test results to ensure they are well informed about what their soil actually needs (as opposed to what a chemical company may want to sell them)."

Teaching the basics and beyond of soil health to farmers in the Pacific is a life's passion for Mike Smith.

Soil schools made a huge difference for farmers groups like Teitei Taveuni, allowing them develop their own research and come up with further understanding of what works for their soil.

Smith is proud to have nurtured soil school path-breakers in Tonga, Samoa, and Taveuni - people he trained, who will go on to train others in their community.

"In a nutshell we are giving a basic introduction to your soil, and learning how to live with them," he said.

Over the past five years they have trained between 600 to 650 farmers in biological farming, and he sees the need for more path-breakers to further this training across the Pacific.

PNG

Getting young people to embrace the soil

Women in Agriculture Development

Peter and Jacinta of PNG

Peter Linibi and Jacinta Bera represented WIAD PNG and gained a lot from the interaction with fellow farmers from across the Pacific.

"I've learnt a lot. It's a bonus. I will be going back equipped with new ideas gained from this workshop. I'm grateful to PIFON for bringing us over here," said Peter.

Jacinta echoed the same comments.

"I count it as a bonus coming for this soil training here in Taveuni and not only sitting in on the theory part but going and seeing the practical aspects."

"I loved it," she said.

"I salute the people of Taveuni and Fiji as a whole. I'm grateful that PIFON has taken the lead in this training and I personally will see what PNG can do for the farmers in PNG. In PNG it's actually involving women in the agriculture sector, that has a big impact on the country."

"Farmer organisation groups play a strong role around the region. Partnership is very important in any aspect whether it be bilateral, political, agriculture, business or whatever it is – network is very important and the partnership PIFON has helped create goes an extra mile because it's not only partnering with PNG, it's with other subsidiaries/partners like SPC. PIFON has taken the lead in involving other partners and that is a big bonus," she said.

Peter is keen to create greater understanding about the importance of the soil.

"People have to have this understanding about the soil because food production and quality depends on the soil. For so many years we've been farming the same land and then we find all the nutrients are gone. Instead of farming, we're mining it. The soil gives food to the plants, the plants gives food to us but humanly we are not giving something back to the soil. So people have to understand that. We have to give something back to the soil," he said.

"I particularly liked the quote from Mr Cox which says – "You look after the soil, the soil will look after you, it is from the soil that we will return so while we're still alive, let's give back to it. It's important for our wellbeing," said Jacinta.

"That is our heart. We want to bring it down to the younger generation in order for it to go down a long way. The younger generation needs to know about this. If we don't teach them now, we will lose."

"The younger generation needs to embrace the soil, to see its value and its importance, they've got to own it, we've got to teach them now!"

Solomon Islands

Let's keep sharing

Shane Tutua, Farmer in the Solomon Islands

Roslyn – Kastom Garden Association, work as program support officer for women and nutritional health.

Clement – Manager at Kastom Garden Association

Shane: Some of the few things we heard here at the workshop I can definitely relate to back in the Solomon Islands regarding soil fertility. It has been a good experience. These kinds of exchanges help to expand the farmer's knowledge and learning from other farmers and farming support organisations.

Roslyn: I particularly liked the new practice discussed such as the mucuna plant which farmers can use to treat their soil fertility. I want to take these ideas back to our women farmers in my country so I can teach them what I've learnt from here.

Clement: It's good to be part of this PIFON networking to learn from other farming organisations especially learning from the experiences of Teitei Taveuni and Tutu Rural Centre. Within our organisation we have promoted similar practices, such as sustainable agriculture and our farmers have adopted these practices.

I think we need to encourage more of these workshops. We are into 2015 now, who knows there might be other farming organisations doing things, or other new practices happening in some parts of the region in a few years. Hopefully these trainings keep going.

Samoa

Forming regional partnerships for the way forward

Workshop participants from Samoa believe that building partnerships and sharing amongst farmers is a key step in strengthening agriculture across the Pacific.

"It's been a really great experience being able to meet farmers from different areas from within Fiji as well as farmers from PNG, Vanuatu, Tonga and the Solomon Islands," said Edwin Tamasese.

"Just seeing what they're doing and how they are addressing challenges – it has really been a good opportunity for sharing information. For instance, coming out here and actually seeing how the Mucuna works....because we haven't actually seen it work in Samoa so it really makes sense when people say you should be using the Mucuna, this is how you should be re-fertilizing your soil and re-mineralizing your soil."

"Seeing how they address the challenges and the dangers they faced – such as the six truck loads of taro being reduced to two half truck loads – it really hits home when you get those examples and you're meeting farmers who are actually experiencing that. So it makes it real," Edwin said.

"It was an opportunity for the participants to see what's going on in agriculture. There's a lot of regional things that are happening, we have formed regional partnerships so that we can get the best out of agriculture from the Pacific. There's been talk on the side about doing a regional breadfruit project and a regional coconut oil project. These are things that can add significant value to our farmers and our communities. Because the market is so big, we're not competing with each other so that's where we can actually work together to makes things go well."

"The way forward is to have more of these workshops to look at synergies to where we can actually work together and share the knowledge without the fear of being in competition. I think the more that you share the more you actually get ahead and if we learn to work that way, I think the whole region will benefit."

Tonga

Implementing the success stories

Sioape Koka & Viliami Soakai

It's important for success stories and experiences of farmer organisations and concepts such as the Tutu Rural Training Centre to share across the Pacific, says Tonga participant Minoru Nishi

"A key strategy is to take some of the successful ideas and set up similar plans in other countries, although we have different cultures – the principles are the same," he says.

Nishori praised the Tutu Rural Training Centre in Taveuni.

"Developing young farmers and communities to be self reliant and not rely on others for their livelihood is quite admirable and I think there are lessons from here that we should take back not only to Tonga but other Pacific Island countries."

"We see the example of Tutu they're doing it themselves, they're empowering young farmers and communities to go back to the land. We should look at the next steps forward in taking some of these methodologies and concepts back to our respective countries, but to do that we need support," he said.

"The importance of this whole exercise is that we're sharing with people who are actually working the land. It's important to understand how we treat our soil so that we don't destroy it, because that's life, it's where we get our food from. If we look after that, we're looking after our future children. More of these trainings should come out in the future and we need to reinforce the message to our people."

Compost is King!

Soil Health and the Samoan Experience

Presentation by Edwin Tamasese – Samoa

Composts are King and it is important for Pacific farmers to create fertilisers by using what is around them says Samoan farmer and Soil Health Pacific Ltd director Edwin Tamasese.

He urged farmers to learn how to make their own composts – worm composts, fish emulsions and compost teas.

"They significantly reduce costs while increasing yields," says Edwin.

"Compost is critical for maintaining crop quality and production especially id you are tiling and liming," he said.

"Green manures are essential for maintaining microbe diversity in the soil."

Soil Health Pacific Ltd specialise in sustainable food and fertilisers, including organic fertilisers (fish emulsion, seaweed emulsion, compost, soft rock phosphate etc) and conventional soil friendly fertilisers.

They also undertake farmer training programs with over 4000 farmers trained over the past five years.

They also set themselves apart in terms of doing farm planning, soil testing and analysis, as well as crop and technology research and development.

Their experience with biological farming and input development has ingrained in them the concept of 'getting the rules right'.

"It is not only nutrition," says Edwin.

"Different regions of the world perform very differently and the tropics is similar to the 'wild west', everything happens at high speed."

"Patience, persistence and data collection are critical."

"Different regions of the world perform very differently and the tropics is similar to the 'wild west', everything happens at high speed"

Edwin shared with participants that the 3 rules they farm by are:

- Varieties
- Environment
- Nutrition

"When you get these right, you cannot fail to produce," says Edwin.

He shared further fruits picked up from their work:

On Varieties:

"If you are growing a crop not designed for your area – no matter how much you feed your crop it will suffer from disease if it is not suited to your environment and you need to know how to minimise it as much as possible."

On Environment:

"The challenge of environment is all about how much effort you are willing to spend and how deep your pockets are. You can grow on the mood – it's about being able to afford it."

On Nutrition:

"Learning how to read your plants and read your field is critical. Brix testing is key to telling you what you need, but having what you need is always a different story."

Déjà vu - The feeling it's all happened before

Using Vetiver grass to improve soil

Presentation by Don Miller – Agriculturalist

Plants have been used for centuries to maintain and improve the soil, and the concept still applies today says renowned agriculturalist Don Miller.

He illustrated to participants on the virtues of Vetiver grass which can trap and contain soil sediments.

Miller pointed to four key points.

"It controls soil erosion, can improve soil infiltration, reduces off-site sediment problems, and can reduce plant disease problems," he said.

Other key characteristics:

- The roots are large
- Bred for oil production
- Infertile as energy used in root growth
- Deep rooted so drought tolerant
- Does not sucker or seed
- Not invasive

Miller showed how Vetiver has been effective all over the world – in place such as Ethiopia and Thailand, and in Pacific countries such as Fiji.

In the 1960s Vetiver grass was successfully used to control soil erosion for sugar that were grown on slopes.

"The CSR mill would not accept cane from slopes over 13 degrees unless Vetiver was planted," Miller said.

After the CSR left Fiji Vetiver planting was no longer a requirement, but many Vetiver hedges survived, and some terrace remnants still exist.

Sediment dropped above a Vetiver hedge

Chieng Rai, Thailand, 1996

The Vetiver Sediment trapping processes

- The vetiver hedge traps surface debris.
- This debris slows the runoff water.
- Soil drops out of the runoff.

This vetiver had been planted 5 weeks before a 220mm in 12 hours storm.

Montmartre , Vanuatu, 2010

Vetiver has been used for re-vegetation and sediment control of gullies and slopes. Vetiver leaf has also been successfully used as mulch.

Miller says the plant is very resilient.

"Vetiver may be able to be incorporated into Shifting Agriculture systems, it can tolerate long periods of shade in certain circumstances and can regrow rapidly after moderate fire."

The session included a practical illustration of how to propagate a Vetiver plant.

'Better soils for Better Profit' – dalo farming video wins media competition on healthy soil

Minoru Nishi and Shane Tutua sorting out the votes for the winning entry

A video submitted by former Fiji Ministry of Agriculture specialist, and now PhD student at Massey University in New Zealand, Rohit Lal won the PIFON media competition at the Pacific Soil Learning Exchange meeting in Taveuni.

Rohit's winning entry – which was both in English and in vernacular Fijian language was titled 'Dalo Production in Taveuni – Building Better Soils for Better Profit'.

PIFON organized the competition as part of commemorating 2015 as the International Year of the Soils. The theme for the competition was 'Healthy Soils for a Healthy Life'.

"2015 is the United Nations declared International Year of the Soils. To mark this important year the Pacific Island Farmers Network (PIFON) together with Fiji farmer organisations, Teitei Taveuni and Tutu Rural Training Centre are organizing a media competition highlighting the positive impact of sustainable soil management around the Pacific region," the application flyer stated.

The competition was open to farmer organisations, researchers, journalists and other interested participants.

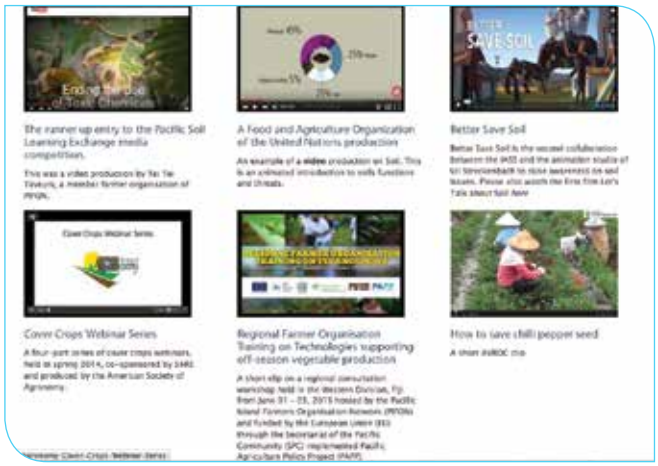
After a very democratic process combining both selection by a judging panel, and participants voting their preference – the winner was decided.

Both the judging panel and the participants voting scored the highest marks for Rohit's submission.

Other entries were received by Teitei Taveuni, on their efforts to educate and create awareness about healthy soils, as well as by the Ministry of Agriculture team at Waiyevo.

A video of the workshop has also been produced and you can view this video, together with the winning video and other entries on the website page:

http://www.pacificfarmers.com/videos/



WORKSHOP AND GROUP DISCUSSIONS

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For more information please visit

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